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THE

CYCLOPÆDIA;

OR,

Universal Dictionary

OF

ARTS, SCIENCES, AND LITERATURE.

VOL. XVII.

Printed by A. Strahan,
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THE

CYCLOPÆDIA;

OR,

UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY

ABRAHAM REES, D.D. F.R.S. F.L.S. *S. Amer. Soc.*

WITH THE ASSISTANCE OF

EMINENT PROFESSIONAL GENTLEMEN.

COLLEGE OF PHYSICIANS

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IN THIRTY-NINE VOLUMES.

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CYCLOPÆDIA:

OR, A NEW

UNIVERSAL DICTIONARY

OF

ARTS and SCIENCES.

GRETRY, Andre, in *Biography*, a fertile and pleaſing compoſer of comic operas, in the French language, was born at Leige in 1741. At ſix or ſeven years old he became a choriſter in that cathedral; but was extremely ill-treated by a brutal ſinging maſter; by whom he was ſent home, in a bad ſtate of health. During his convaleſcence, he hears with rapture ſome Italians ſing at the theatre; has the liberty of the orcheſtra granted him, by which he improves ſo much, that at his return to the choir he gains great credit in the performance of a motet, or anthem, and continued making a rapid progreſs in ſinging till his voice broke. But while it was ſinking, in order to pleaſe his admirers and gratify vanity, in ſinging an air by Galuppi, (at a concert,) that was very high, he brought on a hemorrhage, and continued ſpitting blood for a long time after. He relates the remedies that were moſt efficacious in alleviating his complaint, but which was never quite cured.

Upon the total loſs of his voice, and the precarious ſtate of his health, he began to ſtudy compoſition, but without a maſter, and without rules; and having heard that it was difficult to compoſe fugues, he began a fugue in four parts; reverſed the ſubject; and afterwards compoſed a full anthem of ſhreds and patches from other full anthems, without inventing a ſingle bar: the common practice, we believe, of all beginners who teach themſelves. At length, he had a regular and indulgent maſter in counterpoint during two years; and with pleaſure dived into thoſe myſteries which terrify timid ſtudents under ſevere maſters. M. Rincken, a celebrated organiſt of St. Peter's church at Leige, was his inſtructor; who began by teaching him the common chord and its inverſions; the chord of the 7th to the 6th of the key, and then the *regle de l'octave*. Theſe were acquired in two months time. He afterwards gave him examples, in a figured baſe, of exceptions, eight rules for the uſe of diſcords derived from the 7th, in a MS. of which he has long lamented the loſs. His maſter ſtopped him on the chord of the extreme flat 7th, to ſhew him that any one note of that chord might be made the 7th of another key. (See Enharmonic *chord*.) Here follows an eloge of his maſter's kindneſs, candour, and enthuſiaſtic intereſt which he took in his improvement during two years. He recommends to all maſters the acquiring, if poſſible, the love of their pupils, which will not only render their inſtructions impreſſive but delightful. And without the talent of attaching the ſcholar, and making him love his buſineſs and his maſter, all the reſt is uſeleſs. Gretry grew paſſionately fond of his ſtudies, as much to pleaſe his maſter as improve himſelf. On carrying to a new maſter a maſs which he had juſt compoſed.—"Fair and ſoftly!" ſays M. Moreau; "you run too faſt." Returning the young compoſer his ſcore without looking at it; he wrote down on a ſlip of paper five or ſix ſemibreves. "Write," ſays he, "a treble to this baſe, and ſhew it me to-morrow; but, above all, attempt no more maſſes." "I went from him a little humbled, ſaying to myſelf, my father was in the right in thinking my firſt maſter too indulgent. I carried him his baſe the next day, ornamented with three or four trebles."—"You ſtill march too faſt," he cries; "I only aſked for note againſt note to this baſe."—"I could not reſtrain my impetuoſity. I had a thouſand muſical ideas in my head, and was eager to make uſe of them." "*Dominus vobiſcum*, in contrary motion," ſays my maſter, "that's the way the different parts ſhould move."—"I

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quitted him, ſaying to myſelf, I have learned nothing by theſe two leſſons; but let us go on fair and ſoftly. Yet I could not help ſcribbling. I compoſed ſix ſymphonies, which were ſucceſsfully executed in our city. M. Haſler, the canon, begged me to let him carry them to the concert. He encouraged me greatly; adviſed me to go to Rome, in order to purſue my ſtudies, and offered me his purſe. My maſter in compoſition thought this little ſucceſs would be miſchievous to me, and prevent me from purſuing that regular courſe of ſtudy, ſo neceſſary to the becoming a ſound contrapuntiſt. He never mentioned my ſymphonies." The author, however, does not pretend that the ſame method will do for all ſtudents: the leſſons ſhould be proportioned to the genius and diligence of the ſcholar.

The plan of going to Rome to purſue his ſtudies never quitted the young Gretry. He finiſhed his maſs, and ſhewed it to M. Moreau: telling him, that he agreed in his opinion, that a young muſician, ignorant as himſelf, ought never to attempt ſuch conſiderable works.

He walked to Rome on foot, at eighteen years of age, where he remained five years; during which time he was received into the college of Leige, and lodged and boarded at the expence of that eſtabliſhment. See LEIGE.

Of all that concerns his private life, ſocial intercourſe, maſters, and ſtudies at Rome, we ſhall confine our obſervations, as much as poſſible, to ſuch circumſtances and reflections as may be uſeful to muſical ſtudents, who are likely to ſeek for profeſſional knowledge from books.

On his arrival in Italy, after croſſing the Alps, his reflections are animated, and do juſtice to that country and his own feelings.

"After we had penetrated a little way into the mountains, rocks, and glaciers; nature ſeems ſuddenly to have changed her face. With what pleaſure did I find myſelf all at once in a field enamelled with flowers! It ſeemed as if ſome good genius had tranſported us from earth to heaven. I begged our guide to let me ſtop a moment to enjoy this delicious proſpect; but what was my rapture when I heard, for the firſt time, Italian melody ſung by an Italian! It was from a charming female voice, which tranſported me by its melodious accents. This was the firſt leſſon which I received in muſic, in a country to which I had travelled for inſtruction.

"And this touching voice, with that plaintive expreſſion, which an almoſt vertical ſun generally inſpires; in ſhort, thoſe delicious and exquiſite ſenſations, which I ſought at ſuch a diſtance from my native ſoil, and for which I had quitted every thing, were found in a ſimple country girl."

The maſters in the Roman churches, during his reſidence in that renowned city, were Caſali, Oriſicchio, and the abate Luſtrini, whom he has well characterized. Caſali had grace and facility; Oriſicchio more ſtudy and correctneſs in his counterpoint; and Luſtrini, his diſciple, had the merit of preſerving the auſterity and dignity of the eccleſiaſtical ſtyle, which ought never to be abandoned; but a compoſer thinks it neceſſary to try to pleaſe, even in the church: a rapturous rumour is heard when a movement pleaſes; this induces the chapel-maſter to quit the gravity which the place of performance requires, and they finiſh by confounding the muſic of the church with that of the theatre.

At the end of the reign of Benedict XIV. this abuſe was carried ſo far, that the pope ordered the ſacrament to be adminiſtered in the ſide chapels, to prevent the Romans from attending more to the muſicians than the prieſts, and turning their backs upon the altar. He prohibited the uſe of kettle-drums, trumpets, and all noiſy wind-inſtruments, commanding the maeſtro di cappella, under ſevere penalties, to finiſh the veſpers by day light.

When this part of the author's book was written, he ſeems to have been untainted with philoſophiſm, and to have reſpected the church, concerning the muſic of which he gives ſome admirable counſel to young compoſers.

The maſters of Italy, particularly of the Neapolitan ſchool, begin with church muſic, and the maſter-pieces of Aleſſ. Scarlatti, Durante, Leo, Pergoleſi, Piccini, and Sacchini, which are their maſſes, and are compoſed in a ſtyle of muſic which ſhould be totally diſtinct from that of the theatre.

In church muſic a compoſer may ſtill with propriety avail himſelf of all the riches of learned counterpoint, of canons and fugues, which the theatre but rarely admits.

Secular compoſers may ſometimes, without impropriety and with great effect, write in imitation of the church ſtyle; they riſk nothing in ennobling paſſions connected with the good order and happineſs of mankind.

Eccleſiaſtical muſic is degraded if it quits the bounds preſcribed to it by piety and propriety, while dramatic muſic is exalted by the occaſional admiſſion of ſolemn ſtrains.

The ſtudy of the ideal beauties of harmony is the principal buſineſs of a compoſer of ſacred muſic. M Gretry calls learned muſic the metaphyſical language of ſound. In a theatre the expreſſion of the words and ſituation of the ſinger muſt be exact, becauſe they have a determined ſenſe, and the true expreſſion of the words fortifies the ſituation through all the accompaniments.

He thinks a dull man, if a good harmoniſt, may write good church muſic; but we find a charm in the moſt ſolemn and ſeemingly dry choral compoſitions of Paleſtrina, Coſtantio, Feſta, Leo, Jomelli, Pergoleſi, and Sacchini, apart from the learning and gravity of their ſtyle.

He does not allow that any muſician plays or performs muſic perfectly at ſight, that is not very eaſy and very common, which is the ſame thing; and, in general, what is meant by *natural muſic.* A muſician, to prove himſelf a good ſightſman, muſt ſatisfy the author himſelf, not only by performing the notes correctly, but by ſeizing the true expreſſion, and not auditors ignorant of the compoſer's deſign, and who think it well executed becauſe it is done without heſitation.

At Geneva the father of a child, who paſſed for a *prodigy*, in playing at ſight, deſired M. Gretry to compoſe a very difficult ſonata expreſsly to try his powers of execution, *a' livre ouvent*, and he made an allegro for him, difficult, but without affectation; which the child executed to the aſtoniſhment of every hearer but Gretry himſelf. The young performer did not ſtop, or flounder, but in following the modulations, he changed many paſſages which the compoſer had written, without ſhocking the ear.

"When a ſtudent changes his maſter, he ſhould recommence the firſt principles of compoſition, or the maſter and ſcholar will perpetually miſtake each other's meaning."

Caſali conducted him from fugue to fugue in 2, 3, and 4 parts, adviſing him not to indulge himſelf in compoſitions of a leſs ſevere kind. This was the method which P. Martini purſued with all his diſciples, in proportion to their advancement in the art.

He complains of the cold reception he had from Piccini, when introduced to him as a promiſing young artiſt. Piccini had always a cold and diſcouraging countenance, and was at all times profeſſionally ſo much occupied, that he had no time to ſacrifice to viſitors and politeneſs.

After our author began to write good fugues in four parts, Caſali adviſed him to compoſe motets or full anthems, in 6 or 8 parts, as the *ne plus ultra* of compoſition. After cloſe application under Caſali, during two years, this honourable and able maſter told him he might proceed without a guide.

When he quitted Rome he went to Bologna, where he was received a member of the Philharmonic ſociety, for the obtaining which honour the good Padre Martini aided and aſſiſted him with his counſel in writing a fugue on a fragment of canto fermo, taken by chance.

He was now left to himſelf with his head full of fugues and canons of all kinds, which he could turn topſy-turvy, and of which he could reverſe all the parts at his pleaſure, ſtill preſerving a kind of melody in them all, " and I am certain (he ſays) that a compoſer cannot be ſimple and expreſſive, and, leaſt of all, correct, without vanquiſhing all the difficulties of counterpoint."

A profound contrapuntiſt diſcovers in a ſcore, by a ſingle glance, whether the author is a regular bred harmoniſt; a ſingle note is ſufficient: as a ſingle bare-faced lie throws a doubt upon every thing that its author utters, and there are certain notes in a well regulated baſe, beyond the ken of a ſuperficial contrapuntiſt.

He adviſes the ſtudent to continue writing fugues a conſiderable time, in two parts, in order to familiarize himſelf with the rules for bringing in the anſwers, and ſeizing every favourable opportunity of imitating ſmall portions of the principal ſubject, and its accompaniments. He has inſerted the ſketches of an eaſy fugue, giving the ſubject alternately to the two parts in the regular modulation from key to key, without filling up the accompaniment, which is to correct the melody and complete the harmony. It would be good exerciſe if the young harmoniſt were to add a ſecond treble, a tenor, or a ſecond baſe, as a free part, before he attempts a third in fugue. And in doing this he ſhould try to find ſuch notes as will not only enrich the harmony, but form an agreeable melody in itſelf; and not be content with every unmeaning note which the harmony of the two principal parts will allow. He recommends ſix months to this ſtudy alone. A young organiſt will begin to play extempore fugues before he will be able to commit them to paper with accuracy and clearneſs.

The author tells us that though he loved the muſic of Buranello, Piccini, Sacchini, Ciccio di Majo, and Terradeglias; yet Pergoleſi was his model. We do not recollect, however, being reminded of Pergoleſi's ſtyle by any of M. Gretry's operas, though there are pleaſing airs in them all, caſt in a French mould, which the poetry and national taſte required. Neither Piccini nor Sacchini could always avoid French phraſeology in their melodies in ſetting French words. Gluck adopted the paſſages of Lulli and Rameau, to flatter the nation which he was going to amuſe; but Piccini and Sacchini *under-wrote* the airs, which they ſet to French words, from the mere want of vocal abilities on the opera ſtage of Paris to execute better. The French muſical critics, however, flatter themſelves that the worſe the airs the better the opera, and endeavour to perſuade all Europe that fine ſinging is abſurd, and ruins the drama.

In the chapter of M. Gretry's memoirs, entitled " De la Muſique d'Egliſe," in which he has given the hiſtory of his ſtudies at Rome, after quitting Caſali and going to Bologna, where he is admitted member of the Philharmonic ſociety, he goes back in his narrative to Rome, and relates in an entertaining manner the reception of his firſt comic opera, ſet to Italian words, in that city; charecterizes the muſic of Italy, by ſaying that " the Italian ſchool is the beſt that exiſts, as well for compoſition as ſinging. Italian melody is ſimple and beautiful; it is never ſuffered to be coarſe or inelegant; and a difficult paſſage is deemed barbarous that does not flow naturally from the ſubject, and without effect.

" It is generally agreed (ſays M. Gretry) that the inſtrumental muſic of Italy is feeble; but how ſhould it be otherwiſe? there is little melody, becauſe they are aiming at harmonical effects; yet little harmony is produced, as they are ignorant of modulation. It is eaſy to conceive that abſtracted from theſe two agents, nothing can remain but noiſe."

About this time the opera overtures anſwered this character; and the German ſymphonies of the Manheim ſchool began to be well performed, not only in the northern parts of Germany, but at Paris and Bruſſels. Choruſes were never laboured in Italian operas; as learned choruſes with fugues and complication, in which there is no melody in the under parts, can never be remembered or enlivened by action on the ſtage. But to ſave the Italians from the cenſures of M. Gretry on account of the poverty of their inſtrumental muſic, the Italians had at this time the admirable Boccherini, ſuperior in muſic for violins, without double drums, tromboni, and the noiſe and falſe intonation of many other wind inſtruments, not only to the reſt of his countrymen, but to all the Germanic body anterior to Haydn and Mozart.

His cenſures of the Italian opera, at a time when every part of Europe, except France, was enchanted with it, are copied from Gluck's dedication to his " Alceſte."

M. Gretry ſays (to humour the French) that a great ſinger ruins an opera, by rendering every character which he, or ſhe, repreſents, contemptible and unintereſting.

He quits Rome in 1767, without ſtopping till he came to Geneva, where he undertakes twenty female ſcholars, in order to provide for his journey to Paris, and firſt reſidence in that capital. He writes to Voltaire, intreating him to honour a young artiſt, juſt come from Italy, with a lyrical drama, to try his force in a language ſo enriched by his immortal productions. The old bard ſent him word that he could only anſwer his letter *de vive voix*, as he was too ill to write, but deſired to ſee him as ſoon as poſſible. He had the next day a moſt gracious reception at Fernay, of which our author gives an amuſing account. M. Gretry, in his youth, was intereſting in his perſon and pleaſing in his manners; we ſaw, dined, and converſed with him at Paris, three years after this period. And Voltaire, who treated him with great kindneſs, ſeems to have ſeen him in the ſame favourable light. While he was at Geneva he ſet his firſt French opera of " Iſabelle and Gertrude," which was ſo well received, that the audience called for him to receive their acclamations after the manner of Paris. " One of the performers in the orcheſtra, a dancing-maſter, came to me in the morning previous to the repreſentation, to inform me that ſome young people intended to call for me on the ſtage at the end of the piece. I told him I had never ſeen that done in Italy." " You will, however, ſee it here," ſays he, " and you will be the firſt author who has received this honour in our republic." It was in vain for me to diſpute the point: he would abſolutely teach me the bow that I was to make with a proper grace. As ſoon as the opera was finiſhed, they called for me ſure enough, and with great violence, and I was obliged to appear to thank the audience for their indulgence; but my friend in the orcheſtra cries out aloud, " Poh! that is not it!—not at all!—but get along!". " What's the matter," ſay his brethren?" " I am out of all patience; there did I go to his lodgings this morning, on purpoſe to ſhew him how to preſent himſelf nobly, and did you ever ſee ſuch an aukward booby?"

We have then from M. Gretry an account of his arrival and eſtabliſhment at Paris; of the reception of near 30 of his comic operas, and the cabals, difficulties, and hundred headed hydra which he had to encounter, of poets, rival compoſers, performers, &c. Theſe little hiſtories of dramatic intrigues and vexations are frequently mixed with reflections, of which the peruſal might be uſeful to young compoſers for the theatre.

The ſecond and third volumes of M. Gretry's publication are no longer biographical, but a further analyſis of his operas, and of the characters and paſſions which he had to expreſs; in which there is much refinement, ſome caprice, and complete ſelf-ſatisfaction. Many of theſe little eſſays are, however, very ingenious, and well worthy the attention of young dramatic compoſers, and the approbation of the public more than his own.

But when an author praiſes himſelf as liberally as he wiſhes to be praiſed by others, we not only doubt of his modeſty but merits.

The eſſays in the third volume contain many revolutionary principles, and metaphyſical reflections on muſic. At p. 191, however, he begins to treat of the compoſition of muſic, and its technica. In this ſection of his work the chapter on the abuſe of ſcience is the beſt. He gives ſeven *hints* to the young ſtudents, (*aperçus,*) for the amelioration and extenſion of eſtabliſhed rules of compoſition, ſome of which are practicable, but not new; others ſeem hazarded and not defenſible.

The reform of clefs, the ſtaff, ſolmiſation, and diviſions of time, have been frequently propoſed and attempted.

His theory of diſcords, regarding them as *appoggiaturas*, is ingenious and intelligible, and his gammut, *à l'antique*, rigorouſly in the ſame key, aſcending and deſcending, is the only expedient by which the ſcale can be accompanied by fundamental baſes, without two fifths in the tenor part, or modulation into another key. (See *Plate* I.) His arrangement of the chords in thorough-baſe is judicious and elegant, but not new. His ſeventh hint, or *aperçu*, in making the common chord of the key-note ſerve as an appoggiatura of the whole chord to every note of the octave, would perhaps have been more intelligibly expreſſed by *ſuſpenſion* of the whole preceding chord.

M. Gretry, in producing ſo many works during 30 years of his active life, could have little leiſure for reading the elementary books (or the *grimoirs*, as he calls them) that were publiſhing throughout Europe, or he would not have imagined himſelf the original inventor of all the improvements which he has propoſed, and which, from ſo experienced a compoſer, came with ſuch weight, that his work was ordered by government to be printed for the uſe of the ſtudents in the national Conſervatorio at Paris.

Many of his ſhort hints and inſtructions muſt be allowed the merit of ingenuity and refinement, but are too metaphyſical for young ſtudents, and ſometimes not intelligible out of France; ſuch is chap. vi. vol. 3. where the muſical modes or keys are compared with the modes or accents of ſpeech, or the punctuation of a diſcourſe.

His chap. vii. which treats of rhythm, is ſpiritedly written: and his regret is laudable, and implies humanity and feeling for the churches in France being bereaved of their bells, benighted travellers of guides, and the country people of ſinging maſters for time and tune, of meaſure, and muſical intervals.

M. Gretry is not ungrateful to Italy, he ſpeaks with reſpect of its great maſters, and vol. iii. p. 440, note *, he ſtrongly recommends the prevailing on Italian ſingers to eſtabliſh themſelves at Paris. "Italian muſic is the antidote to the evil which we have to cure. I do not mean bad ſingers, who by an ignorant ambition of gracing and embelliſhing every note, leave not a ſingle paſſage of the original melody unadulterated: they are deteſted in Italy as well as in France."

Yet, in his prediction what muſic *will* be in future, (after giving his opinion what muſic *was*, with the Greeks and Romans,) he ſcruples not to ſay, that all muſic which is not ſubſervient to the drama, *à la Françoiſe*, will be rejected by the public; and boaſted four years ago that the Italians were forming all their muſical dramas upon French models. This ſeemed his wiſh, or perhaps his fear, from his knowledge of the depraved taſte of perſons in power; but ſubdued as Italy is by Gallic plunderers, that country, and all civilized Europe, muſt bid adieu to muſic, lyric poetry, painting, ſculpture, and architecture, in the true genuine taſte of that delightful country, ſo emphatically ſtyled the mother and nurſe of the fine arts; with which, in modern times, the globe has been embelliſhed.

Among modern muſical improvements and inventions, mentioned and propoſed by M. Gretry is Erard's invention of an organ, capable of *creſcendo* and *diminuendo*, by greater or leſs preſſure of the *hand* inſtead of the *foot*, (p. 424.) which caught our attention, having long regarded it as one of the moſt important deſiderata in muſic. But upon enquiry, we were ſorry to find that this intelligence was premature: the method uſed, whatever it was, for augmenting the tone by the preſſure of the fingers, over-blew the pipes in ſuch a manner as to render the tone more *acute*, as well as more *powerful*, which would deſtroy all harmonical proportion and true intonation, in the ſame manner as ſinging out of tune.

If the queen of Naples at one time favoured the French opera, it was not becauſe it was French, but German: as Gluck, a native of Germany, who eſtabliſhed the modern French ſtyle of opera, was highly favoured at Vienna, as well as at Parma, where the ſovereign was married to an archducheſs.

When the author tells us (p. 458) that young ſtudents in ſinging at Rome have drawn tears from him, without words, in their *ſolfeggi* upon a ſingle vowel, does it not recommend toleration to the cenſurers of *diviſions* in opera-ſongs? which, when elegant, fanciful, and well-executed, extend the ſenſe of the word to which they are applied, and afford exquiſite pleaſure to ears well organized.

It will, perhaps, be thought by many readers that all the author's praiſe, and all the precepts, tend to one common centre—himſelf and his own works. In every part of his eſſay where he degrades the importance of harmony, and recommends to the young compoſer to begin without its aid and ſupport, by forming ſimple melodies, we wiſhed to diſpute the point; being certain, from our own experience and obſervation, that if counterpoint is not regularly learned early in life, like grammar, and the pronunciation of a language, it is never learned; or ſo ſuperficially, as to leave doubts and perplexities in the mind, which perpetually recur to the end of life.

Many of his precepts are ſpecious and good in theory, but in practice experience has found them fallible, if not impracticable. Why apply muſic to poetry, we may aſk the puriſts, if it does not heighten its colouring, and facilitate its paſſage to the heart?

We have been diffuſive in this article, as the ſubject of it is a profeſſor of great eminence, and his opinions and diſcuſſions are likely to have weight with young muſicians who may ſeek for information in dictionaries. To ſome of his precepts, however, as we cannot implicitly ſubſcribe, it ſeemed neceſſary to aſſign reaſons for our diſſent; at the ſame time allowing all due praiſe to his abilities as a compoſer, and acumen as a muſical critic; lamenting, at the ſame time, the fallibility of human intellect, in the diſtortion of this ingenious man's mind; which, from an admirable artiſt, and an elegant and pleaſing writer, has transformed himſelf near the end of the Revolution, and of his life, to a bad philoſopher, and author of a more offenſive work to pious and good Chriſtians, than *Philoſophiſm*, till then, ever produced, entitled "De la Verité; ce que nous fûmes, ce que nous ſommes, ce que nous devons être." And may we not venture to aſk citizen Gretry, what dæmon had inſpired him with more knowledge on theſe mattees than the greateſt theologians, metaphyſicians, or atheiſts, of ancient and modern times?

GRETZER, James, a learned German Jeſuit, was born at Marckdorf in the year 1560. He entered into the order at the age of ſeventeen, and applying himſelf with great ardour to his ſtudies, he became a proficient in ancient and modern literature: in philoſophy, theology, and antiquities. He ſucceſſively filled the chairs of philoſophy, morals, and divinity during 25 years, in the univerſity of Ingoldſtadt, where he died in 1625, at the age of 65. He left behind him a collection of controverſial pieces in two volumes folio, printed at Ingoldſtadt. He was author, likewiſe, of a great number of treatiſes in profane and eccleſiaſtical antiquities, of which the moſt celebrated is entitled "De Cruce," in three volumes quarto. According to Dupin, the works of Gretzer, though not of the firſt rank in literary merit, will furniſh very good materials to thoſe who would write on the ſame ſubjects. He was well verſed in the Greek tongue, and publiſhed ſome grammatical pieces in that language, together with notes on certain Greek authors. His works, amounting in number to one hundred and fifty-three, were collected and printed at Ratiſbon in 1739, in 17 vols. folio. Moreri. Dupin.

GREVE, Gerefa, among our *Ancient Writers*, is a denomination of power and authority; ſignifying as much as *comes* or *vicecomes*. See Count and Viscount.

The word is formed from the Anglo-Saxon *grith*, *peace*. Thus Hoveden: "Greve dicitur, ideo quod jure debeat grith, *i. e.* pacem ex illis facere, qui patriæ inferunt væ, *i. e.* miſeriam vel malum."

Lambard makes greve the ſame with *reve*.

Hence, alſo, the words *ſhrieve*, *portgreve*, &c. which were anciently written *ſciregerefa*, *portgerefa*, &c.

Greve, in *Geography*, a town of Etruria; 14 S. of Florence.

Greve *au Lanchau*, a bay on the N. W. coaſt of the iſland of Jerſey.

Greve *de Lecq*, a bay on the N. coaſt of the iſland of Jerſey.

GREVEN, a town of the biſhopric of Munſter; eight miles N. of Munſter.

GREVENBROICH, a town of France, in the department of the Roer; ten miles N. N. E. of Juliers.

GREVENSTEIN, a town of Weſtphalia; 16 miles W. of Brilon.

GREVILLE, Fulke, *lord* Brooke, in *Biography*, was born at Beauchamp's-Court, in Warwickſhire, in 1554. He received his education, partly at Cambridge and partly at Oxford, but chiefly at Trinity-college, Cambridge. From college he went on foreign travel, and on his return was introduced to queen Elizabeth's court, and became the favourite of his ſovereign. She exhibited her regard in a manner not very pleaſing to one of his gallant ſpirit, by reſtraining him from taking part in ſome martial enterprizes abroad, on which his mind was fully bent. He procured but little advancement during this reign, and it was chiefly through the intereſt of ſir Henry Sidney that he obtained two lucrative poſts in the courts of the marches of Wales. In 1597 he received the honour of knighthood, and, two years afterwards, the office of treaſurer of marine cauſes. He ſat in ſeveral parliaments as member for the county of Warwick; and part of one of his ſpeeches on eſtabliſhing precedents has been quoted by lord Bacon. "Why," ſaid he, "ſhould you ſtand ſo much upon precedents? The times hereafter will be good or bad: if good, precedents will do no harm: if bad, power will make a way where it finds none." On the acceſſion of king James he was created a knight of the Bath, and ſoon after had a grant of the caſtle of Warwick, on which he expended on neceſſary repairs twenty-thouſand pounds. In 1614 he was made under-treaſurer, and chancellor of the exchequer, and admitted into the privy-council, and in 1620 he was raiſed to the dignity of a peerage, by the title of lord Brooke of Beauchamp's-Court. He was ſtabbed by a domeſtic whom he had reprimanded for inſolence. He was diſtinguiſhed as a patron of letters, and in 1627, the year before his death, he founded at Cambridge a profeſſorſhip of hiſtory with a handſome ſalary. As an author few of his compoſitions were made public till after his death. In 1632 ſeveral poetical works appeared under his name. Of his proſe writings the moſt intereſting is the life of ſir Philip Sidney, his particular friend. His poetry is generally negligent and flat, but there are occaſional paſſages extremely harmonious. In proſe his ſtyle is affected and involved, yet diſplaying a full mind and a large acquaintance with various learning. Biog. Brit.

GREVILLEA, in *Botany*, named by Mr. R. Brown, in honour of the late right honourable Charles Francis Greville, F. L. S. a vice preſident of the Royal Society, in whoſe garden at Paddington the rareſt and moſt curious plants, from various climates, were cultivated with peculiar ſucceſs, and always devoted to the real advancement of ſcience. Since his death in 1809, the collection has unfortunately been diſperſed. Brown Tr. of Linn. Soc. v. 10. 167. Prod. Nov. Holl. v. 1. 375. Dryand. in Ait. Hort. Kew. ed. 2. v. 1. 204. (Embothrii ſpecies; Sm. New Holl. 25, 29) See Embothrium.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Proteæ*, Juſſ.

Gen. Ch. *Cal.* none. *Cor.* Petals four, cohering by their lower part into a tube, linear, oblique, at length revolute; their ſummits dilated, concave, bearing the ſtamens. *Stam.* Filaments four, extremely ſhort, inſerted into the hollow in the tip of each petal; anthers roundiſh, ſunk in the ſaid hollow. *Piſt.* Germen ſuperior, ſtalked, half-ovate, erect, with a gland on one ſide at the baſe of its ſtalk; ſtyle incurved; ſtigma oblique or lateral, depreſſed, or ſomewhat convex. *Peric.* Follicle ſtalked, half-ovate, coriaceous, ſometimes woody, crowned with the ſtyle, of one central cell. *Seeds* two, elliptical, compreſſed, with a very ſhort margin or wing, by which they are attached to the top of the follicle.

Eſſ. Ch. Petals four, oblique. Stamens ſunk in the cavities of the limb. A lateral gland at the baſe of the ſtalk of the germen. Stigma oblique. Follicle coriaceous or woody, of one central cell. Seeds two, ſlightly winged.

The moſt extenſive genus of its natural order in New Holland, of which country all its 38 ſpecies, defined by Mr. Brown, are natives. When but few of them were known, and their alliances but ill underſtood, it was thought ſafeſt to comprehend them under *Embothrium*, notwithſtanding the fewneſs of their ſeeds, and the ſame caution was uſed in determining their ſpecies, ſeveral having been conſidered as varieties, which Mr. Brown, having had ſuch abundant opportunities of ſtudying them in their native land, has raiſed to the rank of ſpecies. Even thus ſeparated from its parent *Embothrium, Grevillea* comprehends plants that differ greatly in appearance, and in ſome ſubordinate characters, from each other, ſo as to be commodiouſly divided into two principal ſections, the firſt of which is ſub-divided into five ſub-diviſions. We ſhall give one example, or more, of each.

Section I.

Follicle coriaceous, crowned with the entire ſtyle and its depreſſed ſtigma. Seeds oval, very minutely bordered, and crowned with a very ſhort wing.

A. Lissostylis, (from λισσος, *ſmooth*, and στυλος, *the ſtyle.*)

Leaves all entire, in many inſtances having their margins acutely reflexed at the lateral nerves. Flowers faſciculate, or in ſhort cluſters. Style ſmooth. Follicle without ribs.—Thirteen ſpecies, examples of which are

G. *punicea*. (Embothrium ſericeum β; Sm. Bot. of N. Holl. 27. t. 9. f. 5.)—Leaves elliptic-oblong, ſomewhat tapering at the baſe, reflexed at the margin. Flowering branches and cluſters recurved. Upper half of the claws of the petals denſely bearded within. Native of the country near Port Jackſon, New South Wales. A *ſhrub* four or five feet high, flowering in October. *Stem* very much branched, round, the younger branches angular and ſomewhat ſilky, leafy. *Leaves* ſcattered, ſolitary or ternate, about an inch and half long, elliptic-oblong, ſometimes obovate, obtuſe, entire, rather coriaceous, tipped with a ſmall point; green and nearly ſmooth above; white and ſilky beneath; with a prominent middle rib, and a lateral one near each edge, which, from the flexure of that part, becomes the actual border of the leaf, and is roughiſh to the touch; the baſe tapers ſlightly into a ſhort, thickiſh, angular, ſilky *footſtalk*, dilated at the bottom. *Stipulas* none. *Flowers* crimſon, inodorous, in ſhort, denſe, ſilky, corymboſe cluſters. *Corolla* externally ſilky, about half an inch long in its revolute poſition; the upper half, or rather more, of the inſide of the claws, is lined with very denſe, long, prominent hairs. *Style* an inch long, rather thick. *Stigma* inflexed or lateral, but without any projection of the ſtyle beyond it.—We have not ſeen this ſpecies in any garden.

G. *ſericea*. (Embothrium ſericeum α; Sm. Bot. of N. Holl. 25. t. 9. f. 1—4. Andr. Repoſ. t. 100. Sims in Curt. Mag. t. 862. Willd. Sp. Pl. v. 1. 539. E. cytiſoides; Cavan. Ic. t. 386. f. 2.)—Leaves elliptical, obtuſe, with a ſmall point, reflexed at the margin. Flowering branches erect. Cluſters recurved. Summit of the claws of the petals denſely bearded within.—From the ſame country, where it is apparently more common than the former. It has flowered in ſeveral collections about London. Every part is about half the ſize of the preceding. *Leaves* more elliptical, with a ſtronger point, their baſe not tapering. *Flowers* paler, or purpliſh, eſſentially diſtinguiſhed, as Mr. Brown firſt remarked, by the internal beard of the claws being confined nearly to their ſummit, not ſpreading downward, more than half way to the baſe. The *ſtyle* is rather above half an inch in length, and crowns the black ovate *fruit*, long after the latter has burſt on one ſide and diſcharged its ſeeds.

G. *linearis*. (Embothrium lineare; Andr. Repoſ. t. 272. E. linearifolium; Cavan. Ic. t. 386. f. 1. E. ſericeum γ; Sm. Bot. of N. Holl. 27. t. 9. f. 6.)—Leaves linear-lanceolate, with a ſmall point, reflexed at the margin. Cluſters ſhort, nearly upright. Style ſmooth to the very top.—Native of ſtony places near the beach at Port Jackſon. This has longer narrower *leaves*, and paler or whitiſh *flowers*, in more upright cluſters, than the laſt, with which it otherwiſe agrees in habit and appearance.

We have a plant from the ſame neighbourhood, with rather broader and more obtuſe leaves, whoſe margin and marginal ribs are rough with minute teeth, according to the character of Mr. Brown's next ſpecies, *G. ſtricta*, but its ſtyles are ſmooth to the very top, as in the three foregoing, not "ſilky at the ſummit."

With the remaining ſpecies of this ſubdiviſion we are unacquainted.

B. Ptychocarpa, (from πτυχη, *a plait*, and καρπος, *fruit.*)

Leaves all entire. Flowers faſciculate, or in ſhort cluſters, the uppermoſt opening firſt! Stalk of the germen very ſhort. Style hairy or downy. Follicle ribbed!—Six ſpecies, all natives of the neighbourhood of Port Jackſon, in mountainous, heathy, ſandy, or ſtony places, as

G. *arenaria*. "Leaves oblong, obtuſe, with a ſmall point. Cluſters of few flowers, recurved. Piſtils downy."—This is in Kew garden, where it flowers frequently.

C. Eriostylis, (from εριον, *wool*, and στυλος, *the ſtyle.*)

Leaves all entire. Flowers faſciculate, ſomewhat umbellate. Piſtil woolly, ſtalked. Follicle without ribs.—Four ſpecies, as

G. *buxifolia*. (Embothrium buxifolium; Sm. Bot. of N. Holl. 29. t. 10. Andr. Repoſ. t. 218. E. genianthum; Cavan. Ic. t. 387.)—Leaves elliptical, revolute; rough and dotted above; clothed with cloſe pale down beneath. Stigma orbicular, ſurmounted by the reflexed point of the ſtyle.—Grows near Port Jackſon, flowering in November. Meſſrs. Lee and Kennedy raiſed it in 1790, and it flowered with them in 1795. The habit is like that of a *Phylica*. *Leaves* numerous, ſcarcely an inch long. *Flowers* numerous, in terminal, ruſty, hairy umbels; the inſide of the corolla, as well as the ſtyle, equally hairy, but white. The large lateral ſtigma, conſiderably below the end of the ſtyle, is remarkable. The *fruit* is tumid and roughiſh.

D. Plagiopoda, (from πλαγιος, *oblique*, and πους, *the foot.*)

Cluſter denſe. Stalk of the germen running into the oblique apex of the flower-ſtalk, into which are inſerted, on each ſide, two of the petals, one above the other.

Two ſpecies only compoſe this ſub-diviſion, both growing within the tropic.

G. *Goodii*. "Leaves entire, oblong, waved, veiny, ſmooth on both ſides. Cluſters ſtalked, elongated. Stems proſtrate."

G. *venuſta*. "Leaves pinnatifid, trifid, or undivided, ſilky beneath. Cluſters erect. Corolla quite ſmooth. Style very hairy.

E. Grevillea properly ſo called.

Cluſter denſe. Leaves pinnatifid; rarely here and there undivided.

Five ſpecies, found in various parts of New Holland. To theſe Mr. Brown wiſhes to reſtrain the name of *Grevillea*, in caſe his various ſub-diviſions ſhould each be hereafter exalted to the rank of a genus, by the names which he has invented. They are very handſome ſhrubs, as

G. *pungens*. "Leaves pinnatifid; ſmooth above; ſilvery beneath; their ſegments linear, ſomewhat awl-ſhaped, pointed and pungent. Cluſters bent backwards. Corolla and piſtil very ſmooth."

G. *Chryſodendrum*. "Leaves ſimply or doubly pinnatifid; their ſegments linear, narrow, and elongated. Cluſters cylindrical. Flowers half whorled. Corolla downy, its baſe permanent. Germen nearly ſeſſile. Style ſmooth."

Both theſe grow near the ſhore on the north coaſt of New Holland, in Carpentaria.

Section

Section II.

Follicle woody, roundiſh, pointed with only the baſe of the ſtyle. Seed ſurrounded on all ſides with a broadiſh wing.

Cycloptera, (from κυκλος, *a circle*, and πτερον, *a wing*.) Of this ſection there are eight ſpecies. They agree in the woody texture of their follicle with our *Conchium*, (which ſee,) but differ in the cell being central, not excentric, as well as in the circular wing of the ſeeds. They are all tropical plants, various in their leaves, which are either pinnate, trifid, undivided, flat, or cylindrical. Flowers racemoſe. — Examples are

G. *helioſperma*. "Leaves pinnate or bipinnate, ſmooth; their pinnæ oblong or ſomewhat linear; the lowermoſt ſtalked. Cluſters divided, erect. Corolla and piſtil very ſmooth."

G. *mimoſioides*. "Leaves entire, ſword-ſhaped, flat, ribbed, ſmooth, as well as the branches. Follicles obovate; viſcid."

G. *lorea*. "Leaves cylindrical, pendulous, very long. Stigma quadrangular, forming a truncated pyramid."—The fruit of this has not been ſeen by Mr. Brown.

G. *gibboſa*. "Leaves lanceolate, elongated, entire, ſlightly downy, ſingle-ribbed, veiny. Cluſters elongated. Stigma conical. Follicles thickened and gibbous."

This laſt is a ſort of connecting link between the cyclopterous *Grevilleæ* and *Conchium*, the *Hakea* of Mr. Brown.

GREVIN, James, in *Biography*, a poet and phyſician, was born at Clermont in 1538. He was very early diſtinguiſhed by his knowledge of languages, philoſophy, and the belles lettres, and aſtoniſhed the people of Paris, by bringing out a tragedy and two comedies, when he was only 13 or 14 years of age. He took the degree of doctor of phyſic at Paris in 1561. It was principally through his exertions and repreſentations, that the abſurd decree of the faculty of Paris, afterwards confirmed by parliament, againſt the uſe of antimony in medicine was paſſed. He was phyſician to Margaret, ducheſs of Savoy, whom he accompanied to Piedmont; and he died at Turin when only 32 years of age. His poems were much praiſed, and deemed equal to any of his age, but have been ſuperſeded by the greater excellence of ſucceeding writers. In medicine he publiſhed a "Treatiſe on Poiſons," and an abridgment of the anatomy of Veſalius, both in Latin and French. Eloy. Dict. Hiſt.

GREUSSEN, in *Geography*, a town of Germany, in the county of Schwartzburg; 16 miles N. of Erfurt. N. lat. 51° 6′. E. long. 11° 3′.

GREW, Nehemiah, in *Biography*, the firſt and moſt univerſal vegetable anatomiſt and phyſiologiſt of this country, was born at Coventry, where his father Obadiah Grew, D.D. was vicar of St. Michael's church. The year of his birth is not mentioned. He was brought up a preſbyterian, his father having taken the covenant, and on the change of the national form of religion, at the reſtoration of Charles II. he was ſent to ſtudy in ſome foreign univerſity, where he took his degree of Doctor of Phyſic. He ſettled firſt at Coventry, and probably reſided there in 1664, when, as he informs us in the preface to his Anatomy of Plants, he firſt directed his thoughts to the ſubject of that work, "upon reading ſome of the many and curious inventions of learned men, in the bodies of animals. For conſidering that both of them came at firſt out of the ſame hand, and were therefore the contrivances of the ſame wiſdom; I thence," ſays he, "fully aſſured myſelf, that it could not be a vain deſign, to ſeek it in both.—That ſo I might put ſomewhat upon that ſide the *leaf* which the beſt *botanicks* had left bare and empty."—Four years afterwards he conſulted his brother-in-law Dr. Henry Sampſon, who encouraged him to go on, by pointing out a paſſage in Gliſſon's book *de Hepate*, chap. 1, in which the anatomy of plants is hinted at as an unexplored, but very promiſing, line of ſtudy for a practical obſerver.—Dr. Grew's firſt eſſay on this ſubject was communicated to the Royal Society in 1670, by biſhop Wilkins, under the title of an Idea of a Philoſophical Hiſtory of Plants. It was received with the honour and attention it deſerved, being ordered to be printed, and its author was invited to ſettle in London, with which he complied in 1672, and in that year alſo, on the recommendation of the ſame learned divine, he became a fellow of the Royal Society. He was appointed ſecretary in 1677, in which capacity he publiſhed the Philoſophical Tranſactions from Jan. 1677-8, to Feb. in the following year. In 1680 he was made an honorary fellow of the College of Phyſicians.—He is ſaid to have attained to conſiderable practice in his profeſſion, nor did his heterodox origin deprive him of the credit juſtly due to his piety and philoſophical merit, even in the worſt times. He lived indeed to ſee various changes of opinions and profeſſions, apparently with the tranquillity becoming a philoſopher and a good man, and died in 1711.

Dr. Grew's Anatomy of Vegetables, of Roots, and of Trunks, originally formed three ſeparate publications in 8vo. but were ſubſequently collected into a folio volume, and publiſhed in 1682, with 83 plates. In this work, truly original, though Malpighi had about the ſame time, or rather before, purſued the ſame line of enquiry, ſcarcely any thing relative to the vegetable anatomy is left untouched. It was the character of Grew to obſerve every thing, and if a more philoſophical obſerver, more aware of what is beſt worth remarking, be, in general eſtimation, a ſuperior character, the latter is more likely to ſee through the falſe medium of dazzling theory. The works of Grew are a ſtorehouſe of facts, for the uſe of leſs original and more indolent authors. They ſeldom require correction, except where theory is interwoven with obſervation, and even his theories have paſſed current till very lately. His chemiſtry is, of courſe, that of his time, but his remarks on vegetable ſecretions, and their multifarious and peculiar properties, abound with ingenuity and originality, as well as his comparative examinations of the various kinds of fruits and ſeeds. If he had no correct ideas of the propulſion or direction of the ſap, we muſt not forget that he was one of the firſt who adopted and illuſtrated the doctrine of the ſexes of plants, nor did even the principles of methodical arrangement entirely eſcape his notice.

In 1681 Dr. Grew publiſhed a folio volume, entitled *Muſeum Regalis Societatis*, or a catalogue and deſcription of the Natural and Artificial Rarities belonging to the Royal Society, and preſerved at Greſham College. This is a ſcientific and deſcriptive catalogue, with learned references to preceding writers. It is accompanied by "the Comparative Anatomy of Stomachs and Guts begun, being ſeveral lectures read before the Royal Society in 1676." Twenty-two plates illuſtrate the firſt part of this volume, and nine the latter.

The lateſt publication of our author, we believe, was "Coſmographia Sacra, or a Diſcourſe of the Univerſe, as it is the creature and kingdom of God." He was an illuſtrious proof that it is the *fool*, and not the *philoſopher*, who "hath ſaid in his heart *there is no God*." On this ſubject we need not repeat our remarks under the article Fuchsius.

The works of Grew were ſoon tranſlated into French and

Latin. Of the incorrectneſs of the latter, done in Germany, he complains in ſtrong terms. A foreigner might perhaps be perplexed by his ſtyle, which in his earlier performances is ſcarcely equal to the good writers, even of the time in which he lived. Haller appears to have ſtudied and underſtood him with his uſual ſagacity and accuracy.—Grew's works. Haller's Bibl. Bot. Aikin's Gen. Biogr. S.

GREWENMACHEE, a town of France, in the department of the Forêts, and chief place of a canton, in the diſtrict of Luxemburg. The place contains 1867, and the canton 9085 inhabitants, on a territory of 207½ kiliometres, in 17 communes.

GREWESMUHLEN, a town of Mecklenburg; 14 miles W. of Wiſmar. N. lat. 53° 35′. E. long. 11° 15′.

GREWIA, in *Botany*, ſo named by Linnæus, in memory of the great vegetable anatomiſt Dr. Nehemiah Grew; ſee that article.—Linn. Gen. 469. Schreb. 356. Willd. Sp. Pl. v. 2. 1164. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 3. 313. Juſſ. 292. Lamarck Illuſtr. t. 467. Gærtn. t. 106. (Mallococca; Forſt. Gen. t 39. Chadara; Forſk. Ægypt. Arab. 105.)—Claſs and order, *Polyandria Monogynia*. (*Gynandria Polyandria*, Linn.) Nat. Ord. *Columniferæ*, Linn. *Tiliaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of five lanceolate, ſtraight, coriaceous leaves, coloured on their inſide, ſpreading, deciduous. *Cor.* Petals five, the ſhape of the calyx, often ſmaller, emarginate at the baſe. Nectary? a ſcale inſerted into the baſe of each petal, thickiſh, incurved, inclined at the margin, and embracing the ſtyle. *Stam.* Filaments very numerous, briſtle-ſhaped, the length of the petals, inſerted into the baſe of the germen; anthers roundiſh. *Piſt.* Germen roundiſh, ſupported by a column crowned with a five-ſided border, at the baſe of which the petals are inſerted, and at its top the ſtamens; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma obtuſe, four-cleft. *Peric.* Berry moſtly of four lobes and four cells. *Seeds* ſolitary, globoſe, uſually two-celled.

Eſſ. Ch. Calyx of five leaves, coloured within. Petals five, with a ſcale at the baſe of each. Berry ſtalked, of ſeveral cells. Seeds ſolitary.

Obſ. Juſſieu remarks that the honey is really ſecreted by the column, between the corolla and ſtamens. If ſo, the ſcales of the petals are incorrectly termed nectaries. The ſtamens not being inſerted into the piſtil above the germen, this genus belongs to *Polyandria*, next to its near relation *Tilia*, inſtead of *Gynandria*, where Linnæus placed it. The ſpecies which compoſe it have undergone ſeveral revolutions, and ſome of thoſe, included by Linnæus, are now removed to other genera, as *Microcos* and *Alangium*; ſee Willd. v. 2. 1168, 1174; ſee alſo *Lemniſcia*, 1172, which we believe belongs to the latter. Some Eaſt Indian *Grewiæ* have been ill-underſtood, ſo that we find it neceſſary to attempt a review of the whole. They are all ſhrubs or trees, with the habit of Elms, or Lime-trees, with very handſome, though not large, flowers.

1. G. *occidentalis*. Linn. Sp. Pl. 1367. Curt. Mag. t. 422, not 423. Duham. Arb. 276. t. 108. (Ulmi facie arbuſcula Æthiopica, ramulis alatis, floribus purpuraſcentibus; Comm. Hort. v. 1. 165. t. 85.)—Leaves roundiſh-ovate, bluntly ſerrated, ſmooth. Flower-ſtalks ſolitary, club-ſhaped, ſingle-flowered.—Native of the Cape of Good Hope, long cultivated in our green-houſes, where it flowers moſt part of the ſummer. It is ſaid to have been in the royal collection at Hampton Court in 1692, having been, doubtleſs, imported from Holland. This ſpecies is a *ſhrub*, 10 or 12 feet high, much branched, the branches nearly ſmooth. *Leaves* alternate, ſtalked, broad-ovate, rounded, bluntiſh, rather crenate than ſerrated, ſmooth, an inch or more in length, ſomewhat oblique, and much reſembling thoſe of an elm, deciduous. They have three principal nerves, and numerous veins. *Footſtalks* thickiſh, hairy, not a quarter the length of the leaf. *Stipulas* very ſhort, triangular, deciduous. *Flower-ſtalks* axillary, ſolitary, about half as long as the leaf, ſwelling and ſomewhat angular upwards, downy, ſingle-flowered, furniſhed with a joint, at which are ſituated two or three lanceolate *bracteas*, that are very ſoon deciduous. *Flowers* above an inch wide, their calyx externally green and downy, internally pale purple, like the petals, whoſe ſcales at the baſe are of a deeper hue. We have not ſeen the fruit.

2. G. *populifolia*. Vahl. Symb. v. 1. 33. (Chadara, n. 23; Forſk. Ægypt. Arab. 105.)—Leaves orbicular, bluntly ſerrated, roughiſh beneath. Flower-ſtalks ſolitary, thread-ſhaped, ſingle-flowered, longer than the leaves.—Native of Arabia, where it is called *Chadâr*, or *Nabba*; alſo of the Eaſt Indies. A *ſhrub*, much branched and divaricated. *Leaves* ſhorter and rounder than the former, on longer more ſlender ſtalks. *Flower-ſtalks* alſo much more ſlender, ſlightly thickened upwards, with three linear-obovate deciduous *bracteas*. *Flower* about half the ſize of the preceding. The under ſide of the leaves is rough with minute, ſtarry, ruſty hairs.

3. G. *orientalis*. Linn. Sp. Pl. 1367. (Pai-Parſea; Rheede Hort. Mal. v. 5. 91. t. 46. Frutex baccifer malabaricus; Pluk. Phyt. t. 50. f. 4.)—Leaves ovate, pointed, finely and bluntly ſerrated, roughiſh. Flower-ſtalks three-flowered. Petals revolute. Column very briſtly.—Native of the Eaſt Indies. A *ſhrub* ſix feet high, with circularly ſpreading branches. *Leaves* near three inches long, on ſhort rough ſtalks, exactly ovate with an elongated point, cloſely and bluntly ſerrated, or rather crenate, throughout, roughiſh to the touch on both ſides, finely veiny, their ribs more or leſs briſtly. *Stipulas* lanceolate, keeled, very briſtly at the back, rather longer than the footſtalks. *Flower-ſtalks* about half the length of the leaves, hairy, bearing three flowers, their partial ſtalks either all ſpringing from the joint, with ſeveral lanceolate bracteas, or one of them ſtands below the other two, in which caſe the firſt is accompanied by a leaf. *Flowers* larger than thoſe of G. *occidentalis*, with broadiſh revolute petals, ſhorter than the calyx. The *column* is clothed with long, denſe, ſilky, briſtles, from juſt above the inſertion of the petals to the baſe of the ſtamens, as is the germen alſo. *Fruit* near an inch broad, four-lobed, depreſſed, clothed with denſe ſhort briſtles.—We are the more particular in deſcribing this ſpecies, becauſe Vahl and Gærtner ſeem to have miſtaken another for it. We received it long ago from Dr. Roxburgh for the *Microcos*, but that is totally different. We have likewiſe from the Eaſt Indies a plant whoſe leaves are leſs accurately ovate, and rather elliptic-oblong, the petals longer and ſcarcely revolute, but every other part ſo preciſely agrees, that we dare not make it diſtinct, eſpecially as the laſt-mentioned character may depend on the age of the flower.

4. G. *piloſa*. Lamarck. Dict. v. 3. 43. (G. orientalis; Gærtn. v. 2. 112. t. 106. Vahl. Symb. v. 1. 34.)—Leaves elliptic-oblong, ſharply and unequally ſerrated, rough on both ſides with ſtarry hairs. Flower-ſtalks three-flowered. Petals ſtraight, nearly equal to the calyx. Column naked.—Native of the Eaſt Indies. This appears to be Gærtner's orientalis by the fruit, the only part, perhaps, known to him, and which is only one-third the ſize of the laſt, though more deeply lobed. It anſwers exactly to Vahl's deſcription of his *orientalis*, and to Willdenow's variety mentioned in his Sp. Pl. under that ſpecies. Nor can we poſitively

aſſert it is not that of Linnæus, which can be determined only by Hermann's herbarium; but it neither accords with his deſcription nor ſynonyms. Whether it be Burmann's in Fl. Ind. 192. can ſeem ſcarcely worth enquiry, as this author quotes for a variety Rumph. Amb. v. 4. t. 60, *Frutex ceramicus*, a plant as different in every eſſential character as can well be. In this difficulty we have choſen rather to adopt Lamarck's name, as above. The ſhape, and denſe ſtarry pubeſcence, of the *leaves* ſufficiently diſtinguiſh it from the preceding. The *petals* are almoſt as long as the calyx, ſtraight, linear, often jagged at the end. The ſmoothneſs of the *column*, which is merely crowned with hairs under the germen, affords a beautiful and clear diſtinction, very apparent under the ripening fruit. See Gærtner's figure.—Lamarck's deſcription is extremely accurate, but his ſynonyms miſapplied.

5. G. *columnaris*.—Leaves ovate-oblong, crenate, rough on both ſides. Flower-ſtalks three-flowered. Column hairy, twice the length of the germen.—Native of the Eaſt Indies, from whence we have received ſpecimens, ſometimes for *orientalis*, ſometimes for *Maloccoca*. It differs eſſentially from both in its long, hairy column, twice or even thrice as long as the germen it ſupports, and acutely five-angled. The *leaves* greatly reſemble ſome kind of elm, and are rather glaucous, above two inches long, on ſhort hairy ſtalks, ſomewhat heart-ſhaped at the baſe, pointed, unequally crenate rather than ſerrated throughout. Both ſides are very rough to the touch, with minute, ſcattered, ſtarry hairs, as are alſo the ribs beneath. *Stipulas* awl-ſhaped, about equal to the footſtalks, deciduous. *Flower-ſtalks* not half ſo long as the leaves, denſely covered with ſtarry hairs, three-cleft, often but a little above their baſe, and bearing numerous, recurved, lanceolate bracteas, ſmooth on their upper ſide. *Petals* we believe ſhort and recurved. *Fruit* clothed with longiſh, ſtraight, ſcattered hairs, which are alſo remarkable in the young germen, being much longer than thoſe which clothe its column.

6. G. *Mallococca*. Linn. Suppl. 409. Cavan. Ic. t. 369. (Mallococca crenata; Forſt. Gen. 39. Nov. Act. Upſ. v. 3. 180.)—Leaves ovate-oblong, crenate, rough on both ſides; ribs briſtly. Flower-ſtalks three-flowered. Column very ſhort and naked.—Gathered by Forſter in the groves of the iſland of Tongatabu, and on the mountains of the iſland of Huaheine. This bears a conſiderable affinity in character to the laſt, and in habit to *G. piloſa*. The *leaves* are three or four inches long, one and a half or two in breadth, ovate, pointed, often heart-ſhaped at the baſe, crenate throughout, copiouſly veined, of a fine deep ſhining green, roughiſh to the touch on both ſides, with ſome appearance of ſtarry hairs when young; their ribs briſtly beneath. *Footſtalks* half an inch long, thick, hairy. *Stipulas* awl-ſhaped, ſoon deciduous. *Flower-ſtalks* moſtly in pairs, not half ſo long as the leaf, hairy. *Petals* ſhort, ovate, pointed, erect. *Column* ſo ſhort as to be ſcarcely perceptible in the flower, but as the fruit advances it becomes ſufficiently viſible, near a line in length, obconical, ſmooth, crowned with a hairy border. The *fruit* is four-lobed, the ſize of *Euonymus europæus*, but hairy, whence Forſter's name, from μαλλος, *hairy*, and κοκκος, *a berry*. He may well be juſtified, as *Grewia* was then defined, for making this plant a new genus, and it is far more aſtoniſhing that the younger Linnæus ſhould, in the *Supplementum*, mention a difficulty in tracing out a ſpecific difference.

7. G. *lævigata*. Vahl Symb. v. 1. 34. (G. Damine; Gærtn. v. 2. 113. t. 106.)—Leaves elliptic-lanceolate, pointed, ſerrated, ſmooth on both ſides, entire at the baſe. Flower-ſtalks three-flowered. Column ſhort and naked.—Native of the Eaſt Indies. The *branches* are ſlender, purpliſh brown, beſprinkled with white, cloſe-preſſed, cluſtered hairs. *Leaves* on ſhortiſh hairy ſtalks, about two inches long, dark green, veiny, naked, ſmooth, or very ſlightly roughiſh to the touch, elliptic-lanceolate, or ſomewhat obovate, being an inch broad rather beyond the middle, with an elongated ſharp point. They are ſerrated throughout, except at the very baſe, which is entire, ſmooth, and in ſome degree contracted. *Stipulas* awl-ſhaped. *Flower-ſtalks* axillary, ſolitary, ſcarcely half ſo long as the leaf, three-cleft half way down, divaricated, beſprinkled with a few cloſe ſhort briſtles, as if dotted. *Flowers* ſmaller than in any of the foregoing. *Petals* ſhort, erect, acute. *Column* rather longer than in the laſt, five-ſided, quite ſmooth and naked, except at the top, where it is dilated, and crowned with a circle of hairs as in other ſpecies. *Germen* didymous, very ſlightly hairy when young, ſoon becoming quite ſmooth. *Fruit* commonly of two ſmooth grains, the ſize of a pea. It exactly reſembles *G. Damine* of Gærtner, but we find only two cells in each ſeed.

8. G. *glanduloſa*. Vahl. Symb. v. 1. 34.—Leaves ovato-lanceolate, pointed, crenate, nearly ſmooth on both ſides; glandular at the baſe. Flowers nearly ſeſſile.—Native of the iſland of Mauritius. *Branches* roughiſh. *Leaves* on rough ſtalks, three inches long, light green, ovato-lanceolate, pointed, above an inch broad, veiny, firm, naked on both ſides, but not without ſome ſlight roughneſs to the touch. The margin is crenate throughout, and the baſe is remarkable for four or five glandular marginal tubercles on each ſide. The *flowers* reſemble ſome of the earlier ſpecies, and are axillary, on very ſhort, thick, ſimple ſtalks, we are not ſure whether ſolitary or in pairs, nor will our ſpecimen admit of an inveſtigation of the organs of fructification. The *petals* ſeem to be dilated or obovate, and almoſt as long as the calyx.

9. G. *hirſuta*. Vahl. Symb. v. 1. 34.—Leaves ovato-lanceolate, finely downy, ſerrated, unequal at the baſe. Stalks many-flowered. Calyx very hairy.—Native of the ſummits of mountains in the Eaſt Indies. *Vahl.* Received with ſome Java plants from profeſſor Thunberg. Every part, to the inſide of the calyx, is clothed with very ſoft, denſe, ſhort pubeſcence. *Leaves* on ſhort ſtalks, four inches long, one and a half broad, ovate but unequal, ſo as to be half cordate, at the baſe, tapering to an acute point, ſharply ſerrated throughout; their ribs prominent beneath, with numerous ſtraight tranſverſe veins; the upper ſurface is leſs downy, and very finely reticulated. *Stipulas* awl-ſhaped, as long as the footſtalks. *Flower-ſtalks* not much longer, three together, axillary, umbellate, and bearing many ſmall flowers; Vahl ſays but three, yet we ſee no reaſon to doubt his being the ſame as our's. *Bracteas* nearly equal to the partial ſtalks. *Petals* ſhort, oblong, acute, fringed.

10. G. *excelſa*. Vahl. Symb. v. 1. 35. (Chadara arborea; Forſk. Ægypt. Arab. 105.) Leaves oval-oblong, ſerrated, unequal at the baſe; rough above; downy and white beneath. Stalks two or three-flowered.—Gathered by Forſkall on the mountains of Yemen. The Arabs call it *Særak*. We have what agrees with Forſkall's full deſcription, gathered by Dr. Buchanan in the Eaſt Indies, the preciſe place not ſpecified, only our ſpecimen retains no other part of the fructification than the half-grown *germen*, which is turbinate, very hairy, on an extremely ſhort but ſmooth column.—This is ſaid to be a large *tree*. The *leaves* are three or four inches long, green and rough above, very white and downy beneath, unequal like the foregoing at their baſe, on ſhort thick hairy footſtalks. *Stipulas* lanceolate, downy. *Flower-ſtalks* one, two, rarely three or four toge-

ther, one, two or three-flowered, divaricated, hairy, not half ſo long as the leaves.

11. G. *aſiatica*. Linn. Mant. 122. Sonnerat. Voy. v. 2. 244. t. 138. Vahl. Symb. v. 1. 35.—Leaves roundiſh, ſomewhat heart-ſhaped, ſerrated, unequal at the baſe; white and downy beneath. Flower-ſtalks aggregate, much longer than the footſtalks. Column naked, as long as the germen.—Native of the Eaſt Indies. Sent to Linnæus from Surat. Sonnerat ſays it is cultivated in the gardens at Pondicherry. The *leaves* have very much the aſpect of the white American lime tree, *Tilia alba*, and differ from all the preceding in their rounded, heart-ſhaped, unequal-ſided figure. They are two or three inches in diameter, unequally ſerrated, roughiſh above, ſnow-white and finely downy, with prominent ribs and veins, beneath. *Footſtalks* half an inch long, ſwelling upwards, denſely hairy. *Stipulas* the ſame length, lanceolate, acute, downy, permanent. *Flower-ſtalks* axillary, three, four, or five together, ſcarcely half the length of the leaf, moſtly three-flowered, downy. *Flowers* not unlike our common lime-tree, but with red petals half the length of the calyx. *Column* a line in height, cylindrical, ſmooth, with a briſtly crown under the filaments. *Germen* moſt hairy when young, globular, at length almoſt naked. *Fruit* globoſe, red, the ſize of a black currant, acid and agreeable.

12. G. *tiliæfolia*. Vahl. Symb. v. 1. 35. (Microcos lateriflora; Linn. Sp. Pl. 734. Fl. Zeyl. n. 20′. Hamdamanias; Herm. Mus. Zeyl. 3.)—Leaves roundiſh, ſomewhat heart-ſhaped, ſerrated, ſlightly unequal at the baſe, ſmooth on both ſides. Flower-ſtalks ſhorter than the footſtalks. *Vahl.* Native of the Eaſt Indies. *Leaves* twice as large as the laſt, bluntly and pretty equally ſerrated. *Footſtalks* ſcarcely thickened upwards, powdery at the top. *Stipulas* half-heart-ſhaped, hardly half ſo long as the footſtalks. *Flower-ſtalks* axillary, two or three together, about the length of the ſtipulas. *Fruit* two-lobed, ſmooth. Our knowledge of this ſpecies, the only one, except n. 14, that we have not ſeen, is derived from Vahl, who has well diſtinguiſhed it from the laſt, to which Murray had erroneouſly affixed the Linnæan ſynonym.

13. G. *villoſa*. Leaves heart-ſhaped, ſerrated, fringed, rather unequal at the baſe; rough above; downy beneath. Flower-ſtalks ſolitary, as long as the footſtalks. Calyx and germen very briſtly. Column very ſhort.—Gathered by Dr. Rottler on the mountains of Palamcotta in the Eaſt Indies, Nov. 8, 1795. This is a *tree* with very numerous branches; the young ones downy and leafy. *Leaves*, in the flowering ſtate, an inch and a half in diameter, heart-ſhaped, rounded, acute, generally unequal at the baſe, ſharply ſerrated, with hairy teeth; their upper ſurface rugged and harſh; the under denſely downy, greyiſh, with prominent briſtly ribs and veins. *Footſtalks* half an inch long, hairy. *Stipulas* lanceolate, briſtly, deciduous. *Flower-ſtalks* at leaſt equal to thoſe of the leaves, axillary, ſolitary, three or four-flowered, very hairy or briſtly, as is alſo the outſide of the *bracteas*, and *calyx-leaves*, and eſpecially the *germen*, which is globoſe, ſupported by a very ſhort ſmooth *column*, crowned with a ſort of membranous border. The *petals* are half the length of the calyx, oblong and obtuſe.

14. G. *velutina*. Vahl. Symb. v. 1. 35. (Chadara velutina; Forſk. Ægypt. Arab. 106.)—Leaves oval, ſerrated, unequal at the baſe; very ſoft on both ſides; hoary beneath. Flower-ſtalks about three together, as long as the footſtalks, three-flowered. Gathered by Forſkall in Arabia, where it is called *Neſcham*. A *ſhrub*, whoſe branches and every other part are clothed with extremely ſhort ſoft down. *Leaves* on very ſhort ſtalks, an inch long, oval, ſometimes ſlightly angular towards the extremity, obtuſe, unequally and diſtantly ſerrated, whiter underneath, oblique or unequal at the baſe. *Stipulas* ſetaceous, deciduous. *Flowers* ſmaller than in *G. aſiatica*, on axillary, three-cleft, ſhort ſtalks, two or three together. S.

GREWIA *ſalvifolia*. Linn. Suppl. 409, is *Alangium decapetalum*, Lamarck Dict. v. 1. 174. Willd. Sp. Pl. v. 2. 1174.

GREWIA *Microcos*. See MICROCOS.

Since our article GREWIA was written, we have had acceſs to the 4th volume of the *Annales du Muſeum d'Hiſt. Nat.* in which, page 82, is an excellent Mémoire on that genus, by the celebrated Juſſieu, accompanied by five plates, in which fourteen ſpecies are figured. This author deſcribes thirty-three ſpecies, of which four are by himſelf eſteemed doubtful. Theſe are his *apetala*, t. 49. f. 3; *eriocarpa*, t. 51. f. 3; *celtidifolia*; and Vahl's *velutina*. There are ſome doubts reſpecting a few other ſpecies, and as he includes the genus *Microcos* among them, which we do not, the ſuperiority of his numbers is not very great. Our's and Vahl's *glanduloſa* is figured in his t. 48. f. 1. What we have taken for *hirſuta*, is his *tomentoſa*, t. 49. f. 1. His *ovalifolia* appears, by the deſcription, to be our *lævigata*, which he has at n. 16. Our *columnaris* and *villoſa* ſeem unknown to Juſſieu; at leaſt we cannot refer them to any of his deſcriptions or figures.

GREWT, in *Mineralogy*, a word uſed by our miners to expreſs earth, but particularly that earth found in the flat countries and in the banks of rivers, in their ſearches after mineral veins, which is different in colour and nature from the reſt of the bank or bottom. This they always underſtand to have been waſhed off from the neighbouring hills, in the time when the ſhoad-ſtones, by which they train their new mines, were alſo waſhed down, that is, at the univerſal deluge: and this wherever found, proves of great uſe to them in theſe reſearches, as it ſhews which way the waſh from the hill has run, and directs them how to trace the reſt, and where to look for the ſhoad-ſtones with any probability of ſucceſs. They generally examine the banks of rivers, where they have been worn away by land floods, in order to find theſe grewts, and then examine, in a ſtraight line with the next hill, though four or five miles off; and if there be any mine there, they generally meet with ſhoad-ſtones, as tokens of it, in the way. Phil. Tranſ. N 69.

GREWT, in *Mining*, ſignifies the ſpar, or matrix, in which ore is found in a mineral vein; called alſo the gangrene, vein-ſtuff, deads, &c.

GREY, *Lady* JANE, in *Biography*, was the daughter of Henry Grey, marquis of Dorſet, by Frances Brandon, daughter of Charles Brandon, duke of Suffolk, and Mary, queen dowager of France, and ſiſter of Henry VIII. She was born about the year 1537, the exact date not being aſcertained. She was, from a very early age, regarded as a prodigy in learning and uſeful acquirements. Beſides the accompliſhments of needle-work, beautiful hand-writing, and muſic, ſhe poſſeſſed ſuch a knowledge of the learned languages as would be ſurprizing in the moſt promiſing ſcholar of the other ſex who attended to nothing elſe. It is recorded of her, that the learned Aſcham, on paying her a viſit, when ſhe had not completed her fourteenth year, found her reading the Phædon of Plato, in Greek, while the other branches of the family were hunting. She was at this time under the tuition of Mr. Aylmer, afterwards biſhop of London, and was able to write Greek with facility and eloquence, and ſhe is ſaid alſo to have acquired not only the French and Italian languages, but the Hebrew, Chaldee, and Arabic. The ſolidity of her judgment was equal to the readineſs of her apprehenſion, and ſhe diſcourſed upon the moſt important topics with excellent ſenſe. With all theſe endowments, ſhe poſſeſſed that modeſty and gentleneſs which ſo much become the ſex. She imbibed from her preceptor the principles of the reformation, to which, during the remainder of a ſhort life, ſhe always ſteadily adhered. To the events of the period in which lady Jane lived, we have already referred pretty largely in the articles Edward VI. and Dudley, duke of Northumberland. When the latter ſaw that the young king's health was rapidly declining, he meditated the ſecuring of his authority, by a project no leſs daring than criminal. He propoſed to him to ſet aſide both his ſiſters from the ſucceſſion, and bequeathing the crown to lady Jane Grey, though her mother was then living. He had previouſly procured a marriage in May 1553, between this lady and his fourth ſon, lord Guilford Dudley, an amiable youth, who ſoon gained the affections of his charming bride. The act for altering the ſucceſſion was ſpeedily drawn up, and Edward died on the 6th of July of the ſame year: on the 10th of this month, lady Jane's father, now duke of Suffolk, accompanied by the duke of Northumberland, repaired to Durham-houſe, where the young couple reſided, and explained to her what had been done in her favour. She, for ſome time, reſiſted their importunities to become queen, knowing that ſhe had no real title to the ſovereignty, and having an unconquerable averſion from a public and ſplendid ſtation. At length, overcome by the aſſumed authority of her parents, and eſpecially by the entreaties of her huſband, ſhe conſented to become a queen, and was proclaimed to the city of London. Her reign was very ſhort: in nine days Mary was acknowledged as the rightful ſovereign, and lady Jane was rejoiced to return to a private ſtation: but the vindictive queen was not ſatisfied with having obtained her right, ſhe was reſolved to avenge herſelf on thoſe who had diſputed it. The duke of Northumberland was immediately beheaded; after which, the innocent lady Jane and her huſband were arraigned, tried, and convicted, and finally put to death. On the fatal morning, her huſband, who had been confined in ſeparate apartments, requeſted to be permitted to take a laſt farewell of her. This ſhe thought it beſt to decline, leſt it ſhould be the means of ſhaking their reſolution, at a moment when every exertion of fortitude was requiſite. She contented herſelf with giving him a parting token out of her window, as he was led to execution. She ſaw, with compoſure, his remains brought back, and immediately wrote three ſentences in Greek, Latin, and Engliſh, which ſhe preſented to the conſtable of the Tower. In a very ſhort time, the officers announced that ſhe muſt follow the ſteps of her deceaſed huſband. She received the ſummons with heroiſm, acknowledged that ſhe had done wrong in not rejecting the ambitious propoſals of her father, and declared her willingneſs to expiate the crime by death. This dreadful tragedy was acted Feb. 12, 1554. She was but ſeventeen years of age; to the credit of the age, ſhe was univerſally pitied, and the memory of her virtues has excited the higheſt reſpect; while the recollection of the bloody acts of the queen has been a ſubject of general and perpetual execration. Biog. Brit.

Grey, Richard, who flouriſhed in the 18th century, was born in the year 1693. Having received the elements of a good education, he was entered at Lincoln college, in the univerſity of Oxford, where he took his degree of M. A. in 1718. He ſoon had preferment in the church, and was at length made a prebend of St. Paul's, London. In the year 1730, he publiſhed his "Memoria Technica," or a new method of artificial memory. This work has gone through ſeven or eight editions, beſides which there have been ſeveral abridgments of it, in which the whole theory is developed, and as much of the practical part as is neceſſary in common life. (See Memory, *Artificial*.) In the ſame year he publiſhed "A Syſtem of Engliſh Eccleſiaſtical Law," extracted from the "Codex Juris Eccleſiaſtici Anglicani," of the biſhop of London, for the uſe of ſtudents in the univerſities who are deſigned for holy orders. This work was ſo highly eſteemed, that as a ſort of remuneration, he was, in the following year, preſented by the univerſity with the degree of doctor of divinity. About the year 1738, he publiſhed a new and eaſy method of learning Hebrew without points, &c. and in 1742, he preſented the public with "Liber Jobi in verſiculos Metrice diviſus, cum Verſione Latina Alberti Schultens, Notiſque ex ejus Commentario excerptis, &c." Dr. Grey was author of many other works; that on Job occaſioned a controverſy between Dr. Warburton and himſelf. He died in the year 1771, in his 78th year. Gen. Biog.

Grey. See Gray.

Grey, in *Ichthyology*, an Engliſh name for a truttaceous fiſh, the Salmo *eriox* of Linnæus, (which ſee,) caught in many of the rivers of England.

Mr. Pennant believes this to be the *ſewin* or *ſhewin* of South Wales, which is very common in the neighbourhood of Carmarthen. This fiſh appears in the Eſk, in Cumberland, from July to September, and is then in ſpawn. The lower jaw grows hooked, when it is out of ſeaſon. The inhabitants of the North of England, and of South Wales, conſider this fiſh as a diſtinct ſpecies from the ſalmon.

Grey *Abbey*, in *Geography*, a ſmall town in the county of Down, Ireland, in the peninſula of Ardes; 89½ miles N. from Dublin, and 6½ from Donaghadee.

Grey *Antimony ore*. See Antimony.

Grey-*Beds*, in *Mining*, ſignify in the neighbourhood of Macclesfield, in Cheſhire, an indurated ſandy loam, periſhable, called ſtone-bind in Derbyſhire, &c. and ſand-ſtone at Newcaſtle, in Northumberland, &c. See Kirwan's Geo. Eſſays, p. 306.

Grey *Cobalt ore*. See Cobalt.

Grey *Copper ore*. See Copper.

Grey *Deer*, in *Zoology*. See Cervus *Guinenſis*.

Grey *Fly*. See Gad-*fly*.

Grey *Manganeſe ore*. See Manganese.

Grey-*Melting*, in the *Iron Manufacture*, is the name at the iron furnaces and founderies for the beſt kind of pig-iron. See Iron.

Grey *Stone*, in *Mineralogy*, grauſtein of Werner, a rock belonging to the neweſt fletz trap-formation. We are informed by Mr. Jameſon that it is an intimate mixture of white feldſpar and blackiſh hornblende, in which the feldſpar predominates; that it contains olivine and augite, two foſſils that do not occur in porphyry-ſlate, but which occur almoſt always in baſalt, into which the grey-ſtone is ſometimes ſeen to paſs; and that a portion of the unchanged rocks in the vicinity of Veſuvius is grey-ſtone.

If the rock thus characterized be entitled to a particular appellation, we think that, in order to prevent confuſion, a name ſhould have been choſen that was not yet applied to another mineral ſubſtance. The rock which has hitherto been called *grauſtein*, is the *Saxum metalliferum* of Born. As this differs in many reſpects from porphyry, under which name it has been mentioned by ſome writers, and as it is a rock of conſiderable importance, which contains almoſt the whole of the metals of Hungary and Tranſylvania, a ſhort account of it will not be deemed ſuperfluous in this place.

The grauſtein, or Saxum metalliferum, ſays Haidinger, bears ſome diſtant reſemblance to the Saxon porphyry-rock: its component parts are a coarſe, grey, or blueiſh indurated clay, with much black mica; ſometimes it exhibits an admixture of feldſpar and of lithomarge, and now and then, in the neighbourhood of veins, a portion of quartz and even lime-ſtone. Its texture is by no means ſlaty or foliated, but uniformly compact; and it occurs in conſiderable ſtrata, affecting various inclination and dip. Only a ſingle inſtance of a ſlaty ſtructure is mentioned by Born. Its fracture is coarſe, granular, or earthy, and, in general, much reſembles indurated clay; but when expoſed to a ſtrong fire, it melts, without addition, into a black glaſs. There are four varieties of grauſtein, 1, with black mica; 2, with white lithomarge and black mica; 3, with white, moſtly decompoſed, feldſpar and black mica; 4, with quartz and black mica. The argillaceous baſe is moſtly grey, ſometimes greeniſh or reddiſh; the mica occurs now and then cryſtallized in four and ſix-ſided laminæ.

It is in this rock that almoſt all the metalliferous veins occur in Lower Hungary. In Schemnitz and Kremnitz it is moſtly of a light green colour, and dry clayey appearance: towards Herrengrund, Neuſohl, and the Hodritz, it changes its nature, owing to the admixture of a fat greeniſh clay, and of a conſiderable portion of ſilvery mica, which impreſſes it with a ſlaty character, approaching to that of gneiſs. The veins traverſe it with great regularity, and are of conſiderable thickneſs: the vein at Schemnitz, called Spitaler-hauptgang, is from fourteen to eighteen, and the Bieberſtollen-hauptgang from four to five fathoms thick The principal vein-ſtones are quartz, which is often ferruginous and foliated, but at Kremnitz maſſive and white; a reddiſh-brown, iron ſhot, ſometimes auriferous jaſper, called zinnopel; ſeveral varieties of clay-ſtone and calcareous ſpar. In Kremnitz, in the Bartholomew ſhaft, ſome green and pale red fluor ſpar was found, a ſubſtance very ſcarce in Hungary and Tranſylvania. Alſo gypſum often occurs in thoſe veins, and ſelenite, with copper pyrites. Almoſt all metals are found in this grauſtein, but more particularly gold and ſilver, at Schemnitz and Kremnitz, in Hungary, Nagyag, Fuzeſh, Boitza, &c. in Tranſylvania. Copper occurs in it at the Herrengrund, near Neuſohl; lead in the Thereſa-mine at Schemnitz, at Offenbanya in Tranſylvania, &c.; tin, biſmuth, cobalt, and nickel are not found in grauſtein.

The argentiferous lead and copper ores at Fiorazzo in Tyrol, occur in a rock perfectly ſimilar to the Saxum metalliferum, or grauſtein of Hungary.

The grains of feldſpar and lithomarge in this rock are often ſeen decompoſed and deſtroyed, in which caſe the maſs adopts a ſpongy appearance; a circumſtance which has induced ſome writers to conſider grauſtein as a lava.

A more detailed account of this grauſtein, (which, as has been pointed out before, ſhould not be confounded with Werner's grauſtein,) is given in the Bergmanniſches Journal, by profeſſor Wiedenmann, who endeavours to prove that this rock-ſtone is perfectly different from porphyry, to which ſome mineralogiſts have referred it.

GREY *Wethers*, in *Geology*, is a name by which certain large, looſe, blocks of ſtone are well known, that are ſcattered on the chalk downs of Dorſetſhire, Wiltſhire, Berkſhire, Buckinghamſhire, &c., and were ſo, in much greater quantities, in ſome earlier periods, before they had been removed by the inhabitants for building and other purpoſes. Theſe blocks of ſtone are ſome of them of immenſe length and breadth, and at Stonehenge, on Saliſbury plain, and in other ſituations, have been applied to the formation of the very ancient temples of the Druids, Cromlechs, &c. M. de Luc notices theſe grey wethers at page 307 of his Geology; and rather haſtily condemns the explanation which has been offered, to account for theſe huge and uniform looſe blocks of ſtone, *viz.* their being the remains of a ſtratum of ſtone (not *primitive* certainly) which has been waſhed away, except leaving theſe blocks as memorials of its exiſtence. The diſcoveries of Mr. William Smith, within the laſt twenty years, have ſhewn, that in numerous places where regular ſtrata are found on the chalk ſtrata, a ſand ſtratum is ſeen, having a bed of theſe ſtones in it, from eighteen inches to two feet or more thick, exactly anſwering in grain and fracture to theſe grey-wether blocks; and the fact ſeems indiſputable, that the waſhing away of the ſand and great part of the ſtratum, in an early era of our planet, has left theſe looſe blocks; ſomewhat ſimilar to what M. Cuvier and M. Brongniart obſerved at Bougwain, in the foreſts of Fontainbleau, and of Palaiſeau, in the environs of Paris, (ſee Philoſophical Magazine, vol. 35, p. 56. 116. and 117.) above the chalk; whether belonging to the ſame ſtratum or another. we will not take upon us to determine. The grey-wether blocks are of an irregular ſized grit, with a cherty texture, and are or have been found on the top edge of the chalk, throughout its whole courſe through England. An attentive traveller will nowhere approach the chalk diſtrict from the weſtward or northward, without obſerving the ſtep-ſtones and guard-ſtones at the doors and corners of houſes and lanes, the foundations of the buildings, &c. to be made of theſe blocks of ſtone, for ſeveral miles beyond the edge of the chalk, whither they have been carried by the inhabitants, and who have alſo uſed and conſumed much larger quantities of them, in their roads, in many inſtances, which has occaſioned theſe blocks to be much ſcarcer now in ſome diſtricts, than they formerly were. Between Marlborough and Calne, on the road from London to Bath, theſe grey-wether blocks are ſeen lying from about $77\frac{1}{2}$ miles to $81\frac{1}{4}$, but particularly in a ſlight vale on the north ſide of the road, at $77\frac{3}{4}$ miles, where the ſtone blocks almoſt cover the ſurface.

GREYHOUND. See HOUND and DOG.

GREYHOUNDS, in *Aſtronomy*. See CANES *venatici*.

GREYLAG GOOSE. See ANSER and DUCK.

GREY LEAGUE, in *Geography*, the moſt conſiderable, in extent as well as population, of the three Griſon leagues. (See GRISONS.) The etymology of the word *grigia* or *grey*, which gives its name to this league, and indeed to the whole country, is extremely uncertain. Some conceive that the people of this diſtrict, being the original inhabitants of the country, were called *grey* in contradiſtinction to the more modern inhabitants, by way of alluſion to grey hairs, an emblem of antiquity. Others imagine, that the firſt authors of the revolution, which, in 1424, gave liberty to the communities in the Grey League, were dreſſed in the coarſe grey cloth of the country, and that, in commemoration of this great event, the league was called *Grey*. The appellation, however, is of high antiquity, and exiſted long before the revolution. Tacitus calls the inhabitants of this country "Rhætos Griſeos, id eſt canos;" and Ammianus Marcellinus ſtyles the diſtrict about Coire "Canos campos," or the *Grey* fields. It may be obſerved, in general, that the term "Griſons," or *grey* people, was the general name by which all the inhabitants of Rhætia were diſtinguiſhed; but as the inhabitants of the diſtrict called the Grey League firſt took arms for the purpoſe of aſſerting their independence, they naturally ſtyled themſelves the league of the people called Griſons, or the *Grey* league; while thoſe of the other two diſtricts, who afterwards formed ſimilar aſſociations, although equally known by the name of Griſons, took other appellations to diſtinguiſh themſelves from the firſt confederacy.

The territory now occupied by the Grey league was formerly ſubject to the abbot of Diſentis, the counts of Werdenburgh, of Sax, of Maſox, and the baron of Retzuns. The people ſeem originally to have poſſeſſed conſiderable privileges, which were gradually undermined; till at length they became impatient of oppreſſion, and excited by the example of the neighbouring Swiſs republics, they determined to deliver themſelves from the grievous ſubjection under which they laboured. The meeting of the inſurgents was compoſed and orderly; and a ſolemn deputation was diſpatched to the reſpective ſovereigns at Truns. The deputies ſtated their grievances to the chiefs, and not only extorted redreſs, but procured a confirmation of ſeveral obſolete privileges, and the addition of many others. In conſideration of theſe conceſſions, the chiefs reſerved to themſelves certain prerogatives, which ſome of their deſcendants or ſucceſſors enjoy to this day;—a diſtinction, which is now peculiar to this league, and renders the general conſtitution in ſome reſpects more ariſtocratical than that of the two others. Theſe prerogatives conſiſt in being preſent at the annual diet of the league, and in alternately propoſing three candidates for "Landrichter," or chief of the league, one of whom is nominated by the deputies. The counts of Werdenberg being extinct, theſe prerogatives are now confined to the emperor of Germany, as baron of Retzuns, the abbot of Diſentis, and the temporary count of Sax. But as no real count of Sax now exiſts, certain communities of the Grey league ſeized the domains upon the extinction of that family, and continue to exerciſe the rights formerly enjoyed by the counts of Sax. Another diſtinction belonging to the Grey league is this. Like the other leagues, the particular diſtricts poſſeſs their courts of criminal juſtice in the laſt reſort; but in all civil cauſes above a certain value, an appeal lies to ſixteen deputies, annually aſſembled at Truns. This league has been long united with the two other Griſon leagues. See GRISONS.

This league is divided into eight high juriſdictions, which are ſub-divided into 27 communities, as follow:

	Communities.	Members of General Diet.
I. Diſentis	1. Diſentis,	1
	2. Tavetch.	1
II. Valley of Lugnetz	3, 4. Lugnetz.	2
	5. Wals.	1
III. Grub	6, 7. Ilantz,	2
	8. Schlowis,	1
	9. Tenna.	1
IV. Waltenſburg	10. Waltenſburg,	1
	11. Lax,	1
	12. Oberſax.	1
V. Flims	13. Flims,	1
	14. Retzuns and Embs,	2
	16. Trins and Tamins.	1
VI. Rheinwald and Schams	17, 18. Valley of Rheinwald,	2
	19, 20. Valley of Schams.	2
VII. Heunzenberg and Tuſis	21. Tuſis and Catzis,	1
	22. Heunzenberg.	1
	23. Saffien,	1
	24. Cepina.	1
VIII. Maſox	25. Valley of Maſox,	1
	26. Ruſſle,	1
	27. Calanca.	1

GREYSAU, a town of Sileſia, in the principality of Neiſſe; eight miles S.E. of Neiſſe.

GREZ, a town of France, in the department of the Dyle, and chief place of a canton, in the diſtrict of Louvain. The place contains 984, and the canton 8372 inhabitants, on a territory of 160 kiliometres, in 22 communes.

GREZ-*en-Bouère*, a town of France, in the department of the Mayenne, and chief place of a canton, in the diſtrict of Chateau-Gonthier; ſeven miles E.N.E. of it. The place contains 913, and the canton 8728 inhabitants, on a territory of 257½ kiliometres, in 12 communes.

GREZZANO, a town of Italy, in the Veroneſe, on the road to Germany, having a remarkable bridge formed by nature, and connecting two hills; the arch is 50 feet in breadth, and 114 in height; 12 miles N. of Verona.

GRIAS, in *Botany*, is the name of an herb mentioned by Apuleius. *Steph. Theſaur.* Some take it for a kind of creſs. We cannot ſee why Linnæus adopted it for this Weſt Indian tree, except indeed that the fruit, known by the name of Anchovy Pear, is ſaid, when pickled, to be much eſteemed by the Spaniards, and therefore, as a kind of ſeaſoning, bears ſome analogy to the original *Grias.*—Linn. Gen. 266. Schreb. 354. Willd. Sp. Pl. v. 2. 1159. Swartz. Obſ. 215. Mart. Mill. Dict. v. 2. Juſſ. 257.—Claſs and order, *Polyandria Monogynia*. Nat. Ord. *Heſperideæ*, Linn. *Myrti*, Juſſ. (and not ſurely *Guttiferæ*, as Juſſieu makes it?)

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, coriaceous, rather ſmall, in four deep, rounded, equal, concave ſegments. *Cor.* Petals four, much larger than the calyx, oblong, obtuſe, concave, coriaceous, their outer edges thin and ſlightly crenate. *Stam.* Filaments numerous ("inſerted into a ſquare receptacle, united at the baſe into five ſeries;" *Swartz.*), incurved, linear; the outermoſt longeſt, half the length of the corolla; the innermoſt very ſhort; anthers terminal, ſmall, orbicular, of two cells. *Piſt.* Germen inferior, turbinate; ſtyle none; ſtigma minute, croſs-ſhaped, yellow, concealed by the incurved ſtamens. *Peric.* Drupa ovate, with eight furrows, crowned with the calyx. *Seed.* Nut ſolitary, oblong.

Eſſ. Ch. Calyx ſuperior, in four deep ſegments. Petals four. Stigma ſeſſile, croſs-ſhaped. Drupa with eight furrows. Nut ſolitary.

1. G. *cauliflora*. Linn. Sp. Pl. 732. (Calophyllum? foliis tripedalibus obovatis, floribus per caulem et ramos ſparſis; Browne Jam. 245. Palmis affinis Malus Perſica maxima, caudice non ramoſo, foliis longiſſimis, flore tetrapetalo pallidè luteo, fructu ex arboris trunco prodeunte;

Sloane Jam. v. 2. 122. t. 216, and 217, f. 1, 2.)—Native of all the hotteſt parts of the Weſt Indies, in low moiſt or watery places. Frequent in many places in Jamaica. *Sloane, Browne.*

A tall ſtraight handſome *tree*, often 50 feet high, generally with a few terminal ſimple ſhort branches. *Leaves* ſimple, on ſhort ſtalks, pendulous, two or three feet in length, ovate-oblong, entire, or ſlightly waved, tapering at the baſe, ſmooth, thin, with one rib and numerous tranſverſe parallel veins, connected by reticulations. *Flowers* the ſize of a half-crown, yellowiſh-white, fragrant, in ſeſſile cluſters ſcattered over the ſtem or branches far below the leaves, their ſtalks branched and ſcaly. They come forth in the ſpring. *Fruit* ovate, with eight furrows, as big as a large apple. Linnæus, apparently from miſunderſtanding Browne's deſcription, attributes the furrows to the nut, inſtead of the external coating.—Dr. Swartz's deſcription, accompanied by a ſpecimen, has enabled us, we truſt, to give a more correct account of the characters and affinities of this little known genus than has hitherto appeared. Its relationſhip to *Eugenia*, *Barringtonia*, &c., notwithſtanding the ſeſſile ſtigma, ſeems much more certain than to Juſſieu's *Guttiferæ*. S.

GRIASOVETZ, in *Geography*, a town of Ruſſia, and one of the five diſtricts of the province of Vologda, ſituated on a river falling into the Sukkona; 40 miles S.S.E. of Vologda. N. lat. 58° 36′. E. long. 40° 44′.

GRIBALDI, Matthew, ſurnamed *Moſa*, in *Biography*, was born at Chieri in Piedmont, and was educated for the profeſſion of the law. In 1548 he opened a ſchool of law at Padua, where he taught with great reputation. In 1553, having imbibed the principles of the reformation, he was obliged to withdraw ſecretly from that city: and having wandered about from place to place, he was at length introduced to Calvin in Geneva; but as he had incurred the ſuſpicion of being addicted to the Unitarian ſyſtem, that reformer refuſed him his ſociety unleſs he would clear himſelf of the charge; not being able to do this, he was ordered to depart from the city, and the recent fate of the excellent Servetus admoniſhed him of the danger of delay. The perſecuting Calvin predicted the calamities which would befal him, a circumſtance in which he was not likely to be miſtaken, as they were the reſult of that intolerance which he himſelf had excited. Gribaldi was received at Tubingen, where he was choſen profeſſor, till the ſpirit of perſecution impelled him to fly. He now repaired to Bern, in the neighbourhood of which he purchaſed an eſtate with the hope of ſpending his days there, but being cited before the magiſtrates to anſwer for the hereſies imputed to him, he was under the neceſſity of retracting, in order to gain his liberty. Little can be expected from ſuch kind of retractations; that of Gribaldi was not regarded as ſincere, as an evidence of which he afforded an aſylum to the perſecuted Gentilis, for which he would probably have ſuffered ſeverely, had not death interpoſed between him and his cruel perſecutors. He died in 1564. Gribaldi was accounted very eminent in his profeſſion, and a friend to juſtice. He wrote commentaries on the pandects, and other parts of the civil law. Bayle.

GRIBANE, in *Geography*, a town of Canada, on the river St. Lawrence; 30 miles N.E. of Quebec.

GRICANE, a town of Moldavia; 20 miles N. of Jaſſi.

GRICE, a term uſed by country perſons for a young wild boar.

GRICENESS, in *Geography*, a cape on the E. coaſt of the iſland of Stronſa. N. lat. 59° 1′. W. long. 2° 28′.

GRICHE, a town of Perſia, in Segeſtan; 140 miles E.N.E. of Zareng.

GRIEF. The influence of this paſſion on the body is very great, ſo as often to deſtroy all appetite and deſire of meat, either by inſpiring men with a diſreliſh for life, or by a mechanical inſtinct; becauſe food taken at ſuch a time makes but bad nouriſhment, fitter to corrupt the blood than prolong life; on which account it is aſſigned as a phyſical cauſe for the faſting practiſed among the heathens. The influence of this paſſion extends itſelf even to beaſts; which, when indiſpoſed, not only take no pains to provide themſelves food, but alſo refuſe it when laid before them. Vide Mem. Acad. Inſcript. tom. v. p. 50, ſeq. This paſſion has been found to leſſen perſpiration and urine.

GRIELUM, in *Botany*, γριηλον, a ſynonym of the Ιπποσελινον in Dioſcorides, a kind of wild parſley. The name ſeems to have been applied by Linnæus or the younger Burmann to the genus which now bears it, and which they ſeparated from *Geranium*, on account of the leaves, which have certainly a reſemblance to ſome umbelliferous plants, though more to the leaves of an *Artemiſia*. Linn. Gen. 578. Schreb. 311. Willd. Sp. Pl. v. 2. 771. Mart. Mill. Dict. v. 2. Lamarck. Dict. v. 3. 45. Illuſtr. t. 388. Gærtn. t. 36. (Geranium; Juſſ. 269. Cavan. Diſſ. 194.) Claſs and order, *Decandria Pentagynia*. Nat. Ord. *Gruinales*; Linn. *Gerania*. Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, in five deep, ſpreading, acute, equal, permanent ſegments; its baſe flat. *Cor.* regular, of five large, ſpreading, obovate, ſeſſile petals, attenuated at their baſe. Nectary of oblong glands, ſurrounding the germen, and united into a little crown. *Stam.* Filaments ten, thread-ſhaped, rather rigid, equal, permanent, the length of the calyx, or rather ſhorter; anthers ovate-oblong, verſatile, emarginate at each end. *Piſt.* Germens five, diſtinct, awl-ſhaped, erect, ſhorter than the ſtamens; ſtyles none, except the points of the germens; ſtigmas capitate, warty. *Peric.* Capſules five, oblong, pointed, hard. *Seeds* ſolitary? oblong.

Eſſ. Ch. Calyx deeply five-cleft. Petals five. Nectariferous glands forming a crown round the germen. Filaments permanent. Capſules five, pointed, with ſolitary ſeeds.

Obſ. Linnæus doubts whether there may not be ſome ſexual difference between different flowers, or an occaſional abortion of the piſtils. This genus is certainly very near *Geranium*, but wants the beak of the fruit, and conſequently thoſe awns of the capſules ſo remarkable in that, as well as in *Erodium* and *Pelargonium*. See Gerania.

Only one ſpecies is known,

G. *tenuifolium.* Linn. Gen. 578. Lamarck. Dict. v. 3. 45. (G. laciniatum; Gærtn. v. 1. 180. Geranium grandiflorum; Linn. Sp. Pl. 958. Cavan. Diſſ. t. 75. G. fruteſcens incanum, foliis multifidis, flore magno luteo dentato; Burm. Afr. 88. t. 34. f. 1. Ranunculo-platycarpos, foliis tenuiſſimè diſſectis, flore ingenti ſulphureo; ibid. 149. t. 53.)—Native of the Cape of Good Hope. It appears to have been formerly alive in the gardens of Holland, but we know nothing of it in thoſe of this country. The *ſtem* is ſhrubby, but diffuſe and very much branched, and clothed, like the *leaves*, with more or leſs of a white cottony down. The latter are alternate, repeatedly forked, an inch or two in length, their ſegments narrow, linear and acute. *Flowers* larger than a common mallow, yellow, on long, ſimple, ſolitary, lateral ſtalks; the petals uſually toothed, or ſlightly jagged. They are very handſome, and their colour is unuſual in this tribe.

Lamarck preſumes too much on John Burmann's accuracy when he ſuppoſes his two figures above cited really repreſent different plants, becauſe they expreſs ſome differences of character.

GRIEN Head, in *Geography*, a cape on the W. coaſt of the iſland of Barray, one of the Scots Hebrides. N. lat. 66° 59'. W. long. 7° 31'.

GRIESBACH, or Griespach, a town of Bavaria; 14 miles W. of Paſſau.

GRIESKERRIE, one of the ſmaller Shetland iſlands. N. lat. 60° 32'. W. long. 0° 58'.

GRIEZ, a town of Perſia, in Segeſtan; 53 miles S.W. of Ghizni.

GRIFALCO, a town of Naples, in Calabria Ultra; four miles W. of Squillace.—Alſo, a town in the province of Otranto; 17 miles S.E. of Otranto.

GRIFFET, Henry, in *Biography*, was born at Moulins in 1698. He was educated among the Jeſuits, in whoſe connection he remained till the abolition of the order, when he retired to Bruſſels, where he died in 1775. He publiſhed a new edition of "Father Daniel's Hiſtory of France," in 17 volumes 4to.; to this he ſubjoined learned and curious diſſertations, and the life of Lewis XIII., which occupies three of the volumes. He was author alſo of "A Treatiſe on the different kinds of Proof employed in eſtabliſhing hiſtorical Facts." This is eſteemed a ſolid and very judicious performance. He gave a new edition of Avrigny's Memoirs of Profane Hiſtory in five volumes, and publiſhed "Sermons," and other works of practical piety. Gen. Biog.

GRIFFIER, John, a landſcape painter, born at Amſterdam in 1645. A pupil of Roland Roghman, to whoſe manner he did not adhere after he became acquainted with the more perfect one of A. Vandervelde and Lingelbach, though his talents were of a far inferior claſs to either of thoſe artiſts. He ſettled in England, and made views of many of the principal places, which are highly wrought, but with rather an artificial tone of colouring. His execution was minute and laboured, but his pictures are very well completed in that ſtyle. He likewiſe employed his talents in imitations of Rembrandt, Ryſdael, Polemburg, and Teniers, and ſo ſucceſsfully, that his productions are often taken for originals. He died in the 73d year of his age in 1718. He was known by the appellation of the old Griffier.

Griffier, Robert, or the young Griffier, was a ſon of John, and practiſed the ſame profeſſion as his father, and in the ſame ſtyle. He reſided chiefly upon the continent, and produced a great number of elaborate pictures of views on the Rhine, &c. with many figures in them.

GRIFFON, Gryphus, γρυψ, in *Natural Hiſtory*, the name of an imaginary bird of prey, of the eagle kind.

The ancients ſpeak fabulouſly of the griffon: they repreſent it with four legs, wings, and a beak; the upper part repreſenting an eagle, and the lower a lion: they ſuppoſe it to watch over gold-mines, hidden treaſures, &c.

The animal was conſecrated to the ſun; and the ancient painters repreſented the chariot of the ſun as drawn by griffons. M. Spanheim obſerves the ſame of thoſe of Jupiter and Nemeſis.

The griffon, in Scripture, is that ſpecies of the eagle called in Latin, *oſſifraga*, the *oſprey*; and פרס, of the verb פרס, *paras, to break.*

The griffon is frequently ſeen on ancient medals; and is ſtill borne in coat-armour.

Guillim blazons it rampant; alleging, that any very fierce animal may be ſo blazoned, as well as the lion. Sylveſter, Morgan, and others, uſe the term *ſegreiant*, inſtead of rampant.

This is alſo an ornament of architecture in conſtant uſe among the Greeks, and was copied from them, with the other elegancies of architectural enrichments, by the Romans. See Sphynx.

Griffon, in *Ornithology*. See Vultur *fulvus*.

GRIG, in *Ichthyology*, a name frequently uſed for the ſand eel, or ammodytes.

Theſe are common in the Thames, and are diſtinguiſhed from the common ſort by having a larger head, a blunter noſe, thicker ſkin, and leſs fat; and they are not ſo much eſteemed, and ſeldom exceed three or four ounces in weight.

GRIGGIO, in *Geography*, a river of Naples, which runs into the Adriatic. N. lat. 42° 12'. E. long. 14° 50'.

GRIGNAN, a town of France, in the department of the Drôme, and chief place of a canton, in the diſtrict of Montelimart, 10 miles S.S.E. of it. The place contains 1669, and the canton 8042 inhabitants, on a territory of 207½ kiliometres, in 13 communes.

GRIGNOLS, a town of France, in the department of the Dordogne, and chief place of a canton, in the diſtrict of Perigueux; 10 miles S.S.W. from it. The place contains 1014, and the canton 10,559 inhabitants, on a territory of 187½ kiliometres, in 12 communes.—Alſo, a town of France, in the department of the Gironde, and chief place of a canton, in the diſtrict of Bazas; 9 miles S.E. of it. The place contains 3160, and the canton 5000 inhabitants, on a territory of 135 kiliometres, in 10 communes.

GRIGNON, a village of France, in the neighbourhood of Paris, is rendered intereſting to the curious, and to the geologiſt in particular, for its quarries of gypſum and ſtone, which contains ſuch a multitude and variety of organic remains, that 600 different ſpecies of foſſil ſhells have been there obſerved! See Philoſophical Magazine, vol. 33, p. 314, and vol. 35, p. 118.

GRIGRI, in *Ornithology*. See Ramphastos *Aracari*.

GRIGUET Bay, in *Geography*, a bay at the N.E. extremity of Newfoundland. N. lat. 51° 40'. W. long. 55° 24'.

GRILIMON, a town of Aſiatic Turkey, on the W. coaſt of Natolia. N. lat. 38° 35'. E. long. 26° 19'.

GRILLA, La, a town of South America, in the government of the Caraccas; 50 miles S.S.W. of Merida. N. lat. 7° 22'. W. long. 70° 56'.

GRILLADE, in *Cookery*, meat broiled on the gridiron; thus called from the French *griller*, to *broil*.

The word is alſo uſed for the browning of any diſh, by rubbing a red-hot iron over it. To *grill* oyſters, is to put them into ſcollop ſhells, ſeaſon them with ſalt, pepper, and parſley ſhred, and pour their own liquor to them, covering them with grated bread, ſtewing them half an hour on the fire, and browning them with a red-hot iron. Shrimps are *grilled* after the ſame manner.

GRILLON, in *Geography*, a town of Africa, in Sierra Leone. N. lat. 10° 34'. W. long. 13° 30'.

GRIMALDI, Nicolino, in *Biography*. See Nicolino.

Grimaldi, Gio. Francesco. See Bolognese.

GRIMANI, Domenico, cardinal, was born at Venice in 1460. His father being procurator of St. Mark, and afterwards doge of the city, the ſon was ſoon brought into public notice, and employed by the ſtate in important offices. In 1493 he was raiſed to the purple by pope Alexander VI. He is noticed by hiſtorians on account of the piety which he diſplayed towards his father, who having been commander of a fleet, and defeated by the Turks, was impriſoned and treated with great rigour. The ſon offered to take his place, which being refuſed, he attended him in priſon, and rendered him all the ſervice in his power. The ſubject of this article was an eminent patron of the fine arts: he collected a choice and valuable library, conſiſting of eight thouſand volumes in all languages, which, at his deceaſe, he bequeathed to the canons regular of St. Salvadore, in Venice. He made a fine collection of ſtatues, and other remains of antiquity, which, augmented by his nephew John, patriarch of Aquileia, was preſented by both to the republic of Venice. He was the friend and liberal patron of the great Eraſmus, and tranſlated from the Greek ſome homilies of Chryſoſtom. He died in 1523. Moreri.

GRIMAUD, in *Geography*, a town of France, in the department of the Var, and chief place of a canton, in the diſtrict of Draguignan; 12 miles S. of Frejus. The place contains 1164, and the canton 5009 inhabitants, on a territory of 327½ kiliometres, in four communes.

GRIMBALD, in *Biography*, a learned monk of St. Bertin, in France, who, during the ninth century, at the requeſt of our excellent monarch, Alfred, being ſkilful in all the liberal ſciences, particularly *muſic*, was ſent hither by Fulk, archbiſhop of Rheims, to introduce a regular method of ſtudy in our ſchools.

GRIMBERG, in *Geography*, a town of Germany, in the county of Marck; 12 miles W. of Dortmund.

GRIMBUSTER-HOLM, one of the ſmaller Orkney iſlands, near the N. coaſt of the iſland of Pomona.

GRIMM, in *Zoology*, ANTILOPE *Grimmia*, Guinea antelope of Pennant, has ſhort, ſlender, ſtraight, ſharp-pointed horns, which are furrowed their whole length, and ſlightly annulated at the baſes; with a large lachrymal cavity under each eye, and a tuft of black hairs between the horns. This is a very elegant animal, about 18 inches high at the ſhoulders, the horns of the male about three inches long, and the females are ſaid to be hornleſs; the colour is various, being in ſome of a light bay colour, in others brown, mixed with aſh-colour, and tinged with yellow; the belly white, and the ſhort tail white beneath and black on the upper part; a black ſtripe runs down the middle of the face; under the chin is a ſmall hairy wart; the ears are large, and have three longitudinal depreſſions on the outſide; on each ſide, between the eyes and the noſe, is a large depreſſion, always moiſt, and containing a viſcid humour, which ſoon hardens and becomes black; the legs are aſh-coloured, very ſlender, and elegant, the fore-legs being adorned with a black band as far as above the knees, and having only a ſlight excreſcence inſtead of ſpurious hoofs. This animal inhabits Guinea.

GRIMMA, in *Geography*, a town of Saxony, in the circle of Leipſick, on the Mulda. It has three churches and a college. The articles of its chief trade are wood, linen, thread, beer, and flannels; 15 miles E.S.E. of Leipſick. N. lat. 51° 12′. E. long. 12° 40′.

GRIMMEN, or GRIMN, a town of Anterior Pomerania, 14 miles S. of Stralſund. N. lat. 54° 6′. E. long. 13° 4′.

GRIMMIA, in *Botany*, was named by Ehrhart, and ſubſequently by Hedwig, in honour of Dr. John Frederick Charles Grimm, author of a methodical enumeration of the plants about Iſenach, in Upper Saxony, printed in the Nov. Act. Acad. Naturæ Curioſorum, v. 3, 4, and 5, as alſo of an account of the *Braſſica alpina*, referred by him to *Turritis*, in v. 3. Of this he ſent a drawing to Linnæus, as mentioned in the Syſt. Veg. along with a ſpecimen. Whatever his ſcientific merits may be, the writer of this can teſtify, that they are not enhanced by ſuavity of manners. Ehrh. Beitr. v. 1 176. Hedw. Fund. v. 2. 89. Sp. Muſc. 75. Schreb. 759. Sm. Fl. Brit. 1183. Swartz. Muſc. Suec. 27. (Weiſſia; Hedw. Fund. v. 2. 90. Sp. Muſc. 64. Swartz. Muſc. Suec. 25. Bryi et Mnii ſpecies variæ; Linn.) Claſs and order, *Cryptogamia Muſci*. Nat. Ord. *Muſci*.

Eſſ. Ch. Capſule ovate. Fringe ſimple, of 16 teeth, broadeſt at their baſe. Flowers terminal. Veil cylindrical.

We refer the reader to the article DICRANUM for ſome remarks on the Hedwigian ſyſtem of Moſſes, which equally concern the preſent genus, diſtinguiſhed from that by having undivided, inſtead of forked, teeth in the fringe. *Grimmia*, even including *Weiſſia*, is not half ſo numerous in ſpecies as *Dicranum*; nor can they with any propriety or convenience be ſeparated, the only ſuppoſed difference being, that *Grimmia* of Hedwig has *ſome* of its male flowers axillary, while in *Weiſſia* they are all terminal, which leads to no certain technical diſtinction, any more than to a natural one, in any kinds of Moſſes. Even Mohr, by no means prone to leſſen the number of genera, unites theſe two, and in his *Index Muſei Plantarum Cryptogamicarum*, enumerates 25 ſpecies, to which indeed he ſubjoins the *Octoblepharum*, and ſome ſpecies of *Pterogonium*, regardleſs of the ſmall number of teeth in the former, and of the axillary female fructification in the latter, juſt as he unites *Bryum* and *Hypnum* together, in defiance of all natural principles.—The ſpecies of *Grimmia* in the *Flora Britannica*, are twenty-ſeven, to which two more have ſince been added in *Engliſh Botany*. A few of theſe indeed are placed by Mohr in ſome of his other genera, not adopted by us.

The general habit of *Grimmia* is not much unlike that of *Dicranum*, except ſome of the latter ſpecies, which are much branched, and have broader darker-coloured leaves than the reſt. Among theſe principally are found ſome axillary bud-ſhaped male flowers. The genus does not naturally divide itſelf into any accurately defined ſections; we muſt therefore take a general view of the leading ſpecies only.

G. *recurvata*. Hedw. Crypt. v. 1. 102. t. 38. Engl. Bot. t. 1489. (Bryum recurvatum; Dicks. Crypt. faſc. 2. 7. B. ſetaceum; Walf. in Jacq. Miſc. v. 2. 96. t. 12. f. 1.) is one of the ſmalleſt of Moſſes, the *Phaſca* excepted. It grows in barren graſſy mountainous places, and is annual, obſervable only in the ſpring. The *ſtem* is ſo ſhort as to be ſcarcely diſcernible. *Leaves* numerous, briſtle-ſhaped, bright green. *Fruit-ſtalk* ſolitary, capillary, at firſt erect, then recurved. *Capſule* olive-coloured, pear-ſhaped, ſmooth, with a little incurved lid half its own length. The minute *fringe* conſiſts of ſixteen deep-red teeth, dilated at their baſe.

G. *puſilla*, (Weiſſia puſilla; Hedw. Crypt. v. 2. 78. t. 29 A.) and *ſtriata*, Engl. Bot. t. 1988, are alſo minute ſpecies.

G. *ſchiſti*, Engl. Bot. t. 1952, is a larger and very pretty alpine ſpecies of rare occurrence.

G. *Starkeana*, Engl. Bot. t. 1490; *atro-virens*, t. 2015, not in Fl. Brit.; *lanceolata*, t. 1408; are all allied by their broader leaves, dark-colour and ſtouter habit; nor is *calcarea* (Bryum calcareum; Engl. Bot. t. 191.) unlike them, notwithſtanding its cylindrical foliage.

G. *controverſa*, t. 1367; *Dickſoni*, t. 1420; and *cirrata*, (Vaill. Paris. t. 24. f. 8.) agree in their beautiful capillary *leaves*. curled or frizzled in drying, and a peculiar elegance of form in their *capſules*.

G. *recurviroſtra*, Engl. Bot. t. 1438, is nearly allied to them in delicacy, but has broader *leaves*, and a ſhorter blunter *lid*.

G. *verticillata*, t. 1258, is remarkable for having eſcaped the obſervation of Haller, Hedwig, and moſt other cryptogamic botaniſts. Mohr has it not in his liſt. It is a very elegant moſs, with a branched *ſtem*, and narrow *leaves*, of a fine green, growing in ſubalpine ſprings, on a calcareous ſoil, in conſequence of which it is found incruſted with minute ſtalactitical fragments, as white as ſnow. The *fruit-ſtalks*, though at firſt terminal, become immediately lateral, in conſequence of the elongation of the branches, in this, as in other ſpecies. Linnæus adopted this plant entirely from Dillenius, and the Rev. H. Davies has communicated it to us from its original place of growth. To him alſo we are obliged for the diſcovery of G. *criſpula*, t. 2203, (Weiſſia criſpula; Hedw. Sp. Muſc. t. 12. f. 1.—6.) in Angleſea; though ſince found by other botaniſts in Ireland and Suſſex.

G. *acuta*, Engl. Bot. t. 1644, not ſo characteriſtically repreſented there as could have been wiſhed, is conſpicuous on its native mountains for its ſilky olive-coloured aſpect, and long, curved, but never criſped, ſhining *leaves*. The *fruitſtalks* only become ſpiral and twiſted by drying.

G. *inclinata*, t. 1824, is a *Swartzia*, now *Cynontodium*, of Hedwig; *Afzelia* of Ehrhart (which is equivalent to *Weiſſia*); and *Didymodon* of Swartz and Mohr. The chief character of *Cynontodium* is that the ſtamens and piſtils are in the ſame flower, which is of no value in founding genera of Moſſes, and of *Didymodon* that the teeth are approximated in pairs, which we do not find the caſe with the preſent plant, nor does it appear to us of any generical importance, except where the teeth are 32, as in *Trichoſtomum*.

G. *heteromalla*, t. 1899, otherwiſe not unlike the laſt, has the leaves curved to one ſide, like *homomalla*, t. 1900; but this has its 16 teeth approximated in pairs, an admirable ſpecific mark, but the two moſſes are otherwiſe ſo very nearly akin, that it decidedly can be no generic one.

G. *nigrita*, t. 1825, found in ſandy ground in Scotland, bears a moſt ſingular, round, dark-coloured, drooping capſule.

G. *Forſteri*, t. 2225, we are nearly perſuaded is *Mnium conoideum*, t. 1239.

G. *conoſtoma*, t. 1135, a large and handſome ſpecies, is made a genus, *Conoſtomum*, by Dr. Swartz in Schrader's New Journal, on account of the long-pointed cohering fringe; and the diſtinct habit reſembling that of *Bartramia*, confirms the meaſure. There is an antarctic ſpecies beſides.

G. *nuda*, Engl. Bot. t. 1421, (the *roſea* of ſome late foreign authors,) is known by its beautiful pink ſtalk, round capſule, and very few ſhort leaves.

G. *ſplachnoides*, t. 2164, (Splachnum longicollum; Dicks. Crypt. faſc. 4. 4. t. 10. f. 9.) is extremely remarkable for its reſemblance to a *Splachnum*, which is ſo great, that ſome very eminent judges have thought it a kind of *luſus Naturæ*; but we cannot admit the ſuppoſition.—The exotic *Weiſſia radians*, Hedw. Sp. Muſc. 73, t. 13. f. 1—4, is nearly akin to this, and no leſs like a *Splachnum* in habit.

G. *fugax*, (Weiſſia fugax; Hedw. Sp. Muſc. t. 13.) a German ſpecies of diminutive ſtature, ranges near ſome of our firſt-mentioned, as does his *microdonta*, t. 11. His *criſpula*, t. 12. f. 1—6, from Bohemia, is neareſt our *Dickſoni*.

After the above follow the more dark and broad-leaved branching ſpecies, of which G. *apocarpa*, t. 1134, is a common and characteriſtic example, not rare on trees or rocks. Its hair-pointed upper *leaves*, nearly ſeſſile *capſule*, (which is uſual in theſe,) and red *fringe* and *lid*, ſerve to identify it.—G. *Donniana*, t. 1259; *alpicola*, t. 2226; *maritima*, t. 1645; *rivularis*, t. 1345; and *ſtricta*, t. 1963, all much reſembling each other, make up the Britiſh ſpecies of this tribe. G. *plagipodia*, Hedw. Sp. Muſc. t. 15. f. 5—13, and eſpecially *cribroſa*, Hedw. Crypt. v. 3, t. 31 A, natives of Germany, are remarkable for the perforated teeth of their crimſon fringe, which in the laſt-mentioned are no leſs beautiful than curious.

GRIMNESS, in *Geography*, a cape on the E. coaſt of the iſland of South Ronaldſha. N. lat. 58 42′. W. long. 2° 45′.

GRIMOLOW, a town of Poland, in the palatinate of Podolia; 46 miles N. N. W. of Kaminiec.

GRIMROOS, a town of New Brunſwick, on the river St. John. N. lat. 45 50′. W. long. 66° 12′.

GRIMSAY, one of the weſtern iſlands of Scotland, ſituated between North Uiſt and Benbecula. It is a barren iſland, 2 miles long, and covered with heath. N. lat. 57° 27′. W. long. 7 13′.

GRIMSBY, or GREAT GRIMSBY, ſo called to diſtinguiſh it from a village of the ſame name, is a borough, market, and ſea-port town, ſituated near the mouth of the Humber, in the wapentake of Bradley-Haverſtoe, in Lindſay diviſion of Lincolnſhire, England. It is one of the moſt ancient boroughs in the kingdom, was formerly rich and populous, and poſſeſſed a conſiderable ſhare of foreign commerce and internal trade. The firſt charter was granted by king John. Two members, elected by the reſident burgeſſes, have been returned to parliament ever ſince the reign of Edward I. At the ſiege of Calais, by Edward III. Grimſby ſupplied the king with eleven ſhips and 170 mariners. But the trade afterwards declined, and the harbour, which had been very commodious, became nearly choaked with mud. The ſpirit of the place has, however of late revived; the harbour has been improved, and a dock conſtructed at a great expence, by which means the trade of the port has been increaſed, and the town extended by many additional buildings. Here were formerly two pariſh churches; but that of St. Mary, which was a handſome building, and its ſteeple a good land-mark for mariners, has been long ſince taken down. The remaining church, St. James's, is a ſpacious ſtructure, built in the form of a croſs, with a tower in the centre. Originally it was of greater extent, a part of the choir having fallen down about the year 1600. The ſteeple is a beautiful ſpecimen of Engliſh pointed architecture, and appears to have ſuffered leſs from the depredations of time than other parts of the church. The alterations it has undergone at different periods by no means correſpond with the ſtyle of the original building. The civil government of the town is now veſted in a mayor, two bailiffs, twelve aldermen, and thirty-ſix burgeſſes. The mayor and bailiffs hold ſeparate courts; the former on Tueſday, the latter on Friday. Grimſby is diſtant from London 170 miles: contains 257 houſes and 1524 inhabitants; has a weekly market on Wedneſdays and two annual fairs. Here were formerly a monaſtery of Grey friars, a convent of Benedictine nuns, and a priory of Auguſtine canons; many ancient monuments, removed from theſe religious houſes, are now depoſited in St. James's church.

Grimſby had the honour of being the birth-place of that diſtinguiſhed prelate, Dr. John Whitgift, archbiſhop of Canterbury, and a zealous aſſerter of the doctrines and diſcipline of the eſtabliſhed church. He was born in 1530, and died Feb. 1603.

In the vicinity of the town are many of thoſe extraordinary fountains called Blow-wells. Theſe are deep circular pits which furniſh a continual flow of water, riſing to the ſurface of the ground but never overflowing. Beauties of England and Wales, vol. ix.

GRIMSBY-*Canal*, is a ſhort canal of very large dimenſions, leading from the Humber river to Grimſby wet docks, made in purſuance of an act of 36 Geo. III. See our article CANAL.

GRIMSBY's *Townſhip*, a townſhip of Upper Canada, in Lincoln county, W. of Clinton, and fronting lake Ontario.

GRIMSEL, a mountain of Switzerland, being one of the Alps which ſeparate the Vallais from the country of Berne. The aſcent of this mountain preſents the ſeveral ſhades of vegetation: in the valley and lower parts of the mountain, corn and rich meadows: then foreſts of larch and pine; next ſhort graſs, together with ſeveral ſpecies of herbs, that afford exquiſite paſture to the cattle: to theſe ſucceed the various tribes of moſſes and lichens; then bare rocks and ſnow. In the midſt of this mountain, about two miles from the top, is a ſmall plain or hollow, containing one ſolitary hovel, furniſhing accommodations for travellers, and kept by a landlord who is placed here by the canton of Berne, and reſides in it about nine months, from the firſt of March to the beginning of December. When he returns he leaves proviſions for any unfortunate wanderer who may chance to paſs this way in winter; and on both ſides of the track long poles are fixed for direction to travellers after the ſnow has fallen. In the ſummer months numerous herds of goats are kept upon theſe mountains. The ſources of the Aar are three lakes near the hovel juſt mentioned; one of theſe lakes is of a dark appearance, and its name is as melancholy as its aſpect: it is called the "lake of the dead," becauſe the dead bodies of thoſe who periſh in travelling theſe inhoſpitable regions are thrown into it.

GRIMSON, a ſmall iſland on the W. ſide of the gulf of Bothnia. N. lat. 61° 14′. E long. 17° 6′.

GRIMSTA, a town of Sweden, in Weſt Gothland; 18 miles N. E. of Uddevalla.

GRIN, a town of Armenia; 130 miles N. E. of Erivan.—Alſo, a ſmall iſland in the Atlantic, near the W. coaſt of Africa. N. lat. 19° 29′.

GRINADIL, one of the ſmaller weſtern iſlands of Scotland, near the E. coaſt of Benbecula.

GRIND, a ſmall iſland near the coaſt of Frieſland; 10 miles N. N. W. of Harlingen. N lat. 53° 21′. E. long. 5° 13′.

GRINDAL, EDMUND, in *Biography*, was born at a village near Whitehaven, in Cumberland, in the year 1519. He diſcovered, at a very early age, a ſtrong inclination for learning, and after he had paſſed through the grammar ſchool he was ſent to Magdalen college, Cambridge, from whence he removed to Chriſt's college, and again to Pembroke Hall, where he was choſen fellow in 1538. He took his degrees, and in 1548 was appointed ſenior proctor of the univerſity, and in the following year he was elected lady Margaret's preacher at Cambridge. His learning, piety, and virtue recommended him to the notice of biſhop Ridley, who, in 1550, appointed him his chaplain, and in the following year he was collated to the precentorſhip of St. Paul's cathedral. His next promotion was to the appointment of chaplain to his majeſty, and in 1552 he was made prebendary of Weſtminſter. Upon the death of king Edward Mr. Grindal, who did not mean to abandon his principles, thought it prudent to retire into Germany, to avoid the perſecution of Mary and her cruel biſhops. He ſettled at Straſburg, where he applied with great diligence to the ſtudy of the German language, to qualify him to preach in the churches of that country. While he was on the continent he was very induſtrious in collecting authentic accounts of the lives and writings of the ſufferers in England for the Proteſtant religion, which he preſented to Mr. John Fox, who inſerted them in his "Acts and Monuments." (See FOX, JOHN.) Upon the demiſe of queen Mary, in 1558, he returned to England, and was employed with others in preparing the new liturgy, which was to be preſented to the queen's firſt parliament. He was alſo employed in ſome important miſſions, and appointed maſter of Pembroke Hall, Cambridge, in the room of Dr. Young, who refuſed to take the oaths of ſupremacy. This was in the year 1559, and in the ſame year he was nominated to the biſhopric of London, in the ſtead of Bonner; but he did not abſolutely accept it on account of ſome ſcruples of conſcience with reſpect to the habits and ceremonies to be uſed by the biſhops. Having conſulted his friend Peter Martyr, who recommended him to comply, he was conſecrated before the cloſe of the year. In 1560, biſhop Grindal, in conjunction with the archbiſhop of Canterbury, reformed the calendar for the book of Common Prayer, and ordered that the ten commandments, in Engliſh, ſhould be ſet up upon the eaſt wall of every church throughout the kingdom. In 1563 he was employed, with the archbiſhop of Canterbury and ſome civilians, in preparing a book of fixed ſtatutes for Chriſt's college, Oxford. About the ſame time he rendered an important ſervice to the Engliſh merchants at Antwerp and other places, at that period under the Spaniſh dominion, who, from repeated ill uſage, were deſirous of removing from their territories to ſome commodious place on the continent, where they might enjoy the rights of conſcience, and purſue their trade without the reſtrictions grievouſly impoſed on them by the Spaniſh government. By means of his intereſt with the queen, and his able management with the agent of the earl and counteſs of Eaſt Friezeland, he procured a licence for their eſtabliſhment at Embden, where they were ſoon ſettled to their entire ſatisfaction. In the year 1564 biſhop Grindal was admitted to the degree of doctor of divinity by the univerſity of Cambridge, who deputed Miles Coverdale to adminiſter to him the oaths, at his palace in London; and in the ſame year he received orders from the queen and archbiſhop Parker to proſecute all thoſe who did not comply with the act of Uniformity. Perſecution, however, was biſhop Grindal's ſtrange work; he endeavoured to conciliate by every method of kindneſs and perſuaſion, rather than make uſe of the ſword of the law, and when many were ſuffering cruel impriſonment, and refuſed to make any conceſſions with the hope of liberation, he interfered and obtained their releaſe. In 1568 he ſet about a ſubſcription for the relief of the perſecuted Proteſtants abroad: and in the year 1570 he was tranſlated to the archbiſhopric of York, and almoſt immediately afterwards went into Yorkſhire, where he found the charge which he had undertaken was more laborious than he expected, on account of the ſuperſtition and groſs ignorance that prevailed, and the ſcarcity of laborious clergymen, to inſtruct and reform them: but having put his hand to the plough he was determined not to ſhrink from his duty, and, with the zeal and perſeverance which he manifeſted, in a few years, he ſucceeded in introducing a favourable change into his dioceſe. Upon the death of archbiſhop Parker, Dr. Grindal was tranſlated to the ſee of Canterbury. He fell under the queen's diſpleaſure for reſiſting her wiſh in reſpect to putting down perſons who met together for religious exerciſes. He declared that he could not in conſcience, and without offence to the Majeſty of God, give his conſent in this buſineſs; and in a ſtrong letter which he addreſſed to her majeſty, he exhorted her to remember, that ſhe was a mortal creature and accountable to God. This letter ſo enraged the queen, that ſhe ſent the worthy archbiſhop an order from the ſtar-chamber, which cauſed him to be confined to his houſe, and to be ſequeſtered from his archiepiſcopal functions for ſix months. As, however, the archbiſhop refuſed to retract, the ſequeſtration was continued, notwithſtanding a petition from the members of the convocation to have it removed, till the year 1582. At this period the venerable prelate loſt his ſight, and he took that opportunity of reſigning his dignity; but he never regained the queen's favour, becauſe he would never acknowledge that he was wrong in reſiſting her imperious commands. He died in 1583, leaving behind him a character of great learning and piety; of unblameable and exemplary manners. He was mild, generous, friendly, and affable; eaſy of acceſs even in the higheſt ſtate of exaltation. None of his writings were publiſhed excepting a ſermon, and a "Dialogue betweeen Cuſtom and Truth," printed in Fox's "Acts and Monuments." Biog. Brit.

GRINDELWALD, in *Geography*, a town, or rather village, of Switzerland, in the canton of Bern, at the foot of the Scheidec. This village, conſiſting of numerous cottages, diſperſed over the plain and upon the riſing hills, exhibits an agreeable and pictureſque ſcene, heightened by a view of the vallies of ice, which ſtretch along the ſteep ſides of the mountains in a regular curve, and are beautifully ſkirted with wood. The two vallies of ice which extend into the plain of Grindelwald are called the ſuperior and inferior Glaciers. The former lies between the Wetterhorn and the Mettenberg; the latter between the Mettenberg and the Eger-horn. The Mettenberg is the baſe of the Schreckhorn; and the Eger-horn, or Pointed Peak, borders on the valley of Grindelwald, and ſlopes gradually from barren rock to fertility and cultivation.

GRIND-MILL, or *Blade-mill*, in the *Manufactures*, is a kind of mill common in the neighbourhood of Sheffield, and other places where cutlery, edge-tools, and poliſhed ſteel articles, as fenders, &c. are manufactured: in theſe mills, a great number of large grind-ſtones are mounted on ſpindles, and, by means of ſtraps, are turned with great velocity. Water, in all the rivers and brooks near Sheffield, was formerly applied to theſe mills, but of late years ſeveral large ſteam-engines have been applied, to work additional grind-mills in the town and neighbourhood: the firſt of which was erected by the late Mr. Francis Thompſon, engineer, of Aſhover, Derbyſhire. See CUTLERY.

GRIND-STONE, *cos gyratalis*, in *Natural Hiſtory*, is a very coarſe, rugged, rough, and harſh ſtone, of a yellowiſh brown colour, compoſed of an irregular grit, cemented together by a coarſe and debaſed terrene cryſtalline matter, and intermixed with a very few glittering ſpangles of white talc; it cuts freely, but bears no poliſh; it is pervaded by water, will not ſtrike fire with ſteel, is not acted upon by acids, and burns to a deep red colour, but acquires no hardneſs. It is chiefly dug in the northern counties of England, and uſed for grind-ſtones, whence its name.

GRIND-STONES, in the *Manufactures*, are flat circular ſtones uſed for the grinding of edge tools, when ſuch are mounted on a ſpindle, and turned by a winch-handle, as is common in every part of the country; but in diſtricts where cutlery and tools are manufactured, great numbers of theſe ſtones are uſed in one building, called a grind-mill or blade-mill, and are turned by water or ſteam-engines. (See GRIND-MILL.) The ſtone ſuited to form grind-ſtones is what is denominated a ſharp grit, that is, the grains of ſand or ſilex of which it is compoſed are partly uniform in ſize, and are firmly attached to each other by a ſilicious or other very hard cement, without the interſtices between the grains being filled up, as frequently is the caſe, or nearly ſo, with the other kinds of ſand-ſtone. Grind-ſtones are of very different degrees of fineneſs, in the grains of ſilex, according to the different ſtrata whence they are obtained: the coarſeſt and beſt for heavy works, ſuch as the grinding of gun-barrels, &c. are from the firſt or mill-ſtone grit of the Derbyſhire ſtrata (ſee the ſection of theſe, in the Phil. Mag. plate 2, vol. xxxi.): others are from the third rock, the next ſtratum but two above the former: and in other counties coarſe grind-ſtones are manufactured from the coarſe grit rocks near the bottom of their different coal ſeries; for it is rather remarkable, that all the grind-ſtone quarries with which we are acquainted, are in the coal-meaſures or ſtrata where vegetable remains abound. The finer ſorts of grind-ſtones, and what are called whitening or poliſhing ſtones by the Sheffield cutlers, are from *different* rocks, in the upper part of the great Derbyſhire coal-ſeries; Mr. Whitehurſt, p. 168. of his "Inquiry," ſeems to have known, or diſtinguiſhed but two out of the 18 or 20 grit-ſtone rocks which this ſeries contains, and ſays, "the *upper* ſtratum of argillaceous ſtone is excellent for the uſe of cutlers' grinding-ſtones." Mr. Mawe's knowledge of theſe ſtrata ſeems to have been equally confined, ſee his ſection and deſcription in the "Mineralogy of Derbyſhire," p. 14. It may prove intereſting to many of our readers, to ſee the following liſt of grind-ſtone quarries, with their degrees of coarſeneſs, *viz.*

Aſhover, N.W. (hill quarry) Derbyſhire, middling.
Ayreſhire (water of Ayre) Scotland.
Beely Moor, E. of the town, Derbyſhire, coarſe.
Belper, S.E. (Hungerhill) Derbyſhire, middling.
Biddulph-Hall, N.W. of Leek, Staffordſhire, coarſe.
Bilſtone, S.E. of Wolverhampton, Staffordſhire, middling.
Bolſover, N.W. (nunnery) Derbyſhire, middling.
Bredſal Moor, N. of Derby, middling.
Brinclif-edge, S.E. of Sheffield, Yorkſhire, fine.
Buxton, N. (Corbar) Derbyſhire, fine.
Darley Moor, E. of the town, Derbyſhire, coarſe.
Gate-head fell, S. of Newcaſtle, Durham.
Gloſſop, Derbyſhire, coarſe.
Harthill, S.E. Yorkſhire, fine.
Hooton-Roberts, near Rotherham, York, middling.
Horſley, N. of Derby, fine.
Lane-top, N. of Sheffield. Yorkſhire, whitening.
Little-Eaton, N. of Derby, coarſe.
Milford, S. of Belper, Derbyſhire, coarſe.
Molecopt-hill, S. of Congleton, Cheſhire, coarſe.
Morley-Moor, N. of Derby, fine.
Norton, W. (Hemp-yard lane) Derbyſhire, fine.
Overton (Gregory) in Aſhover, Derbyſhire, coarſe.
Poleſworth, S.E. of Tamworth, Warwick.
Purton, W. of Wolverhampton, Staffordſhire, fine.
Ridgeway (Lum-delph) in Eckington, Derbyſhire, fine.
Stanley, N.E. of Derby, fine.
Stanton by Dale, E. of Derbyſhire, fine.
Stanton Moor, N.E. of Winſter, Derbyſhire, coarſe.
Therberg, near Rotherham, Yorkſhire, fine.
Treton ditto. ditto. fine.
Warton, E. of Tamworth, Warwickſhire.
Wickerſley, near Rotherham, Yorkſhire, middling.
Wokes, near Barnſley, Yorkſhire.

Some of theſe quarries are very ancient; that in Aſhover is noticed in the Doomſday ſurvey, but ſince the incloſure of the pariſh it has been diſuſed. The ſale of grind-ſtones from ſome of them, where navigations are near, are very conſiderable.

GRINDERS, MOLARES *dentes*. See *Molares* under the article CRANIUM.

GRINDING, TRITURATION, the act of breaking or comminuting a ſolid body, and reducing it into powder, duſt, flour, farina, or the like.

Grinding is one of the ſpecies of diſſolution. The painters' colours are ground on a marble or porphyry, either with oil or gum-water.

Some late phyſicians contend, that digeſtion is performed by grinding the food in the ſtomach. See DIGESTION.

GRINDING is alſo uſed for rubbing or wearing off the irregular or otherwiſe redundant parts of the ſurface of a body, and reducing it to the deſtined figure, whether that be flat, concave, or the like.

The *grinding of glaſſes* is a conſiderable art, and, as ſuch, neceſſarily requires to be here inſiſted on; eſpecially that of optic glaſſes.

Method of grinding optic-glaſſes.—For convex glaſſes, the firſt object is to provide a diſh or baſon, within whoſe cavity the glaſs is to be formed.

In order to this, they take a piece of braſs, copper, iron, or wood, and form it into a ſegment of a circle, having the radius of the baſon or the diſh intended: this done, a baſon is forged by a ſmith, either of iron or copper, having its cavity exactly fitting or correſponding to the ſegment above mentioned, though ſometimes they chuſe to have the baſon caſt; in this caſe, the rules elſewhere delivered for concave mirrors are to be here obſerved. (See MIRROR.) The figure of the baſon, thus roughly formed, is to be finiſhed in the pewterer's lathe, or on a ſtone mould A, *Plate* V. *Optics*, *fig.* 3, fixed to an iron axis with a pinion B C, moveable by a wheel D E, and that by a winch or handle F. The baſon being ground on the mould till it exactly fits in all parts, they take it off, and cementing it to a wooden block (loaden, if need be, with lead), ſtrew it over with fine ſifted ſand, and thus grind it over again on the mould, till all the furrows or ſcratches be quite taken away.

Laſtly, they grind large pieces of glaſs in a baſon, with find ſand between, till ſuch time as, its ſurface being well ſmoothed, there is no longer any oppoſition to the motion.

Note, the diſh is known to be perfectly finiſhed when, a hair being ſtretched over it, its ſhadow projected in the cavity, eſpecially in a camera obſcura, does not appear any way diſtorted.

The baſon finiſhed, they proceed to chooſe glaſſes for the purpoſe: in order to this, lay them on clean paper, and obſerve what colours are projected upon it; for the ſame are the colours of the glaſſes. Always ſet aſide thoſe of the darker colours, and chooſe the brighter; but as the whiteſt and brighteſt have uſually veins, and beſides, in tract of time, by the humidity of the air, are apt to ruſt and loſe their poliſh; for this reaſon Huygens recommends thoſe a little yellowiſh, reddiſh, or greeniſh; Hevelius the blueiſh. A glaſs is found to be free from bubbles, ſands, veins, knots, and ſpires, by holding it to the ſun, and receiving the rays through it on a white paper; for the flaws above mentioned will each project a ſhadow upon it.

If, inſtead of lenticular, or at leaſt ſpherical glaſſes, you make uſe of plate-glaſs, it muſt be divided and cut with a diamond into ſquares; and if it be too thick to break otherwiſe, you may do it by laying it on a table covered with cloth, in ſuch manner as that the ſide or part to be ſevered hang over the edge: for, being ſtruck with an iron inſtrument, in this ſituation, it eaſily breaks in the direction of the line drawn by the diamond. Having thus got a ſquare piece, deſcribe two concentric circles upon it with a pair of compaſſes, one of whoſe legs carries a diamond: the diameter of the inner circle to be equal to the breadth of the intended lens, and that of the outer ſomewhat more; and break off the corners, as above directed, and the leſſer inequalities take off on a grind-ſtone, or the like. Examine now whether the piece of glaſs be every where equally thick; if it be not, reduce it to ſuch equality by grinding it on an iron plate with ſand and water. Laſtly, glue or cement the glaſs thus prepared to a wooden handle N M O, *fig.* 4. with a cement made of pitch and a fourth part of reſin, or one part of wax and eleven of colophony: care being taken that the baſe or bottom of the handle N O be equal to the glaſs, and that the centre of the glaſs and handle meet together. Smaller lenſes, as thoſe uſed for microſcopes, are fixed on with ſealing-wax.

Now, to grind the glaſs, and bring it to the convexity required, ſmear over the diſh equally with fine ſifted ſand moiſtened with water; then taking the handle with the glaſs on it, work it on the baſon, ſometimes this way, and ſometimes that, to prevent the form of the baſon from being diſturbed, never leaning too hard upon it. When the glaſs has got the figure of the baſon, clean it well of all the ſand and filth adhering, and ſprinkle the baſon over with emery moiſtened in water, grinding the glaſs thereon till all the roughneſs and inequalities are taken away: after this, the fine ſand uſed in hour-glaſſes may be of ſervice, applied and uſed as before; remembering to take out the ſand, when too much worn, and ſubſtitute new in its ſtead. Some, in lieu of this, chooſe ſeveral ſorts of emery, each finer than the other, or even the power of flint calcined and pounded. Laſtly, grind the ſame glaſs in another baſon or diſh, which is a ſegment of a leſſer ſphere, making uſe of the like ſand as before, till it has got a pretty high rim or margin all around. Becauſe the preſſion is not here determined accurately enough upon the middle of the glaſs, by the mere guidance of the hand, ſome have choſen to make uſe of the following machine, eſpecially for grinding object-glaſſes.

Fix the diſh H I, *fig.* 5. on a horizontal table; exactly over its centre let the aperture D be, through which paſs an iron arm five or ſix inches long, faſtened to the ſtaff A B: let the other extreme of the ſtaff be fitted into a hole cut in the diſh, and faſtened therein. Now to grind the glaſs inſtead of the diſh, take hold of the ſaid ſtaff, and work with ſand, &c. as before.

Huygens tells us, that he always uſed firſt a coarſe emery, then a finer powder of the ſame, which would be fifty ſeconds in ſinking to the bottom of a veſſel of water, putting in freſh every half or quarter of an hour: ſometimes too, he uſed emery of fifty ſeconds, for three quarters of an hour; then emery of four hundred ſeconds, for four-fifths of an hour; and laſtly, emery of forty-five minutes, for a quarter of an hour. The ſame effect is had from powder of flints, broken in an iron mortar, mixed with water, and ſtirred ſometimes with a wooden ſpatula, taking the powder as it precipitates in ſome certain time to the bottom of the veſſel, by decanting the water. What remains is to poliſh the glaſs.

For a more particular account of the method of grinding and poliſhing glaſſes for teleſcopes, extracted from Mr. Huygens and other authors, by Mr. Molyneux, and comprehending the method of making and poliſhing the tools, of chooſing the glaſs, of preparing the glaſſes before they can be ground and poliſhed, of grinding the glaſſes, and of giving them the laſt and fineſt poliſh, we muſt refer to Smith's Optics, book iii. chap. i. paſſim.

The late ingenious Mr. James Short, in a paper left with the Royal Society, to be opened and printed after his death, gives the following directions for working object-glaſſes of refracting teleſcopes truly ſpherical.

Prepare two plates or tools, of braſs, the one convex, and the other concave, being both portions of a ſphere of the ſame radius as the focal length of the object-glaſs you want to have, or rather of a radius ſomewhat longer than the focal length you want, for a dioptrical reaſon; let theſe plates or tools be between two and three times the breadth of the object-glaſs deſired; or, in long focal lengths, twice the breadth will be ſufficient: let theſe tools be of a ſufficient thickneſs in proportion to their breadth or diameter, and let them be ground with fine emery exactly true to one another, working them alternately, the one above the other, to preſerve the ſame focal length; or, if it is deſired longer, you muſt work the convex above the concave; or, if deſired ſhorter, you muſt grind the concave above the convex.

After this, you prepare another braſs plate or tool, of the ſame breadth and thickneſs as the two former, and of the ſame radius of concavity: its being truly turned on a lathe will be ſufficient for this purpoſe; which tool is to ſerve afterwards for the poliſhing of the two ſurfaces of your object-glaſs, and therefore called the poliſhing tool.

Prepare a piece of ſtraw-coloured glaſs, of the plate-glaſs kind, of the proper diameter for the object-glaſs you deſire, which ought always to be broader than the proper aperture for that length; let this piece of glaſs be ground flat, in another tool, on both ſides and as nearly parallel as may be, and ſomewhat poliſhed, in order to diſcover whether there are any veins or flaws in the glaſs. When you are ſatisfied of the goodneſs of the glaſs, you are then to prepare a handle to faſten your glaſs to. Great care muſt be taken in this, for fear of bending your glaſs by the handle: Mr. Short adviſes to take a flat piece of braſs, or rather of the concavity of the ſphere, to which the glaſs is to be ground; this piece of braſs ſhould not be thicker than two-thirds of the thickneſs of the glaſs, of a circular form, leſs in breadth ſomewhat than the glaſs itſelf, and having ſides of the ſame form, at right angles to the flat piece of braſs, and theſe ſides ought to be of ſuch a ſhape as that the fingers may eaſily apply to it in working, and theſe ſides ſhould be as low as may conveniently be, and no thicker than about two-thirds of the glaſs. This handle is to be faſtened to the glaſs, by warming the glaſs and handle gently before a fire, and laying ſome pitch upon the glaſs thus warmed, till it becomes ſoft like melted wax; and then laying your braſs handle, a little heated, on the pitch, you preſs it a little, till you are ſure there is nothing between the glaſs and the handle but pitch; you then lay down the glaſs and handle upon ſomething flat, taking care that the handle is in the middle of the glaſs till it is entirely cold. It is very material to know, that the pitch, to be uſed for faſtening the handle to the glaſs, muſt be ſoft pitch, that has never been uſed nor melted; for any other pitch will infallibly bend the glaſs.

You then grind your glaſs in the concave tool with emery, and give it the proper figure and ſmoothing for the laſt poliſh, in the common manner.

In order to give your glaſs the laſt poliſh, which is the moſt difficult part of the whole work, you are to prepare ſome pitch for covering the before-mentioned poliſhing concave tool, which is done in this manner: take ſome pitch, and melt it in an iron ladle, and let it boil for a quarter of an hour or thereabouts; by this boiling, the pitch, when cold, will become hard and brittle: or you may ſhorten this operation, by melting equal quantities of pitch and roſin, and then there is no occaſion to let it boil ſo long. Your pitch being thus prepared, you again melt it, and take it off the fire, and let it ſtand till the pitch becomes pretty cold, or of a thickiſh conſiſtence; and having warmed the poliſhing tool a little, to make the pitch ſtick to it, you pour out of the ladle upon the poliſhing tool as much pitch as you judge will cover the whole tool, when ſpread out, to about the thickneſs of one-eighth of an inch; you then invert this tool with the pitch upon it, and preſs it upon the convex tool, which muſt be quite dry, clean, and cold, in order to give it the figure of the convex tool: in caſe it has not ſpread out ſo as to cover the whole ſurface of the poliſhing tool, you may warm the pitch by holding it before the fire, and preſſing it upon the convex tool, as before, till it has entirely covered the ſurface of the poliſhing tool; you then plunge it into cold water, till the braſs is quite cold.

N. B. In order to know if your pitch is hard enough, you preſs the edge of the nail of your thumb upon it, and if it receives an impreſſion, the pitch is not hard enough.

You then proceed to prepare this poliſhing tool, for the laſt poliſh of your glaſs, by grinding this poliſhing tool upon the convex tool with pretty coarſe emery, and a ſmall quantity of water, in the common way that tools are ground one upon another; but this muſt be done only for a ſmall ſpace of time, and the poliſhing tool muſt have no other preſſure than its own weight, for fear of ſome of the emery ſticking in the pitch, and you muſt never allow the emery to grow dry: when you have ground the pitch, ſo as to be all over of the ſame colour, you then waſh the pitch from all the emery with a bruſh and clean water; after this, you take a bottle of water, and, holding the pitch tool in a ſloping poſition, you pour water out of the bottle ſo as to fall upon every part of its ſurface.

You then place the poliſhing tool in a horizontal poſition, and you put upon it ſome putty, waſhed from all its gritty particles, but it need not be the fineſt waſhed, and you put a good deal of water upon your poliſhing tool, mixing the putty and it together, and you poliſh your glaſs upon this pitch-poliſher in the common manner of poliſhing glaſſes.

After you have poliſhed your glaſs about ten minutes, you again grind your poliſher upon the convex tool with emery, as before, for fear the pitch has, by working, loſt any of its proper figure; and the oftener you do this, the truer will be the figures of your glaſs; and in this manner you proceed till the glaſs is quite poliſhed.

You then take your glaſs off its handle, by holding it before the fire, till it is ſo warm that you can ſlide the handle off the glaſs; and whilſt the glaſs is warm, you take off as much of the pitch as you can with the ſharp edge of a knife; you then lay the glaſs down to cool, and when quite cold, you drop ſome ſpirits of wine upon it; and this, with a cloth, will wipe off the reſt of the pitch.

You then examine the centre of the ſurfaces of your glaſs; and if it lies to one ſide of the centre of your glaſs, mark that place with a ſpot of ink, and then put on your handle as before, upon the ſide that is now poliſhed, with its centre over the ſpot of ink, and grind your glaſs as before, till the circular remaining part of the glaſs to be ground is as much diſtant from the centre of the glaſs on the other ſide from the ſpot as the ſpot was from the centre of your glaſs; you then, by heat, return your handle to the centre of the glaſs, and proceed to grind and poliſh this ſide of the glaſs as before.

N. B. The concave and convex tools ſhould be ground with fine emery, after you have done one ſide of your glaſs;

for the oftener theſe are ground together, you will be the more ſure of having your figure true. Phil. Tranſ. vol. lviii. p. 507, &c.

Method of Grinding, &c. the ſpecula of reflecting teleſcopes.—The method generally followed by workmen is that propoſed by Meſſrs. Molyneux and Hadley, and publiſhed in Dr. Smith's Optics; this has been lately improved, in a very conſiderable degree, by Mr. Mudge, whoſe directions, founded on accurate experiments, and practiſed with ſucceſs in the conſtruction of teleſcopes, we ſhall adopt wherever they differ from thoſe that occur in the book juſt cited. For making the gages, take a long pole of fir, deal, or any wood, of a little more than double the length of the inſtrument intended, and ſtrike through each end of it two ſmall ſteel points, and by one of them hang it up perpendicularly againſt a wall; then take two pieces of thin plate-braſs, well hammered, a little thicker than a ſixpence, which may be about an inch and a half broad, and let their length be in proportion to the diameter of the ſpeculum as three to two; ſo that if the ſpeculum be eight inches diameter, theſe may be about twelve. Fix each of theſe ſtrongly with rivets between two thin pieces of wainſcot, ſo that a little more than a quarter of an inch in the breadth may ſtand out from between the boards. Then fix up theſe pieces horizontally againſt the wall under your pole, and therewith, as with a beam-compaſs, ſtrike an arch upon each of them; then file each of them with a ſmooth file to the arch ſtruck, ſo as one may be a convex and the other a concave arch of the ſame circle. Theſe braſſes are the gages to keep the ſpeculum, and the tools on which it is ground, always to the ſame ſphere: and that they may be, therefore, perfectly true to each other, it is neceſſary to grind them with fine emery one againſt the other, laying them on a flat table for that purpoſe, and fixing one of them to the table. When the gages are perfectly true, let a piece of wood be turned about two-tenths of an inch broader than the intended ſpeculum, which it is beſt to caſt in no caſe leſs than two-tenths of an inch thick; and for ſpecula of ſix, eight, or ten inches broad, this ſhould be at leaſt three or four-tenths thick when finiſhed. This board being turned, take ſome common pewter, and mix with it about one-tenth of regulus of antimony, and with that wooden pattern, caſt one of this pewter, which will be conſiderably harder than common pewter. Let this pewter pattern be truly turned in a lathe, and examined by means of the gages before-mentioned, as a pattern for caſting the ſpecula themſelves; and take care, when it is turned, that it be at leaſt one-twentieth of an inch thicker, and about one-tenth of an inch broader than the ſpeculum intended to be caſt from it. The manner of making the moulds for caſting is now to be explained, and will ſerve for a direction as well for caſting this pewter pattern, as afterwards for caſting thereby the ſpeculum itſelf. The flaſks ſhould be of iron, and at leaſt two inches wider every way than the ſpeculum intended. In each flaſk there ſhould be the thickneſs at leaſt of one inch of ſand. The caſting-ſand which the common founders uſe will anſwer the purpoſe as well as any; and any ſand will do which is naturally mixed with a ſmall proportion of clay, to make it ſtick. The ſand ſhould be as little wet as may be, and well beaten, but not too hard. The ingates ſhould be cut ſo as to let the metal flow in, in four or five ſtreams, over the whole upper part of the mould; otherwiſe, whatever pores happen in the metal will not be ſo equally diſperſed as they ſhould be over the whole face of the metal, theſe pores generally falling near the ingate ſtreams. Let the flaſks dry in the ſun for ſome hours, or near a very gentle fire, otherwiſe they will warp, and give the ſpeculum, when caſt, a wrong figure: for, beſides ſaving the trouble in grinding, it is beſt, on many accounts, to have the ſpeculum caſt of a true figure; and for this reaſon it is beſt to caſt it from a hard pewter pattern, and not from a wooden one, as founders uſually caſt.

For the compoſition of the metal and manner of caſting it, ſee SPECULUM. When the metal is caſt, the next buſineſs is to grind and poliſh it, for which, ſays Mr. Mudge, four tools are all that are neceſſary, *viz.* 1. The rough-grinder, for working all the rough face of the metal: this is beſt made of lead, ſtiffened with about a fifth or ſixth part of tin; it ſhould be at leaſt a third more in diameter than the metal which is to be ground; and for one of any ſize, not leſs than an inch thick. It may be cemented on a block of wood, in order to raiſe it higher from the bench.

This leaden tool being caſt, muſt be fixed in the lathe, and turned as true as poſſible by the gage to the figure of the intended ſpeculum, making a hole in the middle, as a lodgment for the emery, of about an inch diameter, for a metal of four inches: when this is done, deep grooves muſt be cut acroſs its ſurface with a graver, in the manner repreſented in *Plate* V. *Optics*, *fig.* 6; theſe grooves will ſerve to lodge the emery, and by their means the tool will cut much faſter. Any kind of low handle, fixed on the back of the metal with ſoft cement, will be ſufficient; but it ſhould cover two-thirds of its back, to prevent its bending.

2. The next tool is the convex braſs-grinder, on which the metal is to receive its ſpherical figure. In order to form this tool, procure a round ſtout piece of Hamburgh braſs, at moſt a ſixth part larger than the metal to be poliſhed; and let it be well hammered into a degree of convexity, by the aſſiſtance of the gage, ſuitable to the intended ſpeculum: then ſcrape and clean the concave ſide ſo thoroughly, that it may be well tinned all over; then caſt upon it, after it has been preſſed a proper depth into the ſand, the former compoſition of tin and lead in ſuch a quantity, that it may, for a ſpeculum of four inches diameter, be at leaſt an inch and a half thick, and with a baſe conſiderably broader than the top, in order that they may ſtand firmly upon the bench in the manner hereafter to be deſcribed. This being done, it muſt be fixed and turned in the lathe with great care, and of ſuch a convexity as exactly to ſuit the concave gage. This tool muſt have a hole, ſomewhat leſs than that in the metal to be worked upon it, in the middle, quite through to the bottom. When it is finiſhed off in the lathe, its diameter ſhould be one-eighth wider than the metal.

The 3d tool is the bed of hones, the uſe of which is to perfect the ſpherical figure, and to give the metal a fine ſmooth face. See *Bed of* HONES.

The 4th and laſt tool is the bruiſer, with which both the braſs-grinder and the hones are to be formed; this tool ſhould be made of thick ſtout braſs, perfectly ſound, about a quarter of an inch thick, and hammered as near to the gage as poſſible; it ſhould be then ſcraped, cleaned, and tinned on the convex ſide, as the ſecond tool was on the concave, and the ſame thickneſs of lead and tin caſt upon it. This ſhould be as broad at bottom as at top; and when it is fixed in the lathe, and turned off concave to the convex gage with accuracy, the diameter ought to be of a middle ſize between the hones and the poliſher or braſs grinder, which is uſed for this purpoſe. Having with the lathe roughly formed the convex braſs grinder, the bed of hones, and the concave bruiſer, the convex and concave braſs tools and the metal muſt be wrought alternately and reciprocally upon each other with fine emery and water, ſo as to keep them to the ſame figure as nearly as poſſible, in order to which ſome waſhed emery muſt be procured, by putting it into a bottle, half filling the bottle with water, and ſhaking the mixture; ſo that the coarſeſt of the emery will ſubſide to the bottom firſt, and the fineſt remain at the top: when freſh emery is laid on the tools, it is beſt done by gently ſhaking the bottle, and pouring out a ſmall quantity of the turbid mixture. The next operation is to grind the braſs convex tool with the bruiſer upon it, which is continued for about a quarter of an hour, and then the convex tool is wrought upon the bruiſer in the ſame manner. When theſe have been wrought on each other, occaſionally adding freſh emery, till the veſtiges of the turning tool are got out and both brought nearly to a figure, the ſame form muſt be given to the metal, by grinding it upon the braſs tool with the ſame kind of emery; taking care, however, by working the two former tools frequently together, to keep all three exactly in the ſame curve. The beſt kind of handle for the metal is made of lead, a little more than double its thickneſs, and ſomewhat leſs in diameter, of about three pounds weight, with a hole in the middle, a little larger than that in the metal: the handle ſhould be cemented on with pitch. The upper edge of this weight muſt be rounded off, that the fingers may not be hurt, and a groove, about the ſize of the little finger, be turned round juſt below it, for the more conveniently holding and taking the metal off the tools. When the bruiſer, braſs tool, and metal, are all brought to the ſame figure, and have a good ſurface, the next part of the proceſs is to give a correct ſpherical figure and a fine face to the metal, upon the hones; theſe, however, ſhould be covered with water for at leaſt an hour before they are uſed, otherwiſe they will be liable to alter their figure; and they muſt be never ſuffered to grow dry whilſt they are in uſe, for the ſame reaſon.

In order to give a proper figure to the hones, correſponding to that of the braſs tool, bruiſer, and metal, when they are fixed down to the block, ſome common flour emery, unwaſhed, with a good deal of water muſt be put upon them, and the bruiſer being placed upon the hones, and rubbed over them with a few ſtrokes and a light hand, the inequalities of the ſtone will be ſoon worn off, the mud that is generated being waſhed away, every quarter of a minute, with a great deal of water. As ſoon as the hones have received the general figure of the bruiſer, and all the turning ſtrokes are worn out from them, the emery muſt be carefully waſhed off, and cleared from the joints with a bruſh under a ſtream of water. The bruiſer and metal muſt be likewiſe cleared in the ſame manner. The hones being fixed down to the block, the bruiſer muſt be worked upon them with very cautious, regular, ſhort ſtrokes, forward and backward, to the right and left, turning the axis of the bruiſer in the hand while you move round the hones, by ſhifting your poſition, and walking round the block. The manner of conducting this operation is minutely deſcribed by Mr. Mudge. The metal may then be rubbed upon the hones in the ſame cautious manner, occaſionally rubbing the bruiſer upon the hones, in order to ſharpen them. When in this way the hone pavement has given a fine face and true figure to the metal, you may proceed to try the metal and judge of its figure, by waſhing the hone-pavement quite clean; then putting the metal upon the centre of it, and giving two or three light ſtrokes round and round only, without carrying the edges of the metal much over the hones; this will take out the order of ſtraight ſtrokes; then having again waſhed the hones and placed the ſpeculum upon their centre, with gentle preſſure, ſlide it towards you till its edge be brought a little over that of the hones; then carry it quite acroſs the diameter as far as the other ſide, and having given the metal a light ſtroke or two in this direction, take it off the tool. The metal being wiped quite dry, place it upon a table at a little diſtance from a window; ſtand as near the window, at ſome diſtance from the metal, and looking obliquely on its ſurface, turn it round its axis, and you will ſee at every half turn the grain given by the laſt croſs ſtrokes flaſh upon your eye at once over the whole face of the metal. This is a certain proof of a true ſpherical figure.

The laſt operation is that of poliſhing the ſpeculum, and this is the moſt difficult and eſſential part of the whole proceſs. Mr Mudge, having made ſome ſtrictures on the method of Meſſrs. Hadley and Molyneux, generally followed, deſcribes at large that which he has diſcovered after a number of trials, both of giving a correct parabolic figure and an exquiſite poliſh at the ſame time. Availing himſelf of the manner of poliſhing with pitch practiſed by ſir Iſaac Newton, and mentioned in his Optics, he formed his poliſher by coating the braſs convex tool equally with pitch, which ſhould be neither very hard and reſinous nor too ſoft, about the thickneſs of a ſhilling, and by applying the bruiſer to it, gave the pitch upon the poliſher a fine ſurface and the true form of the bruiſer. He then divided the leaden weight upon the back of the metal into eight parts, by ſtrokes on the ſurface of the lead, which are marked with the numbers 1, 2, 3, 4, &c. in order to diſtinguiſh and regulate the turns of the metal. He alſo put half an ounce of putty into an ounce phial, and filled it two-thirds with water; and having ſhaken the whole, let the putty ſubſide, and ſtopped the bottle with a cork: the other appendages of his apparatus are a ſmall-ſized camel's hair bruſh in a tea-cup with a little water, a piece of dry clean ſoap in a galley-pot, and a ſoft piece of ſponge. Theſe, as well as the metal, bruiſer, and poliſher, ſhould be conſtantly covered from duſt.

The poliſher being fixed down, is bruſhed over with the camel's hair bruſh, after it has been wetted and rubbed a little over the ſoap; then the bruiſer is worked lightly upon it, till it has acquired a good face and is fit for the metal. Then, having ſhaken up the putty in the phial, and touched the poliſher in five or ſix places with the cork wetted with that and the water, the bruiſer is placed upon the tool, and a few ſtrokes given to it upon the putty, in order to rub down any gritty particles: after which, having removed it, the metal is worked lightly upon the poliſher round and round, carrying the edges of the ſpeculum, however, not quite half an inch over the edge of the tool, and now and then with a croſs ſtroke. The putty is repeatedly applied in the ſame manner, and wrought into the pitch in the courſe of the operation; and if the bruiſer be apt to ſtick, and does not ſlide ſmoothly upon the pitch, the ſurface of either tool may be occaſionally bruſhed over with the ſoap and water. After ſome continuance of this proceſs, the pitch is well defended by the coating of the putty, and the metal, preſſed only by its own weight and that of the handle, and occaſionally moiſtened, moves over it with a more uniform and regular friction. When the poliſh of the metal nearly reaches the edge, the round ſtrokes muſt be gradually altered for the ſhort and ſtraight ones. When this has been done for ſome time, in the manner minutely deſcribed by Mr. Mudge, the metal will begin to move ſtiffly as the friction increaſes, and the ſpeculum poliſhes very beautifully and ſpeedily, and the whole ſurface of the poliſhing tool will be equally covered over with a fine metallic bronze. As the metal wears much, its ſurface muſt be now and then cleaned with a piece of ſhammy leather, and the poliſher likewiſe with a ſoft piece of wet ſponge. You will now be able to judge of the perfect ſpherical figure of the metal and tool, when there is a perfect correſpondence between the ſurfaces, by the fine equable feel there is in working, which is totally free from all jerks and inequalities. Having proceeded thus far, you may put the laſt finiſhing to this figure of the metal by bold croſs ſtrokes, only three or four in the direction of each of the eight diameters, turning the metal at the ſame time: this muſt be done quickly; for, if the tool be ſuffered to grow quite dry, you will never be able, with all your force, to ſeparate that and the metal, without deſtroying the poliſher by heat. The metal will now have a beautiful poliſh, and a true ſpherical figure, but will by no means make a ſharp diſtinct image in the teleſcope; for the ſpeculum will not be found to make parallel rays converge without great aberration: and, indeed, the deviation will be ſo great, as to be very ſenſibly perceived by a great indiſtinctneſs in the image.

Suppoſing then the metal to be now truly ſpherical, ſtop the hole in the poliſher, by forcing a cork into it underneath, about an inch, ſo that it do not reach quite to the ſurface; and having waſhed off any mud that may be on the ſurface of the tool with a wet ſoft piece of ſponge, whilſt the ſurface of it is a little moiſt, place the centre of the metal upon the middle of the poliſher; then having, with the wet bruſh, lodged as much water round the edge of the metal as the projecting edge will hold, fill the whole of the metal and its handle with water, to prevent the evaporation of the moiſture, and the conſequent adheſion between the ſpeculum and poliſher, and let the whole reſt in this ſtate for two or three hours: this will produce an intimate contact between the two, and by parting with any degree of warmth they may have acquired by the nearneſs of the operator, they will become perfectly cold together. By this time you may puſh out the cork from the poliſher to diſcharge the water, and give the metal the parabolic figure, in the following manner: move the metal gently and ſlowly at firſt, a very little round the centre of the poliſher, then increaſing by degrees the diameter of theſe ſtrokes, and turning the metal frequently round its axis, give it a larger circular motion, without any preſſure, but its own weight: this manner of working may ſafely be continued about two minutes, moving yourſelf, as uſual, round the block, and carrying the round ſtrokes, in their increaſed and largeſt ſtate, not more than will move the edge of the metal half an inch or five eighths over the tool. The ſpeculum muſt not all this while be taken off from the poliſher, and conſequently no freſh putty can be added. It will not be ſafe to continue this motion longer than the time above-mentioned; for if the parabolic tendency be carried in the leaſt too far, it will be impoſſible to recover a true figure of that kind, but by going through the whole proceſs for the ſpherical one in the manner before deſcribed, by the croſs-ſtrokes upon the poliſher, which takes a great deal of time.

In order to try the true figure of the ſpeculum, place it in the teleſcope for which it is intended, and uſe the inſtrument as a kind of microſcope, moving the object to ſuch a diſtance that the rays may be nearly parallel. At about twenty yards a watch-paper, or ſome ſuch object, on which there are ſome very fine hair-ſtrokes of a graver, is fixed up. The lead muſt be taken off from the ſpeculum, the ſpeculum placed on the cell of the tube, and the inſtrument directed to the object; make an annular kind of diaphragm with card-paper, ſo as to cover a circular portion of the middle part of the metal between the hole and the circumference, equal in breadth to about an eighth part of the diameter of the ſpeculum; this paper ring ſhould be fixed in the mouth of the teleſcope, and remain ſo during the whole experiment, for the part of the metal covered by it is ſuppoſed to be perfect, and therefore unemployed.

There muſt likewiſe be two other circular pieces of card-paper cut out, of ſuch ſizes, that one may cover the centre of the metal by completely filling the hole in the laſt deſcribed annular piece; and the other, ſuch a round piece as ſhall exactly fit into the tube, and ſo broad, as that the inner edge may juſt touch the outward circumference of the middle annular piece. It would be convenient to have theſe two laſt pieces ſo fixed to an axis, that they may be put in their places or removed from thence ſo eaſily as not to diſplace or ſhake the inſtrument. All theſe pieces therefore together will completely ſhut up the mouth of the teleſcope.

Let the round piece which covers the centre of the metal, or that which has no hole in it, be removed; and, by a nice adjuſtment of the ſcrew, let the image (which is now formed by the centre of the mirror) be made as ſharp and diſtinct as poſſible. This being done, every thing elſe remaining at reſt, replace the central piece, and remove the outſide annular one, by which means the circumference only of the ſpeculum will be expoſed, and the image now formed will be from the rays reflected from the outſide of the metal. If there be no occaſion to move the ſcrew and little metal, and the two images formed by theſe two portions of the metal be perfectly ſharp and equally diſtinct, the ſpeculum is perfect, and of the true parabolic curve; or at leaſt the errors of the great and little ſpeculum, if there be any, are corrected by each other.

If, on the contrary, under the laſt circumſtances, the image from the outſide of the metal ſhould not be diſtinct, and it ſhould become neceſſary, in order to make it ſo, that the little ſpeculum be brought nearer, it is plain that the metal is not yet brought to the parabolic figure; but if, on the other hand, in order to procure diſtinctneſs, you be obliged to move the little ſpeculum farther off, then the figure of the great ſpeculum has been carried beyond the parabolic, and hath aſſumed an hyperbolic form. When the latter is the caſe, the circular figure of the metal muſt be recovered (after having fixed on the handle with ſoft pitch) by bold croſs ſtrokes upon the poliſher, finiſhing it again in the manner above deſcribed. If the ſpeculum be not yet brought to the parabolic form, it muſt cautiouſly have a few more round ſtrokes upon the poliſher: indeed a very few of them, in the manner before deſcribed, make in effect a greater difference in the ſpeculum than would be at firſt imagined. If a metal of a true ſpherical figure were to be tried in the above-mentioned manner in the teleſcope (which Mr. Mudge has frequently done), the difference of the foci of the two ſegments of the metal would be ſo conſiderable, as to require two or three turns of the ſcrew to adjuſt them; ſo very great is the aberration of the ſpherical figure of the ſpeculum, and ſo improper to procure that ſharpneſs and preciſion ſo neceſſary to a good reflecting teleſcope.

Suppoſing that the two foci of the different parts of the metal perfectly coincide, and that by the union of them, when the apertures are removed, the teleſcope ſhews the objects very ſharp and diſtinct, you are not however then to conclude that the inſtrument is not capable of farther improvement; for you will perceive a ſenſible difference in the ſharpneſs of the image, under diffrent poſitions of the great ſpeculum with reſpect to the little one, by turning round the great metal in its cell, and oppoſing different parts of it to different parts of the little metal, correcting by this means the error of one by the other. This attempt ſhould be perſevered in for ſome time, turning round the great ſpeculum about one-ſixteenth at a time, and carefully obſerving the moſt diſtinct ſituation each time the eye-piece is ſcrewed on: when, by trying and turning the great metal all round, the diſtinct poſition is diſcovered, the upper part of the metal ſhould be marked with a black ſtroke, in order that it may always be lodged in the cell in the ſame poſition. This is the method Mr. Short always uſed; and the caution is of ſo much conſequence, that he thought it neceſſary to mention it very particularly in his printed directions for the uſe of the inſtrument.

And farther, Mr. Short frequently corrected the errors of the great by the little metal in another way. If the great ſpeculum did not anſwer quite well in the teleſcope, he cured that defect, ſometimes by trying the effect of ſeveral metals ſucceſſively, by this means correcting the errors of one by the other.

The apparatus above-deſcribed, for examining the parabolic figure of the ſpeculum, is repreſented in *Plate* V. *Optics*, *fig.* 7: A A is the mouth of the teleſcope, or edge of the great tube; B B is a thin piece of wood faſtened into and fluſh with the end of the tube, to which is permanently fixed the annular piece of paſteboard *c c*, intended to cover and to prevent the action of the correſponding part of the ſpeculum. D is another piece of paſteboard, fixed by a pin to the piece of wood B B, on which it turns as on a centre; ſo that the great annular opening H H may be ſhut up by the ring F F, or the aperture G G by the imperforate piece E, in ſuch manner that, in the firſt inſtance, the reflection may be from the centre, and in the latter, from the circumference of the great ſpeculum.

Mr. Mudge has remarked, that the operation of poliſhing will not proceed well in the heat of ſummer or the cold of winter; and that neither this, nor the other of grinding upon the the hones, will go on ſo well, unleſs they be continued uninterruptedly from beginning to end. In the above account it has been ſuppoſed, that the metal to be wrought was about four inches diameter; if it be either larger or ſmaller, the ſizes of the hones, bruiſer, and poliſher, muſt be proportionably different.

The proceſs for poliſhing the little ſpeculum of a teleſcope muſt be conducted in the manner already deſcribed, for that of the large one; only obſerving, that as the little metal has an uninterrupted face, without a hole, ſo there is no occaſion for one in the poliſher; and likewiſe that, as the ſpherical figure is the only object in this caſe to be attempted, the difficulty of execution is much leſs than in the former. As it is always neceſſary to ſolder to the back of the little ſpeculum a piece of braſs, as a fixture for the ſcrew to adjuſt its axis; Mr. Mudge has communicated a neat and ſafe method of doing it, which he received from the late Mr. Jackſon, and which may be very uſeful to the optical or mathematical inſtrument-maker upon other occaſions. Having cleaned the parts to be ſoldered very well, cut out a piece of tin-foil the exact ſize of them; then dip a feather into a pretty ſtrong ſolution of ſal ammoniac in water, and rub it over the ſurfaces to be ſoldered; after which place the tin-foil between them as faſt as you can (for the air will quickly corrode their ſurfaces ſo as to prevent the ſolder taking), and give the whole a gradual and ſufficient heat to melt the tin. If the joints to be ſoldered have been made very flat, they will not be thicker than a hair: though the ſurfaces be ever ſo extenſive, the ſoldering may be conducted in the ſame manner, only that care muſt be taken, by general preſſure, to keep them cloſe together. In this manner, for inſtance, a ſilver graduated plate may be ſoldered on to the braſs limb of a quadrant, ſo as not to be diſcernible by any thing but the different colour of the metals.

We ſhall cloſe this article with obſerving, that a method of giving the parabolic figure to his great ſpeculum was a point of perfection which Gregory and Newton had wiſhed for, but deſpaired of attaining, and which Hadley does not appear to have attempted either in his Newtonian or Gregorian teleſcope. Mr. Short is ſaid to have poſſeſſed the ſecret; however, it died with that ingenious artiſt. The method diſcovered by Mr. Mudge, above recited, is, as he has ſtrong reaſon to believe, the ſame with that of Mr. Short. See farther on this ſubject Smith's Optics, book iii. chap. ii. and Mr. Mudge's excellent paper in the Phil. Tranſ. vol. lxvii. part i. art. 16. p. 296—348. See Telescope.

Grinding is alſo uſed for a coarſer and leſs accurate method of ſmoothing or poliſhing the ſurface of a body, particularly glaſs for looking-glaſſes, &c.

In the new method of working large plates of glaſs for looking-glaſſes, coach-glaſſes, &c. by moulding, and, as it were, caſting them, ſomewhat after the manner of metals, deſcribed under the article Glass, the ſurface being left uneven, it remains to be ground and poliſhed. In order to this, the plate of glaſs is laid horizontally on a ſtone in manner of a table, and to ſecure it the better, plaſtered down with mortar or ſtucco, that the effort of the workman, or of the machine uſed therein, may not ſhake or diſplace it; to ſuſtain it, there is a ſtrong wooden frame that ſurrounds it an inch or two higher than the glaſs: the bottom or baſe of the grinding engine is another rough glaſs about half the dimenſions of the former; on this is a wooden plank, cemented to it; and upon this are proper weights applied, to promote the triture, the plank or table being faſtened to a wheel, which gives it motion. This wheel, which is at leaſt five or ſix inches diameter, is made of a very hard but light wood, and is wrought by two workmen placed againſt each other, who puſh and pull it alternately; and ſometimes, when the work requires it, they turn it round. By ſuch means, a conſtant mutual attrition is produced between the two glaſſes, which is favoured by water and ſands of ſeveral kinds beſtowed between; ſand ſtill finer and finer being applied, as the grinding is more advanced; at laſt emery is uſed. We need not add, that as the upper or incumbent glaſs poliſhes and grows ſmoother, it muſt be ſhifted from time to time, and others put in its place.

It is to be noted, that only the largeſt ſize glaſſes are thus ground with a mill; for the middling and ſmaller ſorts are wrought by the hand; to which end there are four wooden handles at the four corners of the upper ſtone or carriage, for the workmen to take hold of, and give it motion. What remains to the perfection of glaſs, comes under the denomination of *poliſhing*, which ſee.

GRINETTA, in *Ornithology*, the name of a water fowl of the gallinula or moor-hen kind. See Fulica *Nævia*.

GRINNAN, in *Geography*, one of the ſmaller Hebrides, on the W. coaſt of Lewis. N. lat. 58° 1′. W. long. 7° 4′.

GRINSTED, East, a borough, market-town, and pariſh, in the hundred of Ruſhmonden, Suſſex, is built on a hill near the northern border of the county, where it joins Surrey. As a *borough*, Eaſt Grinſted has ſent burgeſſes to the national parliament even ſince the firſt year of king Edward II. A. D. 1307. Theſe are elected by 36 burgage-holders, 29 of whom are under the influence of the dukes of Dorſet. The county aſſizes for Suſſex are held in this town, though the county gaol is at Horſham. In the year 1616, Sackville, duke of Dorſet, built a college in this town, and endowed it for 24 aged perſons of both ſexes. It is governed by a warden and two gentlemen aſſiſtants. In the town is alſo a reſpectable charity ſchool. Eaſt Grinſted contains 381 houſes, and 2659 inhabitants. It is 28 miles S.E. of London, and ſeated on the great turnpike road between Croydon and Lewes. A market on Thurſday is chiefly for corn. Here are three annual fairs.

GRIP, in *Agriculture*, a ſmall trench, gutter, or ditch, which is cut acroſs a meadow, paſture, or ploughed field, for the purpoſe of draining it. In the laſt it is moſtly called a water or draining furrow.

It may frequently be a good mode in draining meadow lands in this way, to cut out the pieces in a ſomewhat wedge-like form, afterwards taking off the thin bottom parts, and then replacing them; by which means a hollow or opening will be left below for conducting off the water. See Water-Furrow.

Grip, in *Rural Economy*, a term ſometimes employed provincially to ſignify the hollow or cavity behind the cattle in cow-houſes or cattle ſheds, into which the dung and urine of the animals are diſcharged. Theſe cavities ſhould always be ſunk about eight, ten, or twelve inches below the ſurface on which the cattle ſtand, in order that they may be kept perfectly clean.

GRIPE, in *Mechanics*. See Crane.

Gripe, in *Rural Economy*, a name often provincially applied to ſignify a dung fork.

Gripe *of a Ship*, in *Sea Language*, is the compaſs or ſharpneſs of her ſtem under water, chiefly towards the bottom of her ſtem.

The deſign of ſhaping her ſo is, to make her gripe the more, or keep a good wind; for which purpoſe, ſometimes a falſe ſtem is put on upon the true one.

Gripe is alſo a ſea phraſe for a ſhip's being apt to run too much to windward of her courſe, particularly when ſhe ſails with the wind on her beam or quarter; this effect is partly occaſioned by the ſhock of the waves that ſtrike the ſhip perpetually on the weather-quarter, and force the ſtern to leeward; but principally by the arrangement of the ſails, which diſpoſes the ſhip continually to edge to windward, while in this ſituation of ſailing: in ſuch caſe they ſay ſhe *gripes*.

Gripes, in *Rural Economy*, a name provincially applied to an implement of the forceps kind, which is employed for the purpoſe of eradicating and pulling up weeds of the thiſtle and other ſimilar ſtrong kinds, when growing among grain and other ſorts of crops. See Weeding.

Gripes, in *Medicine*, a pain in the lower bowels, of leſs ſeverity, and more moveable than the colic, occurring and ceaſing at intervals, and generally accompanied by a deſire to go to ſtool, and relieved by ſuch evacuation. The *gripes* are a common ſymptom of dyſentery; they are alſo occaſioned by the irritation of purgative medicines, or by any acrid matter paſſing through the bowels, as indigeſted food, an unuſual quantity of bile, &c. and ſometimes by flatulence only. In infants griping pains are very frequent, and ariſe principally from improper food, or from imperfect digeſtion, by which an acid is formed, which gives a green colour to the bile, and probably renders it more ſtimulating to the inteſtines; whence the gripes in children are commonly followed by green ſtools. The abſorbent earths, combined with rhubarb, and the ſlightly aromatic diſtilled waters, as thoſe of dill, fennel, or mint, ſpeedily relieve the complaint in children, in general. See Infant; ſee alſo Colic and Dysentery.

Gripes, or *Colic*, in *Farriery*, is an acute diſeaſe, to which horſes are very often ſubject. There are three different ſpecies of this diſorder, *viz.* the flatulent or windy, the bilious or inflammatory, and the dry gripes. The firſt is occaſioned by drinking a large quantity of cold water when the body has been heated by exerciſe; or in horſes of delicate conſtitutions, and that have been accuſtomed to tender treatment by drinking very cold water, even without previous heating exerciſe. It is ſometimes produced by bad hay, oats, or clover, or ſuch as is new, and prone to fermentation. When this diſeaſe comes on without any apparent cauſe, Mr. White ſuggeſts that it may probably depend upon a ſpaſmodic action of the ſtomach or bowels, occaſioning a conſtriction of the inteſtine, and a confinement of air. The immediate cauſe of the formation and confinement of the air, however, is, as he conceives, weakneſs, or loſs of vital energy: and therefore the common flatulent colic is eaſily cured by grooms and farriers, who ſeldom give any other kind of medicines beſides thoſe of a ſtimulating quality. This diſeaſe is known by the horſe's alternately and ſuddenly lying down and riſing; by his ſtriking his belly with his fore feet, ſtamping with his fore feet, and refuſing his meat; and when the gripes are violent, by convulſive twitches, turning up his eyes, ſtretching out his limbs, and alternate ſweats and cold damps; ſtriving to ſtale, turning his head frequently to his flanks, rolling about, and often turning on his back. The confined wind has been ſometimes diſcharged by emptying the ſtraight gut with a ſmall hand dipt in oil, and thus the neck of the bladder is eaſed of its load, and the horſe ſtales. It is always proper to bleed young and plethoric horſes in the neck-vein. The following ball and clyſter ſeldom fail of giving relief: take Straſburgh or Venice turpentine, and pounded juniper berries, of each half an ounce; ſal prunella, or ſalt petre, an ounce; oil of juniper one dram; ſalt of tartar two drams; make theſe ingredients into a ball with any ſyrup; and give it whole, waſhing it down with a decoction of juniper-berries, or a horn or two of ale. If this ball does not ſucceed, and make the horſe break wind and ſtale plentifully, in an hour or two give him another ball, and add to it a dram of ſalt of amber; and this may be repeated a third time, if neceſſary: during the fit, let the horſe have gentle exerciſe. Let the following clyſter be given between the balls, or alone, and repeated occaſionally; take chamomile flowers two handfuls; aniſe, coriander, and fennel ſeeds, of each an ounce; long pepper half an ounce; boil them in three quarts of water to two; and add Daffy's elixir, or gin, half a pint: oil of amber, half an ounce, and oil of chamomile eight ounces The horſe ſhould be well rubbed, clothed, and littered with clean ſtraw up to his belly: and a pint of brandy, rum, or geneva, with as much ſweet oil, may be given for a drink; and if this ſhould not ſucceed, boil an ounce of pepper or ginger in a quart of milk, and add to it a handful of ſalt, and half a pint of oil, which, given warm, will purge in two or three hours.

In the firſt attacks of the colic, Mr. Taplin recommends the following ball to be given, according to the ſtate of the diſeaſe, every two, four, or ſix hours; *viz.* anniſeeds in powder, 1 oz.; mithridate, $\frac{1}{2}$ oz.; ginger and grains of paradiſe, of each in powder, 2 dr.; oil of anniſeed, and oil of juniper, of each, 1 dr.; with ſyrup ſufficient to form theſe ingredients into a ball. In caſes of flatulent colic, the following ball, adminiſtered every two, three, or four hours, according to the urgency of the ſymptoms, has been much recommended; *viz.* Venice turpentine, 6 dr, or 1 oz.; purified opium, from 1 dr. to 1$\frac{1}{2}$ dr.; oil of anniſeeds, 1 dr.; and powdered ginger, 2 dr. At the ſame time clyſters, compoſed of the decoction of chamomile, or other common herbs, or of the gruel of oatmeal, with half a pint of olive oil, or an equal quantity of hog's lard, and half a pound of common ſalt, ſhould be occaſionally injected tolerably warm. Opium, it is ſaid, will ſometimes remove the ſpaſmodic affection that attends the flatulent colic, when other medicines have failed. Mr. White, in his "Compendium of the Veterinary Art," recommends to be given, as ſoon as the diſeaſe is obſerved, the following draughts, *viz.* 1. Balſam of capivi, 1 oz.; oil of juniper, 2 dr.; ſpirit of nitrous ether, 1 oz.; ſimple mint water, 1 pint, to be mixed for one doſe. 2. Venice turpentine, 1 oz. mixed with the yolk of an egg; adding gradually peppermint water, 1 pint; ſpirit of nitrous ether, ½ oz., for one doſe. 3. Camphor, 2 dr.; oil of turpentine, ½ oz.; mint water, 1 pint, mixed for one doſe. A clyſter ſhould alſo be injected, compoſed of ſix quarts of water gruel or warm water, and eight ounces of common ſalt. If the diſeaſe has continued for ſeveral hours, and the pain appears to be great, with a quick pulſe, it will be adviſeable to bleed to three quarts, for preventing inflammation, and removing the ſpaſmodic contraction of the inteſtine. The draught and clyſter, recurred to on the firſt attack, will commonly be ſufficient; but if no relief be obtained in an hour or two, the draught ſhould be repeated, and the belly be rubbed for a conſiderable time with a muſtard embrocation. If the diſeaſe reſiſt theſe remedies, which will ſeldom happen, give a pint of caſtor oil with 1½ oz. of tincture of opium: when the horſe gets up, let him be rubbed perfectly dry by two perſons, one on each ſide, and let him afterwards be well clothed. The horſe afflicted with this complaint ſhould be provided with a large quantity of litter, that he may not injure himſelf during the violence of the paroxyſm. As this complaint is liable to occur on a journey, Mr. White recommends the following ball to be wrapped up cloſely in a piece of bladder, to be uſed as occaſion requires; *viz.* Caſtile ſoap, 3 dr.; camphor, 2 dr.; ginger, 1½ dr.; and Venice turpentine, 6 dr.; to be made into a ball for one doſe.

When ſtrong purgatives have been uſed in this complaint, ſuch as 12 or 14 drams of aloes, either alone or with calomel, which ſome farriers have injudiciouſly adminiſtered, and the bowels have been rendered ſo irritable by the violent effect of phyſic, that they become ſubject to troubleſome and even dangerous diſeaſes, and the horſe in this ſtate is attacked with colic or gripes, Mr. White cautions againſt the ſtrong remedies commonly employed, ſuch as ginger, pepper, &c., which often prove fatal by cauſing inflammation. In caſes of this kind the following draught will be found moſt uſeful; *viz* oil of peppermint, 20 drops; tincture of opium, ½ oz.; gum arabic (diſſolved in a pint of warm water), 2 oz., to be mixed for one doſe; the uſe of which ſhould be accompanied with frequent ſmall quantities of gruel, linſeed tea, or any other mucilaginous fluid, and the injection of a clyſter of the ſame kind.

The bilious inflammatory gripes are attended with a fever, beſides more of the preceding ſymptoms: the horſe alſo generally throws out a little looſe dung, with hot ſcalding water, the blackiſh or reddiſh colour and fœtid ſmell of which denote an approaching mortification. In this caſe three quarts of blood ſhould be immediately taken away, and the bleeding ſhould be repeated, unleſs the ſymptoms abate, in a few hours. The emollient clyſter, with two ounces of nitre diſſolved in it, ſhould be thrown up twice a day, and gum arabic water ſhould be plentifully drank, and a pint of the following mixture ſhould be given every two or three hours, till favourable looſe ſtools are procured, and then only night and morning, till the diſorder is removed. Take ſenna, three ounces, and ſalt of tartar half an ounce; infuſe them for an hour or two in a quart of boiling water, and add two ounces of lenitive electuary, and four of Glauber ſalts. If the diſorder increaſes, recourſe muſt be had to the Jeſuit's bark, which ſhould be given in the decoction to the quantity of a pint every three hours, with a gill of red port wine. In a caſe of leſs conſequence, take diapente, one ounce; diaſcordium, half an ounce; powdered myrrh, two drams; make theſe into a ball with two drams of oil of amber, and give it twice or thrice a day.

The dry gripes ariſe often from coſtiveneſs, and are diſcovered by the horſe's frequent and fruitleſs motion to dung, the blackneſs and hardneſs of the dung, the frequent and quick motion of his tail, the high colour of his urine, and his great reſtleſſneſs. The ſtraight gut ſhould, in this caſe, be ſearched by an oiled hand: then throw up the following emollient clyſter twice a day: take marſhmallows and chamomile flowers, of each a large handful; bruiſed bay-berries and fennel ſeeds, of each an ounce; boil them in a gallon of water to three quarts; and having poured the liquor into a pan, diſſolve it in half a pound of treacle, and a pint of linſeed, or of dry common oil. The purging drink preſcribed for the inflammatory gripes ſhould be alſo given till the ſymptoms are removed. The diet for a horſe with the gripes ſhould be ſcalded bran, warm water-gruel, or water prepared by diſſolving four ounces of gum arabic in a quart of water, and mixing it with other water.

GRIPES, in *Sea Language*, is the name of a machine formed by an aſſemblage of ropes, hooks, and dead-eyes, and uſed to ſecure the boats upon the deck of a ſhip at ſea, and prevent them from being ſhaken by the labouring of the veſſel. The hooks, which are faſtened at their ends, are fixed in ring-bolts in the deck on each ſide of the boat; whence, paſſing over her middle and extremities, they are extended, by means of the dead-eyes, ſo as to render the boats firm and ſecure.

GRIPS, in *Agriculture*, a term applied to ſwarths, or ſmall heaps and handfuls of corn, lying in the fields after they have been cut down with the ſcythe or ſickle; but it is more commonly applied in the latter caſe.

GRIPSHOLM, in *Geography*, a town of Sweden, in the province of Sudermanland; 25 miles W. of Stockholm.

GRISALBIN, in *Ornithology*. See LOXIA *griſea*.

GRISARD. See LARUS *Nævius*.

GRISAUNT, WILLIAM, in *Biography*, an Engliſh phyſician of the 14th century, who ſtudied mathematics and aſtronomy with ſo much ſucceſs at Merton college, Oxford, that he was ſuſpected, like his countryman friar Bacon, of magic. From this cauſe, as it is ſuppoſed, he quitted his native country, and devoted himſelf to the ſtudy of medicine, firſt at Montpellier, and then at Marſeilles, where he fixed his reſidence, and lived by the practice of his profeſſion, in which he acquired much ſkill and eminence. The time of his death is unknown: but we are informed that he was living there, an old man, in 1350, and that his ſon, after being an abbot of canons regular at Marſeilles, at length arrived at the pontificate, under the name of Urban V. Griſaunt was the author of ſeveral works on mathematics, judicial aſtrology, and medicine. Hutchinſon's Biog. Med. Eloy. Dict.

GRISETTE. See ALAUDA *Senegalenſis*.

GRISIN, the griſly warbler. See MOTACILLA *griſea*.

GRISLAGINE, in *Ichthyology*. See CYPRINUS *griſlagine*.

GRISLEA, in *Botany*, in memory of Gabriel Griſley, a Portugueſe chemiſt and botaniſt, author of *Viridarium Luſitanicum*, publiſhed at Liſbon in 1661, and reprinted by Seguier, as well as by Ray. The latter ſpeaks of it as a rich catalogue, but faulty in not diſtinguiſhing the cultivated from the indigenous ſpecies, and evincing a deficiency of botanical learning in the author. Griſley, however, correſponded with the chief botaniſts of his day, eſpecially with Tournefort, to whom he ſent ſome new plants.—Linn. Gen. 189. Schreb. 252. Willd. Sp. Pl. v. 2. 320. Mart.

Mill. Dict. v. 2. Juſſ. 331.—Claſs and order, *Decandria Monogynia*, (*Octandria;* Linn.) Nat. Ord. *Calycanthemæ*, Linn. *Salicariæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, tubular, ſomewhat bell-ſhaped, with four, five, or ſix principal teeth, and as many external, minute, alternate ones, coloured, permanent, at length contracted juſt above the baſe, ſometimes ſlightly curved upwards. *Cor.* Petals as many as the larger teeth of the calyx and inſerted between them, oppoſite to the ſmall ones, linear-lanceolate, acute, ſmall, ſcarcely reaching beyond the calyx. *Stam.* Filaments eight, ten or twelve, awl-ſhaped, aſcending, twice as long as the calyx, inſerted into the lower part of its tube at the ſtricture; anthers roundiſh, verſatile, incumbent, ſimple. *Piſt.* Germen ſuperior, ovate, with two furrows, nearly ſeſſile; ſtyle thread-ſhaped, about as long as the ſtamens, aſcending; ſtigma ſlightly notched. *Peric.* Capſule encloſed in the baſe of the calyx, ovate, with two lateral grooves, of two cells; its valves thin and brittle, at length irregularly torn. *Seeds* very numerous, minute, obovate or wedge-ſhaped, horizontal, cloſely crowded, covering the large, cylindrical, central, double column, which is united to the partition at each ſide.

Eſſ. Ch. Calyx with about five large and as many ſmall teeth. Petals oppoſite to the latter. Stamens very long, aſcending. Capſule inveſted with the permanent calyx, ovate, two-celled. Seeds numerous. Receptacle large, round.

Obſ. The original ſpecies has a four-cleft, or often a five-cleft, flower, with eight or ten ſtamens; the others have a five or ſix-cleft flower, with ten or twelve; ſo that ten is the medium number.

1. G. *ſecunda.* Linn. Sp. Pl. 496. Lœfling. It. 245.—Leaves lanceolate, ſtalked, ſmooth. Branches horizontal. Flowers all turned upwards. Calyx half as broad as long.—Gathered by Lœfling in Terra Firma between Cumana and the river Orinoco, in February 1755. It does not appear that any of his ſpecimens reached Europe. The only one we have ever ſeen was found near Curaſſow in the ſame neighbourhood, by J. Mærter, M.D. who returning to Europe in 1791, and being plundered of moſt of his effects amid the horrors of civil war in Flanders, liberally beſtowed on the writer of this a parcel of moſt beautiful and rare South American plants, which were all he was able to ſave from ruin. This gentleman, ſent out by the emperor, was the finder of the numerous plants in South America, which make ſo ſplendid an appearance in the works of Jacquin, though his name is ſcarcely, if at all, mentioned in books. He was ſubſequently profeſſor of Botany at Friburgh in Suabia, and we hope ſtill living.—By means of his ſpecimen, and Lœfling's very exact deſcription, we are enabled to give the following account of this rare plant, which is no where figured. The *ſtem* is ſhrubby, erect, twelve to eighteen feet high, with a few ſtraight branches. The upper *branches* are ſcattered, parallel, long, ſpreading, ſlightly drooping, ſimple or ſubdivided, ſlender, ſmooth, leafy except in their lower part. *Leaves* oppoſite, ſtalked, two-ranked, ſpreading, lanceolate, pointed, entire, two or three inches long, ſmooth on both ſides, with one rib, and numerous, nearly oppoſite, curved, ſimple veins; dark green above; much paler beneath, and beſprinkled with numerous, ſmall, ſcarcely diſcernible, glandular dots. *Footſtalks* nearly half an inch long, ſmooth, channelled. *Stipulas* none. *Flower-ſtalks* axillary, oppoſite, rather longer than the footſtalks, corymboſe or cymoſe, all curved upward to one ſide, ſmooth, coloured, from ſix to ten-flowered. *Bracteas* few, at the baſe of the partial ſtalks, ovate, dotted. *Calyx* of a dark browniſh crimſon, bell-ſhaped, ſlightly angular, with uſually four, but often five, principal diviſions; its ſmaller ones, unnoticed by Lœfling, being very viſible, like little prominent external teeth, before the others expand. The diameter of the calyx towards the top is full half its length, but the baſe is narrower, and as it advances in age, marked with a ſtricture. *Petals*, *ſtamens*, and *ſtyle* of an elegant ſcarlet. All theſe colours, with the green of the leaves, is loſt in one nearly uniform dark brown in the dried plant, but the inſide of the anthers remains of a vivid red or orange-colour. *Germen* only half ripe in our ſpecimens, but evidently two-celled, with a tranſverſe partition, joining the large, round, central column.

It is proper to obſerve that the words "*An Glaucis affinis?*" which finiſh the deſcription of this plant in Lœfling's p. 246, belong to a widely different one, next deſcribed, which ſhould have been numbered 105. This miſtake of the editor, who was no other than the great Linnæus, is copied of courſe in the German edition, p. 318.

2. G. *punctata.* Buch. Cat. MSS. n. 34.—Leaves lanceolate, ſtalked, ſmooth. Branches and flowers erect. Calyx four times as long as broad.—Communicated from the Eaſt Indies by Dr. Francis Buchanan. The *branches* are oppoſite, round, ſmooth, and nearly erect. *Leaves* on ſhort, thick footſtalks, oppoſite, croſſing each other in pairs, lanceolate, pointed, entire, two inches or more in length, ſmooth on both ſides, pale and yellowiſh beneath and marked with much more evident dots than in the preceding. The lateral veins often unite in one common rib near the margin. *Flowers* red, in compound, nearly upright, corymboſe, ſlightly downy cluſters, about one-third the length of the leaves. *Calyx* much more ſlender than in the former, and nearly cylindrical, furrowed, minutely downy, often ſlightly curved according to the inclination of the ſtamens and ſtyle. The *flowers* are often ſix-cleft, with twelve ſtamens. Their buds are turbinate, with horizontally prominent, thick marginal points, which are the outer teeth of the calyx. This ſpecies is moſt allied to the following.

3. G. *tomentoſa.* Roxb. Corom. v. 1. 29. t. 31. (Lythrum fruticoſum; Linn. Sp. Pl. 641. Andr. Repoſ. t. 467.)—Leaves ſeſſile, heart-ſhaped and claſping the ſtem at their baſe; downy beneath. Branches erect.—A native of hills and valleys in the northern provinces of Hindooſtan, flowering during the cold and beginning of the hot ſeaſon, according to Dr. Roxburgh, who ſent ſeeds to the writer of this in 1793, which were raiſed in the botanic garden at Edinburgh. Others have ſince been raiſed about London, and the plant has been named *Woodfordia*, after a very liberal cultivator of exotics, but there is no queſtion of its being a *Griſlea.* It has the habit of the laſt, but the *leaves* differ in their inſertion, and heart-ſhaped baſe, as well as in being downy beneath. The *flowers* are copious, in compound ſpreading cluſters, ſcarlet and very handſome, often ſix-cleft. Their *calyx* is four times as long as broad, and uſually a little curved, ſtriated, ſcarcely downy.

The genus of *Lythrum* differs from *Griſlea* in its large rounded petals, ſtamens ſcarcely exceeding the calyx in length, and capitate ſtigma. Its habit moreover is herbaceous. S.

GRISLEHAMN, or GRISLEHAVEN, in *Geography*, a ſea-port town of Sweden, in the province of Upland; 37 miles E.N.E. of Upſal.

GRISLEHAVEN, OLD, a ſea-port of Sweden, in the province of Upland; 38 miles E. of Upſal.

GRISLY Seeds, among *Herbaliſts*, denote thin, flat, ſkinny ſeeds.

GRISOLA, in *Ornithology*. See Muscicapa *Griſola*.

GRISOLLES, in *Geography*, a town of France, in the department of the Upper Garonne, and chief place of a canton, in the diſtrict Caſtel-Sarrazin. The place contains 2025, and the canton 6477 inhabitants, on a territory of 132½ kiliometres, in 12 communes.

GRISON, one of the ſmaller Grenadines, ſituated between Diamond iſland and Cariacou. It has no freſh water, and is uninhabited.

Grison, in *Zoology*. See Viverra *Vittata*.

Grisons, in *Geography*, a people in alliance with the Swiſs, forming three leagues, *viz.* the *Grey* league, the league of *God's houſe*, and the league of the *ten juriſdictions*, which ſee reſpectively. The reſpective communities of theſe three leagues have their peculiar conſtitutions, enjoy their municipal laws and cuſtoms, and are independent commonwealths in all concerns which do not interfere with the general policy of the whole republic, or the articles of the particular league of which they form a part. The country which they inhabit is bounded on the N. by the canton of Glarus, from which it is ſeparated by a chain of mountains, the higheſt point of which is the "Calendar," and the counties of Sargans and Pludentz, on the E. by the Tyroleſe, on the S. by the Bergamaſco, and the duchy of Milan, and on the W. by the Swiſs Italian bailiwicks, and the canton of Uri. This country conſtituted Upper Rhætia; and, at the decline of the Roman empire, fell under the dominion of the Oſtrogoths, who governed it by dukes. About the ſixth century it became ſubject to the Franks, and in the ninth was united to Germany. The ſeveral alliances or leagues were formed in order to repel the tyranny of the great barons. The league of *God's houſe* is repreſented by ſome writers as the moſt ancient (ſee God's *houſe*); but according to others this league is ſuppoſed to have taken place between the year 1424, which was the era of the formation of the Grey *league* (which ſee), and 1436, the year in which the league of the *Ten* Jurisdictions (which ſee) became independent. The two former are ſaid to have eſtabliſhed an alliance in the year 1425 or 1427; and the firſt perpetual alliance was ratified by the deputies of the three leagues in the year 1471, or, as others ſay, in 1436. This confederation was renewed in the year 1544, and again in 1712. In conſequence of this union, the Griſons engage not to make any new alliance, nor declare war, nor make peace, but by common conſent. They alſo agree to favour one another, to guarantee one another's privileges, &c. Of all the conſtitutions in Switzerland, that of the Griſons is the moſt democratic, as their ſubordinates are totally independent of one another with regard to their particular police. The connection between the three leagues is maintained by means of an annual diet, of the congreſs, and of the three chiefs. The diet is compoſed of 63 deputies, and the three chiefs: the Grey league ſends 27, the houſe of God 22, and the Ten juriſdictions 14; theſe are choſen in the ſeveral communities by every male at a ſtated age. The diet aſſembles annually about the beginning of September at Ilants, Coire, and Davos, by rotation, and continues ſitting three weeks or a month. The chief of the league, in whoſe diſtrict the diet is held, is preſident for that term; the ſupreme authority is not abſolutely and finally veſted in the diet, but in the communities at large; for in all offices of importance, ſuch as declaring war, making peace, enacting laws, contracting alliances, and impoſing taxes, the deputies either have poſitive inſtructions from their conſtituents, or refer thoſe points, concerning which they have no inſtructions, to the deciſion of the reſpective communities, ſo that in effect the ſupreme power conſtitutionally reſides in the body of the people, and not in their repreſentatives at the diet. The three chiefs have no ſuffrage, when the communities ſend their inſtructions, becauſe they are not repreſentatives; but in all caſes which are either not referable, or afterwards ſubmitted to the communities, they vote in the ſame manner as the deputies. The deputies receive for their attendance a ſmall ſalary from the public treaſury, which never exceeds 5*s.* a day. The ariſtocratical party is ſtrengthened by the power delegated to the congreſs, which is an aſſembly formed by the three chiefs, and three deputies from each league. This congreſs generally meets in February or March at Coire; its office is to receive the votes of the ſeveral communities, relative to the queſtions referred to their deliberation at the laſt diet, and to communicate to each the reſult of the general deciſion. The three chiefs, as well as each of the other members of the congreſs, receive, towards defraying their expences, 54 florins, or about 4*l.* The three chiefs aſſemble regularly three times in the year at Coire; their principal meeting is in the month of May, when they write circular letters to the ſeveral communities, concerning the queſtions which are to be laid before the general diet. Throughout the three leagues the Roman law prevails, modified by municipal cuſtoms. The courts of juſtice in each community are compoſed of the chief magiſtrate, who preſides, and a certain number of jurymen choſen by the people. The priſoners are examined in private, and frequently tortured, for the purpoſe of forcing confeſſion, when the judges either divide the fines, or remit the puniſhment for a compoſition. Capital puniſhments are extremely rare, becauſe, it is ſaid, the judges receive greater advantage from fining than from executing an offender. The infliction of torture depends wholly upon the arbitrary will of the judges, a majority of whom may order it for an offence which by the ſtatutes is not capital, nor even puniſhable by corporal penalties. Even in the civil courts moſt cauſes are decided by bribing the judges, and appeals in thoſe communities, in which they are admitted, ſcarcely ſerve any other end than to enlarge the ſphere of corruption; but Coire and a few other places are excepted from this general reflection. Literature among the Griſons is at a very low ebb. The Proteſtants who receive a liberal education repair for the moſt part to Zuric or Baſle, and the Catholics to Milan, Pavia, or Vienna. Each community has a ſmall ſchool, in which the children are taught to read, write, and caſt accounts. At Coire there is a Latin ſeminary for the children of the burghers, and another, inſtituted in 1763, for the education of perſons intended for the church. There is alſo a typographical ſociety in this place for Latin, German, and Romanſh, and books in the Romanſh are printed in the Lower Engadina, and at Diſentis. The religion of the Griſons is divided into Catholic and Reformed, the only perſuaſions tolerated in this country. As the reformation was introduced into this country at an early period, about the year 1524, by the diſciples of Zuingle, the religion of the Proteſtant Griſons bears a greater reſemblance to that ſettled at Zuric, than to the church at Geneva; but the difference between the two ſects is very inconſiderable. The Proteſtants among the Griſons are more numerous than the Catholics, being eſtimated at about two-thirds of the inhabitants. In ſpiritual concerns the Catholics are for the moſt part under the juriſdiction of the biſhop of Coire; and for the reformed churches, each league is divided into a certain number of diſtricts, the miniſters of which aſſemble twice every year: theſe aſſemblies are called "Colloquia." Each colloquium has its preſident, and each league a ſuperintendent, called a dean. The ſupreme authority is veſted in the ſynod, compoſed of the three deans, and the clergy of each league; and candidates for holy orders are examined before the ſynod, which aſſembles every year alternately in each of the three leagues. The number of reformed churches in the three leagues amounts to 135; 46 in the Grey league, 53 in that of God's houſe, and 36 in the league of Ten juriſdictions.

The ſalaries are ſmall; the richeſt benefices yielding perhaps no more than 20*l.* or 25*l.* per annum, and the pooreſt ſcarcely 6*l.* The revenues of the three leagues ariſe from the following articles; *viz.* the duties upon the merchandiſe which paſſes through the Griſons, the Valteline, and Chiavenna, which are farmed at the rate of 17,000 florins, or about 1259*l.*. 2. A third of the fines laid upon delinquents in the ſubject countries, of a fluctuating amount. 3 A tribute of 500 philips (a philip being equal to 5*s.*) from the Valteline, and 100 from Chiavenna. 4. A ſmall fund, the principal part of which is only 4000*l.* veſted in the Engliſh ſtocks. The population of the Griſons may be thus eſtimated: the Grey league contains 54,000 ſouls, the league of God's Houſe 29,000, and the league of Ten juriſdictions 15,000: and if we add 87,000, the number of inhabitants in the Valteline, Chiavenna, and Bormio, the whole population of the Griſons and the ſubject countries, will amount to only 185,000 ſouls, or, allowance being made for deficiencies, will ſcarcely exceed 200,000.

The comerce of the Griſons is very contracted: the only exports (thoſe of the ſubject provinces excepted) are cheeſe and cattle. They import grain, rice, ſalt, and ſilk ſtuffs from Milan; grain from Swabia and Tyrol; ſalt from Tyrol and Bavaria; fine cloth, chiefly Engliſh, French, and Sileſian, through Germany; fine linens and muſlins from Switzerland. As the only manufacture throughout the country is that of cotton eſtabliſhed at Coire, the balance of trade muſt be againſt them; but they are enabled to ſupport this deficiency by means of the eſtates which the Griſons poſſeſs in the ſubject provinces, by the ſums which the governors draw from theſe provinces, by public and private penſions from France and Auſtria, by money ſaved in foreign ſervices, and by the duties upon the merchandiſe paſſing through their territories.

The principal commerce of the Griſons and ſubject provinces is carried on with Milan acroſs the lake of Como, by its branch the lake of Lecco, by the Adda, and by the canals of the Adda and Trezzo: Milan receiving from the Griſons only planks, ſtones for building, and coals.

The languages of the Griſons are the Italian, German, and Romanſh. The Italian, which is a jargon ſimilar to the Milaneſe dialect, is ſpoken by the inhabitants of Pregalia and Puſchiavo, and in the vallies of Maſox and Calanca. The German is ſpoken throughout the whole league of the Ten juriſdictions, a few villages excepted; in the league of God's houſe, at Avers, Coire, and the four villages; and in the Grey league, in various places. The Rhætian or Romanſh is the vernacular tongue among the greater part of the Griſons. It is divided into two principal dialects, the one ſpoken in the Grey league, and the other in that of God's houſe. See ROMANSH.

The houſe of Auſtria, in modern times, has directed all the affairs of the Griſons with the moſt unbounded authority. However, as early as 1790, the agents of France were induſtrious in diſſeminating the new principles; but the great body of the people were averſe from any innovation. At length, in 1794, a ſociety of Griſon Jacobins induced the people to aboliſh the ancient form of government, to ſubſtitute a national convention in the place of the general diet, and to throw themſelves under the protection of France; and this revolution was accompanied with the uſual horrors of pillage, baniſhment, and bloodſhed. Bonaparte had no ſooner concluded the armiſtice with the emperor, than he diſmembered the Valteline, Chiavenna, and Bormio, and annexed them to the Ciſalpine republic. This perfidious conduct rouſed the indignation of the Griſons, and ſerved to favour the cauſe of the anti-revolutionary party, ſo that, in a ſubſequent ſtage of the French revolution, they rejected the mandate of the French directory to incorporate themſelves with the Helvetic republic, and re-eſtabliſhed the ancient government. However, on the renewal of hoſtilities between France and Auſtria, the country of the Griſons became the ſcene of bloody conteſts, and was alternately occupied by both armies, till at length it was conſtrained to ſubmit to the power of France, and to form the ſixteenth department or canton of Switzerland, according to the conſtitution of May 1800, empowered to ſend ſix repreſentatives to the diet.

The country of the Griſons is mountainous, interſperſed with vallies, which in ſome parts are impaſſable during a great portion of the year. The chief of theſe vallies lie towards the ſouth, ſunk in the Alps, which terminate at laſt in impaſſable glaciers, or elevated rocks, yielding no kind of vegetable. Theſe glaciers are the ſources of the principal rivers, as the Rhine, the Inn, and the Adda. The vallies afford ſome corn, but not ſufficient for the ſupply of the inhabitants; the chief objects of attention to the farmers are their ſheep and cattle, from which they obtain excellent butter and cheeſe. The mountains furniſh good paſture, the hills ſupply cheſnuts, and the vallies produce fruit. The mountains abound in metals, minerals, foſſils, and mineral ſprings. The peaſants wear linen and woollen cloth of their own manufacture.

GRISSEY, a town of the iſland of Java, and capital of a kingdom of the ſame name. S. lat. 7° 5′. E. long. 112° 48′.

GRIST denotes corn ground, or ready for grinding.

GRISTOW, in *Geography*, a ſmall iſland in the circle of Upper Saxony, ſituated in the Direnow, between the town of Cammin and the iſland of Wollin, in Anterior Pomerania. N. lat. 53° 55′. E. long. 14° 40′.

GRITA, LA, a town of S. America, in the province of the Caraccas; 50 miles S.S.W. of Merida.

GRITHBRECHE, in our *Old Writers*, the ſame with breach of the peace. In this ſenſe we find it mentioned in leg. Hen. I. cap. 36. "In cauſis regiis grithbreche 100 ſol. emendabit."

It comes from the Saxon, *grithbryce*, which ſignifies the ſame.

GRITHSTOLE, a place of ſanctuary. Blount. See FRIDSTOLE.

GRITS, in *Natural Hiſtory*. See SABURRÆ.

GRIT-STONE, is a ſtone conſiſting of particles of ſand agglutinated together. Of this kind of ſtone there are many varieties, differing in the ſize of the particles of ſand that compoſe them, the different properties of theſe ſands, and their different degrees of compactneſs and agglutination. Some of theſe ſtones are uſed for building, others for grinding, others for whetting ſharp ſteel inſtruments, and others for filtrating water. See FILTRE, GRIND-*ſtone*, WHET-*ſtone*, and STONE.

GRIT-STONE, in *Mining*, ſignifies a hard granular or gritty ſtone, compoſed of grains of ſilex or quartz, cemented together, generally either by a ſilicious, or argillaceous or a ferruginous cement; the firſt of theſe, or the ſilicious gritſtones, are alone fit to be uſed in repairing roads, on account of the cements of the other ſorts being ſoftened by wet and the wear of carriage, the whole ſoon becoming a heavy ſandy mire upon the road, which, when the argillaceous parts are diſſolved and waſhed away by the winter rains, leaves theſe roads in the ſummer as intolerable from their depth of looſe ſand; as moſt travellers muſt have obſerved in the argillaceous grit-ſtone diſtrict about Aſhby de la Zouch, in Leiceſterſhire, and numerous other coal-countries, and the ferruginous grit-ſtone diſtrict about Woburn in Bedfordſhire, and other places. The greater part of the numerous grit-ſtone rocks and beds of ſuch ſtone in the coal-meaſures, are argillaceous, of a fine grit, with minute plates of mica, and are unfit for roads until hardened by the action of fire, being ſtill, however, very weak and improper road materials, if better could be procured.

A large portion of the argillaceous grit-ſtones have but a ſlight diſpoſition to periſh or moulder when expoſed, and can be uſed in walls and ordinary buildings; others will periſh in a few years, and a large portion of what appears, when firſt dug, at proper diſtances below the ſurface, to be very hard grit-ſtone, will, after a very ſhort time of expoſure, fall to a loamy or clayey ſand; ſuch very periſhable grit-ſtone ſtrata, are called by the colliers ſtone-binds, grey-beds, &c. except about Newcaſtle, where they are denominated ſand-ſtones.

In ſome places cryſtallized granular lime-ſtones occur, as in the yellow, or magneſian lime-ſtone range, near Mansfield, in Nottinghamſhire, and ſuch are ſometimes, though improperly, called grit-ſtones, or gritty lime-ſtones. See SAND-*ſtone*.

GRITZGALLEN, a town of the duchy of Courland; 20 miles S. S. W. of Seelburg.

GRIVE, JOHN DE LA, in *Biography*, was born at Sedan in the year 1689. He ſhewed a ſtrong inclination for the ſtudy of mathematics in early life, and was ſent to Paris, after a preliminary education in his native city. He entered into the congregation of the prieſts of St. Lazarus, in which he ſpent ſeveral years. Having taken orders, he was ſent by his ſuperiors to Poland, where, in 1713, he filled the poſt of profeſſor of theology in a houſe belonging to his order at Cracow. Still his mind was devoted to ſcientific purſuits, and being very expert in practical mathematics, he publiſhed "A Plan of Paris," which was ably and very accurately deſigned: but was ſpoiled in the engraving. He determined forthwith to be his own engraver, and publiſhed "The Environs of Paris;" "A Plan of Verſailles;" "The Gardens of Marly;" and "A Survey of the Royal Domains in the Vicinity of Paris;" all which are well executed, and held in high eſtimation by connoiſſeurs. He publiſhed "A Manual of Spherical Trigonometry," and was appointed geographer to the city of Paris. The laſt work which he undertook was the Topography of Paris on a large ſcale. But he died in 1757 before he had accompliſhed his deſign. Moreri.

GRIVELNIK, in *Geography*, a town of Walachia; 30 miles E. of Targoſyl.

GRIVENSKOI, a town of Ruſſia, in the province of Uſting; 96 miles E. of Lalſk.

GRIWHEE, a town of Africa, on the ſlave-coaſt. N. lat. 6° 30'. E. long. 1° 16.

GROAI, a town of Africa, on the ſlave-coaſt; 10 miles N. W. of Cape Palmas.

GROAIS *Iſle*, a ſmall iſland near the W. coaſt of Newfoundland. N. lat. 51°. W. long. 53° 50'.

GROAIX, a ſmall iſland, about four miles long and one and a half wide, near the W. coaſt of France and department of the Morbihan; 18 miles N. N. W. of Belleiſle; N. lat. 47 39'. W. long. 3° 22'.

GROANING, in *Hunting*, a term uſed for the cry or noiſe of a buck.

GROAT, an Engliſh money of account, equal to four pence.

Other nations, as the Dutch, Polanders, Saxons, Bohemians, French, &c. have likewiſe their groats, groots, groches, gros, &c.

We had no ſilver money in the Saxon times bigger than a penny; nor after the conqueſt, till Edward III. who about the year 1351, coined groſſes, *i. e.* groats, or great pieces which went for 4*d.* a-piece; and half groats; and ſo the matter ſtood till the reign of Henry VIII. who, in 1505, firſt coined ſhillings.

GROATS, in *Rural Economy*, the ſmall grains formed from oats by being cut in the mill, after having the huſks or ſhells taken off from the grain.

GROBIN, or *Grobinen*, in *Geography*, a town of the duchy of Courland; 28 miles S. S. W. of Goldingen.

GROCERS, by the ſtat. 37 Edward II. cap. 5. a term uſed for thoſe who engroſs merchandize. See ENGROSSING.

But grocers are now thoſe who deal in ſugars, ſpices, &c. and form one of the incorporated companies of London. See COMPANY.

GRODEK, in *Geography*, a town of the duchy of Warſaw; 40 miles S. W. of Bielſk.

GRODNO, the principal, though not the capital, town of Lithuania, built upon an eminence, overlooking the river Niemen. This is a large ſtraggling place, but contains no more than 3000 Chriſtians, excluſive of the perſons employed in the manufacture, and about 1000 Jews. It has the appearance of a town in decay, containing a mixture of wretched hovels, falling houſes, and ancient palaces, with magnificent gateways, the remains of ancient ſplendour. A few habitations in good repair render the contraſt more ſtriking. The old palace, in which the kings reſided during the diets, ſtood upon a hill of ſand riſing abruptly from the river; but only ſome remains of the ancient walls exiſt. The new palace built, but not inhabited, by Auguſtus III. ſtands oppoſite to the former. It was enacted in 1673, that every third diet ſhould be held at Grodno; but this order has not been regularly obſerved. The late king of Poland eſtabliſhed a royal academy of phyſic in this town, in which ten ſtudents are inſtructed in phyſic and twenty in ſurgery, maintained and taught at the royal expence. The principal manufactures of this place are cloth and camlets, linen and cotton, ſilk ſtuffs, embroidery, ſilk ſtockings, hats, lace, fire-arms, needles, cards, bleaching-wax, and carriages. The country furniſhes ſufficient wood, flax, hemp, beavers'-hair, and wax, for the ſupply of the manufactories, that employ theſe commodities; but the ſilk, cotton, iron, colours, gold and ſilver for the embroidery, and fine thread from Bruſſels for the lace are imported. Theſe manufactories employ 3000 perſons; they were founded by the late king, and reflect conſiderable luſtre on the royal founder. The Roman Catholics have nine churches, thoſe of the Greek church have two; and the Jews here have a ſynagogue: 140 miles N. E. of Warſaw. N. lat. 53° 34'. E. long. 24° 12'.

GROEMS, a town of the duchy of Holſtein; ten miles S. of Ciſmar.

GROENLBERG, the largeſt of the projecting hills that run acroſs the valley of Drakenſtein, the ſoil of which is productive of fruit, wine, and corn. See DRAKENSTEIN.

GROENVELT, JOHN, in *Biography*, a phyſician, and member of the Royal College of London, in the ſeventeenth century, was born at Deventer, in the province of Overyſſel; he ſtudied and graduated at Utrecht, where he began the practice of his profeſſion. But he likewiſe ſtudied under a celebrated lithotomiſt of Amſterdam, from whom he learnt that art, and whoſe eſteem he acquired by the dexterity with which he performed the operation, inſomuch that by his will this maſter bequeathed all his inſtruments to Groenvelt, with a requeſt that he ſhould employ them for the good of mankind. After this time he practiſed this art almoſt excluſively. He left three treatiſes; the 1ſt entiled "Diſſertatio lithologica variis obſervationibus et figuris illuſtrata." Lond. 1684.—2. "Practica qua humani morbi deſcribuntur." Francfort, 1688.—3. "Tractatus de tuto Cantharidum in Medicina uſu interno." Lond. 1698, &c. Theſe works were tranſlated into Engliſh, and the author's name was changed to *Greenfield*. Eloy. Dict. Hiſt.

GROGRAM, in the *Manufactory*, a ſort of ſtuff, made of ſilk and mohair, being in reality no more than a taffety, coarſer and thicker than ordinary.

GROHNDE, in *Geography*, a town of Weſtphalia, in the principality of Calenberg on the Weſer, where a toll is paid; nine miles S. of Hameln.

GROIN, in *Anatomy*. See Inguen.

GROINE, in *Geography*. See Corunna.

GROINES, or Groynes, in *Engineery*, are projections of wood from the outſides of a pier at the entrance of a harbour, to break the force of the waves and to retain the beach or gravel. See Smeaton's Reports, vol. i. pages 121, 271. Sometimes theſe are of piles and planks, ſometimes of faggot, or faſcinery ſtaked down, and ſometimes of hedging or thatching, that is made of ſtrong ſtakes and wattles of hedgewood. Similar projections to theſe, from ſea-walls or banks, are called horſes, jetties, &c.

Groins, in *Architecture*, a ſpecies of croſs paſſages arched above, ſo that the hollow of the one arch may cut through the ſolid into the hollow of the other arch, and leave a void at their mutual interſection.

It is evident, that the firſt conſtruction of groins muſt have been ſubſequent to that of ſimple vaulting, and that the idea muſt have originated in the formation of croſs-arched paſſages, particularly when it was neceſſary to occupy the whole or a part of the arches of both, or of the number which interſected at the ſame place. It is uncertain at what time they were firſt introduced into architecture: they are, however, of remote date; but their antiquity cannot be traced beyond the times of Roman power and grandeur. They became faſhionable at the decline of the empire, and are to be found in the elliptic paſſages of the Coliſeum, the temple of Peace, and the baths of Diocleſian at Rome. In the two latter buildings, the groins over the great halls ſpring from Corinthian and Compoſite columns, the moſt feeble of all ſupports, inſtead of the maſſive piers, which are only capable of reſiſting the lateral preſſure of the arches. Were it not for the auxiliary ſupport of the walls immediately behind in theſe buildings, the columns would not reſiſt the thruſt of the arches for a ſingle moment. The exterior walls of Diocleſian's palace at Spalatro in Dalmatia, and the Gymnaſium, at Alexandria-Troas in Ionia, are alſo vaulted with groins.

After the decline of the Roman empire, groins continued to be uſed in eccleſiaſtical buildings, and wherever grandeur or decoration was required, they were ſeldom or never omitted; they became the moſt conſpicuous features of all ſumptuous buildings and the pride of theſe times, and accordingly were decorated with ribs ſpringing from the walls, and branching over the groined ſurface of the ceiling interlaced with tracery: but except the pointed form of the arch, the principle of the groins remained the ſame for a conſiderable period of time, at leaſt ſo long as the ceiling remained plain. At laſt pillars decorated with columnar mouldings were attached to the walls inſtead of ſquare piers or the wall itſelf, in order to ſupport the ſpringers which were introduced under the groins; and theſe pillars being terminated with a capital, the abacus of which was of the ſame form, naturally ſuggeſted a ſmall change in the ſurface of the vaulting. For the columns now introduced preſented in the general appearance a ſaliant or external angle before the wall inſtead of a parallel ſide, and therefore the ceiling, to be conſiſtent with the baſe, naturally followed the general form of the abacus, ſo that the angles of the groined ſurface became more obtuſe, and the horizontal ſections of the groins at the ſpringing polygons; but the angles of theſe horizontal ſections at the diagonal ſpringers became more acute and the other angles more obtuſe till the ſides of the obtunding angles terminated in two interſecting ſtraight lines in the ſummits of the arches, and formed right angles, which were alſo the ultimate angles at the diagonal ſpringers. Hence the ſaid ſection of the groin above, any pillar being a ſemi-polygon, approached nearer to a ſemicircle as the number of ſpringers were greater, and this polygon ended in a rectangle in the ſummits of the croſs arches. It is not unlikely that this idea generated that of fan-work, and founded a ſyſtem of vaulting altogether upon a new principle, for the conſtruction of groins with diſſimilar ſections, ſpringing from a ſemicircular baſe, and ending in rectangles at the level of the ſummits, was imperfect.

It would eaſily occur, that any number of equal and ſimilar ribs, ſpringing at the ſame angle from a common centre in vertical planes, would ſupport themſelves, provided their upper ends were ſupported; and as the horizontal ſections of the ribs thus diſpoſed, would be in the ſemi-circumference of a circle, their common abutment at the top would be a ſemi-circle horizontally poſited. This idea would be complete by imagining ribs to riſe from four angles of a ſquare or oblong, in the ſame manner, but moſt perfect in the ſquare; then the four abutments for each ſet of angular ſpringers would be quadrants, and theſe quadrants would encloſe a ſpace, and form four convex boundaries to that ſpace, which, filled in with a flat vault, would key the whole together, and keep the quadrantal abutments ſtationary.

Having thus given a particular and tranſitive idea of groins, in order to illuſtrate this ſhort hiſtorical account, it will not be improper to define more particularly the various ſpecies of ſimple vaulting, and thence the general formation of groins, and to ſhew how to diſcriminate the various ſpecies, according to the ſeveral kinds of ſimple vaults which compoſe them; and laſtly, the geometrical conſtruction of groined centering and ribbing for plaiſtering.

Definitions.—A ſimple vault is an interior concavity extended over two parallel oppoſite walls, or over all diametrically oppoſite ſides of one circular wall.

The concavity or interior ſurface of the vault is called the intrados.

The intrados of a ſimple vault is generally formed of the portion of the ſurface of a cylinder, cylindroid or ſphere, never greater than that of the half of the ſolid; and the ſpringing lines which terminate the walls which the vault riſes from, are generally ſtraight lines parallel to the axis of the cylinder or cylindroid.

When the vault is ſpherical, the circular wall terminates in a level plain at top, from which the vault ſprings, and forms either a complete hemiſphere, or a portion of the ſphere leſs than the hemiſphere.

Conic ſurfaces are ſeldom employed in vaulting; but when a conic ſurface is employed for the intrados of a vault it ſhould be ſemi-conic, with a horizontal axis, or the ſurface of the whole cone with its axis vertical.

All vaults, which have a horizontal ſtraight axis, are called ſtraight vaults.

All vaults, which have their axis horizontal, are called horizontal vaults.

A groin is that in which two geometrical ſolids may be tranſverſely applied one after the other, ſo that a portion of the ſurface of the groin will have been in contact with a portion of the ſurface of the firſt ſolid, and the remaining part in contact with the ſurface of the ſecond ſolid, when the firſt is removed.

The moſt uſual kind of groins is one cylinder piercing another, or a cylinder and cylindroid piercing each other, having their axis at right angles.

The axis of each ſimple vault forming the intrados of a groin, is the ſame with the axis of the geometrical ſolids, of which the intrados of the groin is compoſed.

When the breadths of the croſs paſſages or openings of a groined vault are equal, the groin is ſaid to be equilateral.

When the altitudes of the croſs vaults are equal, the groin is ſaid to be equi-altitudinal.

Groins have various names according to the ſurfaces of the geometrical bodies which form the ſimple vault.

A cylinder groin is that which is formed by the interſection of one portion of a cylinder with another.

A cylindroidic groin is that which is formed by the interſection of one portion of a cylindroid with another.

A ſpheric groin is that which is formed by the interſection of one portion of a ſphere with another.

A conic groin is that which is formed by the interſection of one portion of a cone with another.

The ſpecies of every groin, or ſingle arch, formed by the interſection of two vaults of unequal heights, is denoted by two preceding words; the former of which ending in *o* indicates the ſimple vault, which has the greater height, and the latter ending in *ic*, indicates the ſimple vault of the leſs height.

When a groin is formed by the interſection of two unequal cylindric vaults it is called a cylindro-cylindric groin, and each arch is called a cylindro-cylindric arch.

When a groin is formed by the interſection of a cylindric vault, with a ſpheric vault, the ſpheric portion being of greater height than the cylindric portion, the groin is called ſphero-cylindric groin.

When a groin is formed by the interſection of a cylindric vault with a ſpheric vault, and the ſpheric portion of leſs altitude than the cylindric portion, it is called a cylindro-ſpheric groin; and each arch is called a cylindro-ſpheric arch.

When one conic vault pierces another of greater altitude, the groin formed by the interſection is called a cono-conic groin, and each arch a cono-conic arch.

A rectangular groin is that which has the axis of the ſimple vaults in two vertical planes at right angles to each other.

A multangular groin is that which is formed by three or more ſimple vaults piercing each other, ſo that if the ſeveral ſolids which form each ſimple vault be reſpectively applied, only one at a time to ſucceeding portions of the groined ſurface, every portion of the groined ſurface will have formed ſucceſſive contact with certain correſponding portions of each of the ſolids.

An equiangular groin is that in which the ſeveral axes of the ſimple vaults form equal angles around the ſame point, in the ſame horizontal plane.

Cellars and other ſtrong places are frequently vaulted with groins of brick or ſtone, the outer ſupports are moſt commonly pilaſters, attached to a wall; the inner ones are ſquare, or rectangular, inſulated piers, from the corners of which, and from thoſe of the pilaſters ſpring the ſquandrals of the groin.

Illuſtration.—A, A, A, and *fig.* 1. No. 1. are the piers, upon which the groin is built.—No. 2. is the elevation of the nave, exhibiting one of its ribs, and the edges of the common and jack-ribs of the tranſept. In this groin the ſection, or generating figure, acroſs the nave, is a ſemi-ellipſis, and that acroſs the tranſept a ſemi-circle. It may eaſily be demonſtrated, that the line in which two vaults meet in a regular groin is all in one plane, the figure will therefore be the ſegment of a circle or ellipſis, cut off by a double ordinate, parallel to the tranſverſe or conjugate axis. For this purpoſe it is only neceſſary to ſhew that when two points are taken, one in each ordinate, which is at right angles to the axis of the vault, in the baſe of each generating figure, upon the ſame ſide of the axis, in ſuch a manner that the diſtance of the one point, from the neareſt extremity of the baſe, is to the diſtance of the other from its extremity, as the baſe of the former is to the baſe of the latter, the two perpendiculars, erected upon theſe points, are equal to one another.

Let the one generating figure be A K H D, *fig.* 2, No. 1; and the other E L H G, No. 2; and let the two baſes A D and E G, be biſected, each in C, and divided in the points B and F, ſo that $AB : EF :: AC : EC$, alſo let the two heights, C, H, be equal to each other, then will their parallels B K, and F L, be alſo equal to each other, for by a property of the ellipſis $AC^2 : AB \times BD :: CH^2 : BK^2 = \frac{AB \times BD \times CH^2}{AC^2}$ and by the ſame property $EC^2 : EF \times FG :: CH^2 : FL^2 = \frac{EF \times FG \times CH^2}{EC^2}$ but to ſhew the equality of BK^2, and FL^2, it is neceſſary to have the value of F L, in the ſame terms, with B K, for this purpoſe, we have $AB : BD :: EF : FG = \frac{BD \times EF}{AB}$ and $AB : AC :: EF : EC = \frac{AC \times EF}{AB}$ Therefore, by ſubſtituting $\frac{BD \times EF}{AB}$ for F G and $\frac{AC^2 \times EF^2}{AB}$ for EC^2 in the quantity $\frac{EF \times FG \times CH^2}{EC^2}$ it will then be $EF \times CH^2 \times \frac{BD \times EF}{AB} \times \frac{AB^2}{AC^2 \times EF^2} = \frac{AB \times BD \times CH^2}{AC} = EL$ the ſame, value as found, for BK^2, therefore F L is equal to B K. Now it is evident, that if two ſections, B K H D, and E L H G, be moved along their axis, as has already been defined, until the lines K B and F L meet, the point K, will coincide with L, becauſe B muſt coincide with F, upon the diagonal line, conſequently the points K and L, will coincide in the common ſection, perpendicular to the baſe of the groin.—Now all other two points ſo circumſtanced, would likewiſe meet in a plane perpendicular to the baſe of the groin paſſing through the diagonal lines; therefore the common interſection of two cylindric ſurfaces, piercing each other, of the ſame vertical diameters (that is, the generating ſections, having their two parallel diameters equal to each other,) are in the ſame plane, and the common line is an ellipſis, whoſe centre is in the middle of the diagonal line. Now it has been ſhewn, that the nave is completely boarded in without having any reſpect to the tranſept.—In order to get the foot of the jack-ribs, it is found convenient to draw the two diagonals upon the nave, where the ſurfaces of the two vaults meet each other; this is nothing elſe than finding the covering of a cylindric ungula. Make a thin rule of a ſufficient breadth, to fit the curved edge of the ſuperficies.—This rule is to be applied from the bottom or top of the interſection, and bent round upon the boards till the other extremity meet the top or bottom, and a line is to be drawn by the curved edge. The other three angles are to be drawn by the ſame rule, obſerving to reverſe the lines that are upon the ſame ſide to each other. To ſave time in fitting the boards of the tranſept, a mould is made for the ſuperficies of the ungula of this vault in the ſame manner. The boards for the covering are laid together upon a flat ſurface, to the breadth of the circumference of the vault, and a line is to be drawn by the edge of this mould acroſs the ends of the boards, obſerving to apply the mould at the proper angle from the bottom or top. A B D, N° 4, is half a rib of the nave; the circumference A D may be divided into the equal parts A, *t*, and lines drawn parallel to D B, cutting the diagonal A C, in the points *v*, and the baſe A B in *u*; I H or I G, N° 5, is made equal to the arc A D, by bending a thin ſlip of wood round the curve, and marking it at the points *t*, *t*, *t*: this ſlip of wood is to be ſtraightened, and the diviſion transferred to I G at *w*, *w*, *w*, &c. N° 5; draw the perpendiculars *w*, *x*; make the lines *w*, *x*, equal to the lines *u*, *v*. A line being drawn through the points *x*, *x*, *x*, &c. will be the curve for the edge of the mould for finding the angular interſections upon the nave, with that of the covering of the tranſept. In like manner, the mould for cutting the ends of the boards will be found: A F E, N° 4, is half the rib of the tranſept; divide the circumference into the equal parts A *z*, *z z*, *z z*; draw the lines *z y*, *z y*, parallel to E F, cutting the diagonal A C at the points *v*, *v*, *v*, and the baſe A E in the points *y*: put in ſmall tacks, or pins, at the points *z*, and bend a thin ſlip of wood round the arc; mark upon it the points *z* and the extremities of the arc; then ſtraighten it, and lay it upon any indefinite line.

From *o* to M, and *o* to L, N° 6, and mark the points *p*: draw the perpendiculars *p*, *q*; make the lines *p*, *q*, equal to *y v*; and through the points *q* draw a curve, and it will be the edge of the mould for cutting the boarding. In finding theſe moulds, it is not neceſſary that the diviſions round the arcs be equal; but it is convenient, as the arc may be divided into equal parts which form ſegments, whoſe chords differ in length, but an exceeding ſmall quantity from the arc itſelf. Theſe chords, repeated to the number of diviſions of the arc, upon a ſtraight line, will give the rectification of the curve nearly. When the rib of the nave is a ſemi-ellipſis, and that of the tranſept a ſemi-circle, it may be found very convenient to divide the circular arc firſt into equal parts; then drawing perpendicular lines to its baſe, to cut the diagonal from theſe interſections; draw lines perpendicular to the baſe of the other rib, to cut its curve, which will be divided into ſmall ſegments, whoſe curvatures are more proportional to each other, than thoſe of equal chords, as an elliptic arc upon the tranſverſe axis is much quicker towards each extreme than at the middle.

Groin Ribbing.

Timber Groins—Timber groins are thoſe which are conſtructed with timber, and plaiſtered, which form the concave ſurface of the groin, in the ſame manner as thoſe of brick or ſtone turned upon a centre.

There are two methods of forming and diſpoſing of the common ribs, the one, in which they are curved and placed at right angles to the axis of each of their reſpective vaults, and the other, in which they are all ſtraight, and placed parallel, excepting one placed between every two oppoſite piers, for the purpoſe of ſhortening the bearings of the ſtraight ribs. The former of theſe methods is ſhewn at A B C D, *fig.* 3, the latter at B E F C, and the conſtruction on the right-hand of the ſame figure. Suppoſe it were required to have the rib A G H of the tranſept a ſemi-circle, then that acroſs the nave I K L will, conſequently, be an ellipſis to the ſame height. The moſt expeditious method of finding the one from the other: take any number of points, in circumference H G A, and draw lines parallel to the axis, or ſides of the vault, cutting the diagonals from theſe interſections; draw lines parallel to the ſides, or axes, of the other vault. From the baſe I L make all the perpendiculars for the ellipſis I K L equal to thoſe of the ſemi-circle; from the interſections on either diagonal, draw perpendiculars to that diagonal, on either ſide of it; make theſe perpendiculars alſo equal to thoſe of the ſemi-circle.

In warehouſes, as the walls are frequently placed at remote diſtances, it becomes neceſſary to introduce many intermediate ſupports to the floors, which are frequently loaded with the greateſt weight; and as timber-floors are ſubject to both fire and rot, and thereby expoſed to ſudden danger, every means ſhould, therefore, be taken to render buildings of this deſcription proof againſt ſuch caſualties, at leaſt as far as appears eligible in the profits ariſing from the goods which are lodged in the building, being a full compenſation for the additional expences, nothing will contribute further to this end than groins, which, though not applicable to the upper ſtories of a building, (owing to the great expence which would be incurred by the extraordinary thickneſs of walling, and the diminution of ſpace which this would naturally occaſion,) may at all times be uſed in the cellars and ground ſtories, without much addition of labour, or expenditure of materials. It has been found, however, that brick groins, riſing from rectangular piers, are very inadequate to the weight they have to ſupport: we will, therefore, lay before our readers an ingenious tract by Mr. George Tappen, architect, where he clearly points out the diſadvantages of the preſent form, and ſhews how to remedy theſe evils by the introduction of a new manner of groining, which not only gives double the ſtrength, but occupies leſs ſpace, and is much more convenient for turning goods round the corners.

" On a new and more effectual method of building groined arches in brickwork, that they may better anſwer the various uſes they are intended for, in warehouſes of different deſcriptions, ſubterranean ſtructures, or undercroft, and other buildings; as is more particularly ſhewn by a model, made for practical demonſtration, which may be viewed at Mr. Narrien's, N° 70, St. James Street.

It has long been experienced, and univerſally acknowledged, that the preſent eſtabliſhed method of erecting groined arches is a weak and imperfect conſtruction, and, conſequently, improper to be introduced into warehouſes, or ſuch other buildings as require a much greater degree of ſtrength and ſolidity than is uſual, in order to ſupport, with more ſafety, the immenſe weights and burthens which are conſtantly placed therein.

But, notwithſtanding this general opinion, I have never heard that any profeſſional man, or other qualified perſon, has hitherto given himſelf the leaſt trouble or concern in attempting to apply a remedy to the evil, by deviſing ſome more ſecure and judicious manner of conſtructing them, although it is unanimouſly confeſſed that ſuch an improvement would be attended with conſiderable commercial advantage.

Indeed, upon a ſlight inveſtigation of the ſubject, the objections raiſed againſt this kind of arches, as they are now built, appear to be too well founded to require much comment.

In the firſt place, it muſt be manifeſt to every obſerver who examines them, that a very material part of the ſubſtance of the bricks, forming the groined angle, is pared and cut away, with an intent of producing additional length to the curve of that angle by which the joints of all the brick-work are preſerved on an exact level line, as well as from the unavoidable neceſſity of uniting and bonding the ſame into the face of the arch with which it is immediately connected.

Secondly.—The ſlanting, or oblique direction in which the bricks are cut and bedded at the angles of the groins (ſee W, *figure* 1, in the diagram hereto annexed), with an horizontal line at top, render them extremely liable to be thruſt out of their ſituations by any ſudden momentum, or extraordinary impulſe operating on the crown of the arch.

Thirdly.—Were the groins viewed in a ſectional repreſentation, they would preſent the pooreſt and moſt feeble of all forms thus applied, that of a wedge placed vertically on its blade; and at the ſame time diſcover ſo ſmall an area, and conſequently ſuch a want of ſolidity, as to appear incapable of ſuſtaining, ſo ſecurely as they ought, the combined lateral preſſure of the contiguous arches.

Laſtly.—The groins (being the parts where the greateſt reſiſtance ſhould be made), inſtead of ſpringing from a broad ſubſtantial baſe, have nothing elſe to reſt upon, than the moſt flimſy of all ſupports, namely, an extreme corner of a ſquare pier. Again, what may be urged, not only as a confirmation, but as an augmentation of the evils juſt mentioned, is, that when the crowns of theſe arches are loaded with ſtores and merchandiſe, the ſuperincumbent weight has been found, by experience, to act chiefly in the direction of the groins, although they are allowed to be the weakeſt parts of the arch; therefore it follows, as a natural concluſion, that the ſtronger theſe parts are made, the better the whole arch will be able to counteract the tendency of a fracture, and conſequently the greater burthen it will be capable of ſupporting, without the danger of giving way.

Thus having, I preſume, ſufficiently explained my objections to the old groined arches, I will now ſubmit a conciſe deſcription of my new method of building them, referring my readers to the conſideration of the model made for that purpoſe, which, though conſiſting of a ſingle arch only, will nevertheleſs impart a competent idea of a continuation of them where circumſtances may make it neceſſary.

Inſtead of the ſquare piers, ſo commonly uſed, I have adopted octangular ones, being better ſuited to the principles of the new method, as will readily be perceived by the inſpection of the model, or of the diagram hereto annexed: alſo, they occupy leſs ſpace on the ground than the ſquare piers, (being octagons inſcribed therein); nor are they ſo ſubject to injury at the angles, by the rolling of caſks or removal of goods, as thoſe which are ſquare.

The four-inch receſſes between the baſes of the ribs may, if thought beſt, be filled up to the height of the ſpringing courſe, and then the piers would be perfect octagons (as ſhewn by the pier O in the diagram); and conſequently all the angles, by becoming obtuſe, would be leſs expoſed to harm than they are even by this method; but the ſuperficial ſpace of two feet ſix inches in each pier would be loſt.

The octangular piers, meaſured acroſs each way from the feet of the ribs, are four feet eight inches, which is the ſize of the ſquare ones uſed in the tobacco warehouſes at the London docks, but the octagonal piers are attended with this ſuperior and apparent advantage: in each of them there will be a ſaving of room amounting to three feet nine inches, excluſive of the ſpaces between the ribs before mentioned, which ariſes from the truncation of the four triangles (marked *t*) produced by the inſcribing of an octagon within a ſquare. That is to ſay, each of the ſquare piers in the tobacco warehouſes of the London docks, though only the ſame ſize from out to out, occupy three feet nine inches more of the area, or ſuperficial content of the warehouſe, than the octagonal piers, excluſive of two feet ſix inches before mentioned, which added together, would make a ſaving of ſix feet three inches in every pier, if the ſmall ſpaces between the ribs were not filled up. This ſum, multiplied by the number of them throughout the whole building, would amount to a conſiderable loſs of room in regard to ſtowage. And here it ought to be particularly obſerved, that though the octangular piers contain leſs ſubſtance, by the cutting of the four angles than the others, they are nevertheleſs made conſiderably firmer; becauſe the croſs ribs of the contiguous arches, which reciprocally ſupport and reſiſt each other, have a broader footing on the main body of the pier, independently of the intervening ſpandrils, which are to be carried up to the level of the extrados of the arches.

The diſtance of theſe octangular piers from each other I have ſuppoſed to be twenty-one feet, which alſo tallies with the ſpace obſerved in the tobacco warehouſes at the London docks, and which has been proved by experience to be an advantageous diſtance between the piers, for the accommodation of various ſtowage in large warehouſes. I only allude to theſe works by way of a datum, (they being of national notoriety, and very juſtly of public approval,) ſince it is clear to every underſtanding, that the new method, as well as the old, may be practiſed with equal eaſe to any dimenſions, and with any kind of arch.

I have intended the diagonal ribs to conſiſt of two bricks and a half on the face, and two bricks in thickneſs; which alſo may be made larger or ſmaller, agreeable to the ſpan of the arch, the ſize of the piers, or the weight intended to be put upon them. The filling-in arches are meant to be one and a half brick in thickneſs, as is uſual, which may alſo be made thicker whenever it may be thought proper to increaſe the ſize of the ribs and piers. Now it is evident, by inſpecting the model, that theſe ribs, ſpringing not from a ſmall corner or edge of a ſquare pier, but from the ſides of a ſolid octagon, made ſtill more firm and immoveable by the counteracting agency of the oppoſite ribs, with flat ſpandrils above, muſt poſſeſs extraordinary ſtrength and durability. They abut againſt a ſtout ſquare key-ſtone, placed in the central interſection, or which may be brick-work inſtead; and, by their having to bear the whole of the weight placed upon the filling-in arches, they are to be worked throughout with ſolid unmutilated bricks, except ſuch cuttings as may be neceſſary for bond alone; and the whole being carried up at the ſame time, namely, the ribs R, filling-in arches F, and ſpandrils S, and well worked and bonded together in ſtrong flowing mortar, would, according to the ſubjoined mathematical calculation, be capable of ſupporting upwards of twice and a half the weight which the common groined arch of equal magnitude could ſuſtain.

As the diagonal of a ſquare is longer than one of its ſides, ſo it is equally obvious that the girth of the elliptic croſs-ribs muſt be greater than the girth of the ſemi-circular arch, on which account I found that it was not poſſible to keep the joints of the brick-work of the filling-in arches upon the ſame level as the joints of the brick-work compoſing the ribs, without cutting away and diminiſhing the real body and ſubſtance of the bricks, and thereby falling into one error by ſhunning another. But as it frequently happens, that which at the firſt appeared to be attended with conſiderable difficulty, ended in a novel expedient of connecting the ribs and the filling-in arches together in a much better and more ſubſtantial manner, than could poſſibly have been the caſe by any contrivance of making them coincide at the angles. That is, I was induced to ſet back the filling-in arches four inches from the face of the ribs, which renders the cutting of groins totally unneceſſary, and thereby occaſions a ſaving of 3*l.* in point of labour to every arch, which, in an extenſive warehouſe, would amount to a large ſum of money; and it ought, at the ſame time to be recollected, that in many ſituations it is not eaſy to find a workman who perfectly underſtands the principle of cutting the groined angle; ſo that it muſt either be executed in a very imperfect manner, or elſe the work delayed, and perhaps with great inconvenience, until a more experienced bricklayer can be procured.

But what appears to be more deſirable than any pecuniary advantage is, that this method of ſetting back the filling-in arches affords to them a moſt excellent ſhoulder or abutment againſt the whole body of the ribs, as well as a better opportunity of bonding and connecting the ribs and filling-in arches together, in the interior part of the work, and occaſionally on the face, as will be more practically illuſtrated, by conſulting the ſeparate fragment (on a larger ſcale) appertaining to the model of the new improved method; by the inſpection of which, every perſon will be convinced, that all the bond and connection which can be either uſeful or neceſſary to the work, may be obtained with the greateſt eaſe, notwithſtanding the joints of the brick-work of the filling-in arches, and thoſe of the ribs are, not generally ſpeaking, upon the ſame level, though many of the courſes in the progreſs of the work will accidentally come ſo. Now, had the filling-in arches been brought forward ſo as to meet the angles of the ribs, there would inevitably have appeared a continued joint or line of ſeparation in the very worſt place of which it could have happened, *viz.* the angles of the ribs; becauſe, as before obſerved, the courſes of the brick-work cannot be preſerved altogether on the ſame level. Therefore, by ſetting back the filling-in arches, this practical deformity is not only avoided, but the arches themſelves, inſtead of thruſting againſt the extreme corner of the ribs, will, by this diſpoſition, exert their force againſt the whole ſubſtance of them, where there is evidently a greater power to reſiſt it.

All arches require a certain thickneſs for ſupporting their own weight, yet how to determine it is not eaſily done. Indeed the moſt able engineers and architects differ widely in the dimenſions they give, becauſe it is a ſubject which has never been reduced to mathematical inveſtigation, like the equilibrium of arches, but wholly depends upon practical experience, juſt as the thickneſs of walls in houſes and other buildings. But as the ſtrength of all arches, whether ſemi-circular, ſegmental, or elliptical, when of equal thickneſs at the crown, is in an inverſe proportion to their radii, as that of beams of equal and ſimilar ſections is to their lengths; and ſince it has been proved, by many practical inſtances, that an arch 14 inches thick is ſufficient for a radius of ten feet ſix inches, when ſtrengthened by horizontal ſpandrils above, and capable of bearing great weights, as is the caſe in the warehouſes at the London docks, the proportional thickneſs of an arch to any other radius of curvature at the crown will be readily found; or any other thickneſs, if neceſſary, may be aſſumed as a datum, to be employed in the above theorem, for the calculation of the thickneſs of arches of different radii. However, in the groined-arch, which is the chief object of our enquiry, the groins alone have to ſuſtain, not only the weight immediately over them, but alſo that which is thrown upon the filling-in arches; they, therefore, demand as great a thickneſs as can conveniently be allotted them on a pier whoſe ſize is given; upon which account I have made the diagonal ribs of the new groined arch nineteen inches thick and twenty-three inches broad, which is as large a rib as could well be placed upon piers meaſuring only four feet eight inches from ſide to ſide, and thereby a great increaſe of ſtrength is gained over the old groined arch, where the groin is only fourteen inches ſquare, no thicker than the filling-in arches.

To conclude this diſſertation, it may not be improper to obſerve, that Dr. Hutton, in his Treatiſe on the Principles of Bridges, recommends the ſtones of the wall (or ſpandril,) over the extrados of the vouſſoirs of an arch to be bonded into the ſtones of the pier, and with one another; becauſe the pier will then carry part of their weight, and thereby oppoſe a greater power of reſiſtance to the thruſt of the arch: for the ſame reaſon, it would be equally adviſable in the new method of building groined arches, to carry up at the ſame time the diagonal ribs, filling-in arches, and ſpandrils, well bonding the whole together in one ſolid maſs.

Laſtly, the author feels confident, that if the prejudice of old cuſtoms be not permitted to overcome truth and uſeful improvement, the ſeveral ſuperior properties of his new method of erecting groined arches in brick-work, will be the means of bringing it into general practice in works of magnitude, to the utter ſecluſion of the old ſyſtem; ſince it has been proved, that the octagonal piers occupy leſs ſpace on the plan than the ſquare ones; alſo the new arch, by the introduction of the diagonal ribs, is two and a half times ſtronger than the old arch; and there will likewiſe be a conſiderable ſaving in point of labour, by the omiſſion of the groins; ſo that under the impreſſion of theſe united advantages he has extreme ſatisfaction in preſenting theſe explanatory remarks, with the practical model, to the conſideration of the public in general, and of the architect and builder in particular.

N. B. The difference of expence between the centering of the old and new method is ſo ſmall, that it has not been conſidered worthy of computation in the foregoing treatiſe.

Theory upon which the conſtruction of groined arches in brick-work is founded: with a compariſon of their ſtrength according to the preſent manner of building them, and the new method invented by Mr. George Tappen, architect.

Inveſtigated by John Narien.—In any ground arch, the diagonal ribs or groins being kept in equilibrio by the preſſure of the ſuperincumbent ſpandrils immediately over them, it is evident that if the weight of the filling-in arches which reſt upon the ribs with their proper ſpandrils and the loading above them, were in a conſtant ratio to the preſſure neceſſary for keeping the ribs in a ſtate of equilibration, then the whole groined arch would be in equilibrio in all its parts, and would therefore be the moſt perfect conſtruction for ſupporting the greateſt weight.

In the improved arch deſigned by Mr. Tappen, the filling-in arches evidently reſt upon, or are borne by the diagonal ribs; and in the old conſtruction they are ſupported in the ſame manner; becauſe in their mutual interſections, which produce the groined angle, a certain arch is included: but the principles of perfect equilibration cannot be adhered to in any practical work which requires an horizontal floor above, without a loſs of room below the arch. (See Dr. Hutton's Principles of Bridges, ſection ii. page 43, for an arch of equilibration.) Nor can the filling-in arches, with the loading over them, be made to throw upon every part of the ribs a weight proportional to that which is neceſſary to keep them in equilibrio: hence, in whatever way groined arches are conſtructed, there will always exiſt a certain defect in them, on both theſe accounts.

But, as groined arches are abſolutely neceſſary in warehouſes, and many other buildings, for the purpoſe of giving communication throughout the ſame in every direction, which cannot be obtained where parallel walls are uſed ; and as there is moreover a great ſaving of materials reſulting from the arches bearing on piers only, inſtead of ſuch continued parallel walls ; it therefore follows, that every improvement which can be made in them muſt be a valuable acquiſition : eſpecially, as the firſt defect, of a want of equilibration in the ribs, exiſts in all arches built in the common way ; and as the aberration from a true equilibrium, ariſing from the diſproportionate preſſure of the filling-in arches, is not ſo conſiderable but that its effects may, in a great degree, be counteracted by increaſing the ſtrength of the diagonal ribs.

From what has been juſt ſaid, it will clearly appear, that, as the filling-in arches are bonded with the groins independently of the ſpandrils above, the whole force of the ſuperincumbent weight will be found to exert itſelf againſt the ſubſtance of the groins alone : on which account they require the greateſt ſtrength that can be given them ; at the ſame time, the filling-in arches ſhould be made to throw as little weight as poſſible upon them, particularly about the interſections of the ribs, that the tendency they have to fracture towards the crown may be diminiſhed as much as the nature of the caſe will admit. The advantages of the new groined arch over the old one, in theſe two points, will be the ſubject of the following inveſtigation ; its ſuperiority in practice having been ſufficiently explained by the inventor himſelf in the preceding deſcription.

In the old arch, where the groins which have to ſupport the filling-in arches, ſpring from the extreme corners of the ſquare piers, the ſections of theſe groins form a ſquare (ſee *a*, *fig.* 2, in the annexed diagram), having one of its angles turned towards the centre of the curve, and its ſides equal to the thickneſs of the filling-in arches ; whereas in the new arch, the ſection, taken in the ſame manner, forms a rectangle, equal in breadth to the ſide of an octagon inſcribed in the ſquare pier, and of a thickneſs which may exceed that of the old groin in any aſſigned proportion. Now the ſtrength of an arch, in its different points, is meaſured by the greateſt weight which it is able to carry on thoſe points without breaking ; that is, in a ratio compounded of the reciprocal triplicate ratio of the ſine of the angle, formed by the curve or its tangent and the vertical line in its various points, and the reciprocal ſimple ratio of the radius of curvature in the ſame points. But, ſince the relative ſtrength of arches is to be determined by comparing them in their weakeſt parts (namely, the crown), the ſtrength of any arch at the crown, whether circular or elliptical, will be reciprocally as the radius of curvature at that point, ſince the angle formed by the tangent of the curve and vertical line at the point is a conſtant quantity, *viz.* a right angle in every arch ; or reciprocally as the ſpan of the arches when the riſe of them is the ſame (as is the caſe of the diagonal ribs and groins of the new and old method), the thickneſs of the arches themſelves being alſo ſuppoſed the ſame. From this it will be evident, that the ſtrength of the ſame ribs, when of different thickneſſes, will be directly as the areas of their ſections and diſtances of the centres of gravity from the place where the fracture would end, and reciprocally as the ſpans of the arches : that is, if A repreſents the area of the ſection, G the diſtance of its centre of gravity, and S the ſpan of the arch ; then the ſtrength of one arch to another will be as $\frac{A\,.\,G.}{S}$ Hence the ſtrength of the groins in the old arch, and the diagonal ribs in the new one, may be eaſily compared by taking the proportional meaſures of both.

Let the ſide of the ſquare pier be $= a$; then the thickneſs of the filling-in arches will be $= \frac{a}{4}$, which conſequently will be the ſide of the ſquare ſection of the groins in the old arch ; its area, therefore, will be equal $\frac{a^2}{16} = A$, and its half diagonal $= \frac{1}{2}\sqrt{\frac{a^2}{8}} = G$, becauſe the diagonal of this ſquare groin is in the direction of the radius. The diſtance of the piers being $4.5\,a$, the ſpan of the diagonal groins will be $= \sqrt{2 \times (4.5\,a)^2} = 6.364\,a = S$; we have, therefore,

$$\frac{A\,.\,G}{S} = \frac{\frac{a}{32}\sqrt{\frac{a^2}{8}}}{6.364}$$ for the ſtrength of the old groin.

The ſide of the ſquare pier remaining ſtill $= a$ in the new arch, the breadth of the rib $= \sqrt{2\,a^2} - a$, which is the ſide of an octagon inſcribed within the pier, the thickneſs neceſſary for the rib will be $= \frac{a}{3}$: then the area of its ſection will be $= \frac{a^2\sqrt{2} - a^2}{3} = A$; $\frac{a}{6} = G$, and $5.364\,a + \sqrt{2\,a^2} = S$; conſequently $\frac{A\,.\,G}{S} = \frac{a^2\sqrt{2} - a^2}{122.004}$, the ſtrength of the new rib.

If we aſſume $a = 4$ feet eight inches (the dimenſions aſſigned by Mr. Alexander to the piers of the ground arches at the London Dock tobacco warehouſes), the ſtrength of the old groins will be to that of the new ribs as 5.44 to 10.64, or as 1 to 1.96 ; which is nearly two to one in favour of the new conſtruction : and this will be the caſe whatever may be the extent of the arch, while the ſame proportions are preſerved throughout.

We have already obſerved, that the filling-in arches reſt upon the diagonal ribs, except ſuch ſmall parts as come directly on the ſides of the piers ; and that any weight placed upon thoſe arches ultimately fall upon the ribs ; it is, therefore, plain, that every half-rib ſupports the weight of two half filling-in arches, one on each ſide ; and, conſequently, may be ſuppoſed to carry one whole arch. This, as we ſaid before, is productive of a certain evil, becauſe the weight incumbent on the filling-in arches affects the groins with a preſſure which has not a conſtant ratio to that which conſtitutes their equilibrium ; we ſhall, however, preſently prove that this evil is not ſo great in the new arch as in the old one ; becauſe the ribs in the former being broader than the diagonal of the ſquare formed by the ſection of the common ground-angle, the filling-in arches will contain ſmaller areas, and conſequently throw leſs weight on any given point of the ribs, eſpecially when the upper part is loaded with merchandiſe.

If the filling-in arches, with their horizontal ſpandrils, and the loading on the floor above, be cut by parallel vertical planes at equal diſtances from each other, into indefinitely narrow ſections, (as at S in the annexed *fig.* 2.) whoſe ends *c* and *d* bear upon the ribs, thoſe ſections will be to each other as their areas ; but as the loading above is ſuppoſed to be equally diffuſed over the whole ſurface of the arch, the height, *k h*, will be always the ſame ; in which caſe the weight upon the ribs, ariſing from the preſſure of the merchandiſe, will be nearly as the chord *c d*, which is known at any point of the rib or groin, it being equal to twice *g l*, the diſtance of the ſection of the filling-in arch from the interſection of the ſides of the diagonal ribs or groins, which form a right angle. For example, at two feet from V, the vertex or centre of the crown, which is at ten inches from *m*, the interſection of the ſuppoſed ſquare ribs in the groin of the old arch, the chord = twenty inches; while, in the new arch, where the ſame ſection of the filling-in arch is only diſtant 7.6 inches from *g*, the angle of interſection of the diagonal ribs, the chord is but 15.2 inches: hence, the weight incumbent on the ribs in the old arch will be to that in the new, at the ſame point, as 20 to 15.2; conſequently, the tendency the latter may have to break in its weakeſt parts, on this account alone, will be leſs than the former in the proportion of 1 to 1.3, nearly: and by compounding the two proportions juſt found, *viz.* 1 to 1.96, and 1 to 1.3, we have the comparative ſtrength of both arches in the weakeſt parts, namely, about the crown, as 1 to 2.55, or as 1 to 2½ nearly. So that, if the old arch is capable of ſuſtaining 50 tons without danger, the new groined arch would, with the ſame eaſe, bear 125 tons, and in that proportion whatever might be the weight placed thereon.

It muſt be owned, that the ratio of the difference of weight of the ſections of the filling-in arches, in both methods, is variable in different parts, being greateſt in the parts adjacent to the interſection of the ribs or groins, and leſs the farther they are removed from it. Yet, as the parts near the vertex are thoſe where an exceſs of weight would be moſt productive of injury to the arch, it is evident that whatever tends, as the new ribs do, to leſſen the ſuperficies of the filling-in arches, and, conſequently, their weight, and the loading upon them at that place muſt be of the greateſt advantage.

The ſpan of the diagonal ribs being greater in the improved conſtruction than the groins of the old one, thoſe parts of the filling-in arches which lie over the ſmall triangles *t*, where the extreme corners of the ſquare piers would have come had they not been made octangular, are incumbent on the ribs in the former, which in the latter reſt immediately upon the piers themſelves: but this will be of no ſenſible diſadvantage, becauſe they fall ſo near the piers, while the greater length of the arch enables it to admit an horizontal line at top better than in the old conſtruction.

Several attempts have been made by engineers and architects to ſtrengthen the old groined arch, ſometimes by laying in the bricks circularly about the crown; but another method, which has been recently practiſed, is that of placing a certain number of the courſes of bricks from the vertex downwards, at right angles with the direction of the groins; as may be ſeen in the groining at the London Dock tobacco warehouſes. But, for the information of builders in general, I will make a few obſervations on this laſt expedient, which, as well as the others, I do not conceive productive of any great utility; at beſt, it does not make the parts round the crown ſtronger than I have conſidered them in the above inveſtigation: for though the bricks, being ſo placed, oppoſe a reſiſtance to fracture more directly than when they ſtand ſo obliquely to each other as they do in the old way, yet, as it is not poſſible to continue them (where the ſquare pier is uſed) of the ſame form and dimenſions, down to the ſpringing of the groin, the effective ſtrength of the whole arch can, after all, be only equal to an uniform ſquare rib, ſuch as I have ſtated to belong to the old arch. Hence, the concluſions I have drawn, upon the comparative advantages of the old and new methods of building groined arches in brick-work, will not be in the leaſt altered: and I cannot help obſerving, that this laſt contrivance for ſtrengthening the angle of the old arch is a proof how much it has been thought neceſſary to increaſe the power and value of the groins, by endeavouring to make them broad, and give the bricks of which they are compoſed a direct bearing one againſt another; a benefit which, though it cannot be obtained by any partial application of thoſe principles, is certainly gained in a very complete manner by Mr. Tappen's new method; where the ribs are not only compoſed of bricks placed perpendicularly to the direction of the arch, but are alſo kept of an equal ſize from the octagonal baſe or pier on which they reſt, to the very ſummit of the arch, where they mutually join, by which means alone they can be ſaid to impart ſuperior ſtrength to the whole, and thereby render a groined arch built upon ſuch principles a valuable acquiſition in warehouſes, and other large buildings, where the greateſt weights are to be ſuſtained.

In a right ſphero-cylindric groin, *fig.* 2, are given the vertical ſection, paſſing through the centre of the ſphere, and the ſection of the cylindric vault, to determine the ſeat of the angle.

Let A B C D E F G H I K A be the plan whence the ſphero-vault riſes, and K L E the vertical ſection of the ſaid vault; M N O be the ſection of the cylindric part of the groin, and the line N K J be in the vertical plane paſſing through the axis of the cylinder, and centre of the ſphere. In the cylindric arc M N O, let there be taken any number of points *p*, *p*, *p*, &c. and draw the lines M R, *p q*, *p q*, &c. parallel to N S, cutting the ſpheric ſection K L E at the points R, *q*, *q*, &c.; deſcribe arcs *t u*, *t u*, &c. and through the points *u*, *u*, &c. draw a curve, and it will be the ſeat of the ſphero-cylindric curve on the ichnography. To find the ſeat or projection of the ſphero-cylindric curve on the ſection, let there be given the ſeat B *y y y* L inſtead of A *u u u* S. Draw M V parallel, and *p v*, *p v*, *p v*, N V perpendicular to N J, cutting M V at *v*, *v*, &c. Make W *x*, W *x*, W *x*, W X, equal to M *v*, M *v*, M *v*, M V. Draw W *z*, *x z*, *x z*, *x z*, X Z, perpendicular, and B *z*, *y z*, *y z*, *y z*, *y z* parallel to N J, and through the points *z*, *z*, *z*, *z*, *z*, draw a curve, which will be the ſeat of the ſphero-cylindric curve.

Given the ſections of the two arches of a cylindric groin to find the ſeats of the cylindric line.

Let A B C, *fig.* 3, be the arch, and D E F the other, and let A C and D F be their chords; produce C A to I, and F D to H, ſo as to cut each other at G. Draw B F perpendicular to A C, and E F perpendicular to D F, the former biſecting the chord A C at K, and the latter, D F at L. Draw B H parallel to C A, and E I parallel to F D; from the centre G deſcribe the quadrant H I. Take any number of points in the arc F B, and through theſe points draw lines parallel to B H: to cut H G from the cutting-points, deſcribe quadrants, which will cut G I: from the cutting-points in G I draw lines parallel to D F, cutting the arc D E. From the aſſumed points in the arc A B, and the cutting-points in the arc D E, draw lines perpendicular and parallel to A C, meeting each other, and through the meeting-points draw a curve, K F, and it will be the ſeat of the cylindric curve.

Given the ſeats A, B, C, D, *fig* 4, of the ſpringing points of the angular curves of a groin, ſuppoſing the axis of the one vault to be parallel to the horizon, and the other inclined to it, let B A repreſent the level line, and the angle B A D the inclination to the horizon; let the quadrangle A F H B A be an oblong, and A E F the ſection of the level vault, which let be a ſemi-circle, and ſuppoſe the angular curves to be in vertical planes. Draw the diagonals A H and F B, which will be the ſeats of the angular curves, cutting each other in G: draw B D perpendicular to A B. Aſſume any number of points in the arc A E, and draw lines parallel to A B, to cut A G and B G; from the cutting points draw lines parallel to B D, which produce beyond A D. From the points of interſection on A D, and on the parts produced, ſet off correſponding

ſponding ordinates of the quadrant A E, and draw a curve A C D through the extremity, and this will be the ſection of the other part. *Fig.* 5. is the boarding to cover the vaulted ſurface over A G F.

Groin, in the *Pointed Style of Architecture*, a ſpecies of vaulting, in which the arches and ribs meet together in a common centre, as the limbs of the human body may, in a certain degree, be conſidered as meeting together in the natural groin.

GROLL, in *Geography*, a town of Holland, in the county of Zutphen, ſtrongly fortified, ſituated on the river Slinghe, whoſe waters fill the ditches around the fortifications; 19 miles E. of Zutphen. N. lat. 52° 5′. E. long. 6° 32′.

GROMA, among the *Romans*, a way-wiſer, or ſurveying inſtrument; whence thoſe who uſed it were called *gromatici*, and the place in the camp where it was kept, *groma*. Pitiſc.

GROMI, in *Geography*, a town of Ruſſia, in the government of Irkutſch; 112 miles N. of Balaganſkoi.

GROMING, a town of the duchy of Stiria; 25 miles W. of Rottenmann.

GROMMETS, in a *Ship*, are ſmall wreaths, formed of a ſtrand of rope, and uſed to faſten the upper edge of a ſtay-ſail to its reſpective ſtay, in different places. By means of the grommets the ſail is accordingly hoiſted or lowered. Inſtead of theſe, hanks have been lately introduced.

GROMPHENA, in *Botany*, Plin. lib. 26. cap. 7, a ſynonym of a plant, called alſo by Pliny *Symphonia*, which he ſays bears leaves alternately green and roſe-coloured, and which is therefore ſuppoſed to be the *Amaranthus tricolor* of Linnæus. By the tranſpoſition of a letter this name became *Gomphrena* in ſome old writers, in which form it was adopted by Linnæus for the *Amaranthoides* of Tournefort, *Caraveron* of Vaillant, our Globe Amaranthus. See Gomphrena.

GROMWELL, or Gromill. See Lithospermum.

GRONA, from γρωνη, *a cavern*. Loureir. Cochinch. 459. Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, four-cleft, permanent; its ſegments nearly equal; the upper one notched. *Cor.* papilionaceous. Standard inverſely heart-ſhaped, ſomewhat folded together; wings turbinate, obtuſe, ſhorter; keel inflexed, concave, its petals united on each ſide, in their lower part, to the wings, divaricated, and forming a hollow, beneath. *Stam.* Filaments ten, (ſimple and nine-cleft,) their ſheathing baſe aſcending; anthers roundiſh, minute. *Piſt.* Germen linear; ſtyle thread-ſhaped, equal to the ſtamens; ſtigma ſimple. *Peric.* Legume linear, ſtraight, compreſſed, pointed, hairy. *Seeds* numerous, compreſſed, minute.

Eſſ. Ch. Calyx four-cleft; upper ſegment notched. Keel of the corolla united to the wings at each ſide; gaping and hollow beneath. Legume linear, with many ſeeds.

1. G. *repens*. Dâu Lan rūng of the inhabitants of Cochinchina, where it grows on uncultivated riſing ground. The *ſtems* are numerous, ſomewhat ſhrubby, proſtrate, creeping. *Leaves* alternate, ſtalked, ovate, entire. *Stipulas* awl-ſhaped, in pairs. *Flowers* purple, in axillary and terminal, upright ſpikes. *Bracteas* pointed, two-flowered. *Loureiro.*

GRONAU, in *Geography*, a town of Weſtphalia, in the biſhopric of Hildeſheim; 9 miles S S.W. of Hildeſheim.—Alſo, a town in the biſhopric of Munſter; 25 miles N.W. of Munſter.

GRONDEUR, a name given by the French in America to a fiſh which is commonly eaten there; the jaws of which have been brought into Europe, and being examined by Mr. Juſſieu, were found beſet in a remarkable manner with teeth, which perfectly reſembled the bufonitæ, called *crapandines*, and by ſome *ſerpents-eyes*; and which, in their foſſile ſtate, had been for many ages accounted gems. The arrangement of theſe teeth is ſuch, that the whole flat ſurfaces of the upper and lower jaw are in a manner paved with them. They are of different ſhape and ſize in the different parts; thoſe placed towards the edges were of the ſmall and flat kind, commonly found in Malta, and called *ſerpents-eyes*; and the larger *toad-ſtones*, as they are called, were placed more towards the middle; the largeſt of all being placed in two ſtraight rows, or lines, along the centre of each jaw. Each of theſe teeth is articulated by a gomphoſis in the jaw, and when taken out, they all have that natural cavity which is found in the hinder part of the foſſile ones. The ſockets of theſe teeth have much the appearance of thoſe from whence teeth have been frequently changed, and probably the fiſh ſheds them often in the courſe of its life. Mem. Acad. Par. 1723.

GRONDINES, Les, in *Geography*, a town of Canada, on the river St. Laurence. N. lat. 46° 36′. W. long. 71° 58′.

GRONES, a cape on the N.W. coaſt of the iſland of Jerſey; ſix miles N.W. of St. Aubin.

GRONHAMN, a ſmall iſland in the gulf of Bothnia. N. lat. 62° 55′.

GRONINGEN, one of the ſtates of Holland, bounded on the N. by the German ocean, on the E. by Eaſt Frieſland and Germany, on the S. by Overyſſel, and on the W. by Frieſland. See Holland.

Groningen, the capital of the ſtate juſt-mentioned, is a large, rich, ſtrong, well-peopled, city; adorned with many excellent buildings, well fortified and guarded by ditches. The port is commodious, into which ſhips may enter by a canal, about nine miles from the ſea. It is interſected by the river Hunes, which paſſes through it to the ſea northward, and the Dunſter runs eaſtward from it to the river Ems. Some deduce its name from Grunnius, a commander of the Gauls; but others derive it from the excellent green paſtures which ſurround it. This city is governed by four burgomaſters, and a common council of twelve, who are ſovereign judges without appeal; beſides a chamber of juſtice, called "Oudermans," for the inhabitants of the country about Groningen, compoſed of the principal citizens. An univerſity was eſtabliſhed here in 1614, and endowed with the revenues of ſeveral monaſteries. This was anciently a free and imperial city; and it was likewiſe erected into a biſhopric. In 1795, it was taken by the French; 81 miles W. of Bremen. N. lat. 53° 11′. E. long. 6° 24′.

GRONNA, in our *Old Writers*, a deep pit, or bituminous place, where turfs are dug for burning.

GRONOVIA, in *Botany*, ſo named by Houſton, who engraved its parts of fructification in one of his unpubliſhed plates, ſubſequently given to the world by ſir Joſeph Banks, in honour of Dr. John Frederick Gronovius of Leyden. (See Gronovius.) Rel. Houſt. 4. t. 7. This plate indeed is but a copy, like ſome of the others, the original having been loſt.—Linn. Gen. 111. Schreb. 154. Willd. Sp. Pl. v. 1. 1176. Mart. Mill. Dict. v. 2. Juſſ. 394. Lamarck. Illuſtr. t. 144.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Cucurbitaceæ*, Linn. Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, ſuperior, bell-ſhaped, coloured, permanent, divided more than half way down into five lanceolate, equal, upright ſegments. *Cor.* Petals five, ſmall, ſpatulate, rather longer than the tube of the calyx, and inſerted into its baſe. *Stam.* Filaments five, the length of the petals, inſerted alternately with them into the baſe of the calyx, awl-ſhaped, fringed, approximated with the petals into a tubular poſition; anthers erect, heart-ſhaped, two-lobed, projecting a little beyond the petals. *Piſt.* Germen inferior, turbinate, five-cornered; ſtyle cylindrical, the length of the filaments; ſtigma capitate, undivided. *Peric.* Berry dry, roundiſh, five-cornered, coloured, crowned with the calyx, of one cell. *Seed* ſolitary, roundiſh, large.

Eſſ. Ch. Petals five, inſerted, between the ſtamens, into the baſe of the bell-ſhaped calyx. Berry dry, five-cornered, inferior, with one ſeed.

1. G. *ſcandens.* Linn. Sp. Pl. 292. Mant. 343. Jacq. Coll. v. 3. 197. Ic. Rar. t. 338. (G. ſcandens lappacea, pampineâ fronde; Mart. Cent. 40. t. 40.)—Gathered by Houſton, near Vera Cruz. *Root* annual. Whole *plant* fœtid, rough with minute hooked and ſtinging briſtles, by which it adheres to every thing within its reach, and ſupports its weak, and long-branched, but not twiſting nor properly, climbing *ſtem.* *Leaves* alternate, ſtalked, heart-ſhaped, three-lobed, coarſely ſerrated, acute, flat. *Flowers* in ſtalked, three-cleft cymes, oppoſite to the leaves, inodorous. *Calyx* pale yellow. *Petals* orange. *Anthers* brown.

We have derived much additional knowledge of this plant from Jacquin, who cultivated it in his ſtove, where he ſays it flowered from June to October. It has nothing but rarity to recommend it, and is therefore merely mentioned in the Hortus Kewenſis becauſe the ſeeds were ſent into this country by Houſton in 1731, and raiſed at Chelſea, but it does not appear that the plant ever flowered, and being annual, not perennial, was probably ſoon loſt. There can be no doubt reſpecting the natural order to which this genus belongs, notwithſtanding its imperfect reſemblance to *Loaſa,* and the heſitation of Juſſieu; for the notch in the ſtigma is more viſible in the copy of Houſton's figure than in the original, nor does it exiſt in nature.

GRONOVIUS, John Frederic, in *Biography,* was born at Hamburgh in 1611. He received a learned education, and afterwards travelled over the greater part of the continent for improvement. His extenſive learning cauſed him to be invited to occupy the profeſſorſhip of Greek and Belles Lettres at Leyden, vacant by the death of Daniel Heinſius. He died in that city in 1672. He was author of "A Diſſertation on the Sylvæ of Statius," and of three books of "Obſervations," containing corrections and explanations of many paſſages of the ancients. In 1656 he publiſhed "A Treatiſe on the Seſterce," which was afterwards reprinted at Leyden with the title "De Vetere Pecunia." Of the Claſſics, he edited Plautus, Salluſt, Livy, Seneca, Pliny, Quintilian, and Aulus Gellius. Moreri.

Gronovius, James, ſon of the preceding, was born at Deventer in 1645, and, at an early period, was initiated into the ſtudy of the claſſics: in this department of knowledge, as alſo in the ſtudy of the law, he made a very rapid progreſs. In 1688 he came to England, where he contracted an intimacy with the moſt learned men in the two univerſities, and in the metropolis. He afterwards went into France and Flanders, and in 1672 he accompanied the ambaſſador from the States-General to Spain, and returning by way of Italy, he was received with diſtinction by Coſmo, grand duke of Tuſcany, who gave him the profeſſorſhip at Piſa. Soon after his return to Deventer he was appointed profeſſor of Greek and hiſtory in the univerſity of Leyden, and in 1701 he was nominated geographer to the univerſity. He died in 1716, leaving behind him a great character for learning; but he was apt to treat thoſe who differed from him, however wiſe and eminent for literature, with contempt. As the editor of many of our moſt eſteemed claſſics his reputation is ſtill very great. He corrected and wrote annotations on Macrobius, Polybius, Tacitus, Seneca, Pomp. Mela, Aul. Gellius, Cicero, Ammianus Marcellinus, Q. Curtius, Suetonius, Phædrus, Arrian, Minut. Felix, Herodotus, &c.: he wrote notes upon ſome other authors, and diſſertations on various ſubjects of antiquity. He publiſhed a "Theſaurus Antiquitatum Græcorum," in thirteen volumes folio, and a Latin verſion of "Agoſtini on Ancient Gems."

Gronovius, John Frederick, a phyſician and botaniſt of conſiderable learning, was born, we preſume in Holland, in 1690. He took his doctor's degree at Leyden in 1715, on which occaſion he publiſhed a diſſertation upon *Camphor,* of the natural hiſtory and preparation of which, he gives much new information, properly diſtinguiſhing between the camphor of Japan, and of Borneo, a ſubject concerning which little was known before his time, and which is ſtill far from being exhauſted. (See Camphor.) He ſettled at Leyden, and became one of the chief magiſtrates. He adopted the prevailing taſte of his countrymen for making collections of natural hiſtory, and in 1740 publiſhed his *Index Suppellectilis Lapideæ,* or a ſcientific catalogue of his own collection of minerals, drawn up under the inſpection, and with the aſſiſtance of, Linnæus, as in a great meaſure appears from the dedication of the 2d edition to that eminent man in 1750, as well as from the latter having included this pamphlet in the choſen, and uniformly bound, collection of his own works for his library. In a letter to Haller, in 1737, he mentions Gronovius, with Burmann and Adrian Van Royen, as principally anxious to increaſe their collections of dried plants, inſtead of ſtudying genera; for indeed that ſtudy was juſt then more neglected every where than it had for ſome time been, and Linnæus was deſtined to revive it. Gronovius received from Clayton various ſpecimens of Virginian plants, which he, with the aſſiſtance of Linnæus, then reſident in Holland, arranged according to the ſexual ſyſtem, and with proper ſpecific characters, deſcriptions, and ſynonyms, publiſhed under the title of *Flora Virginica,* in 1739, in 8vo. A ſecond part or ſupplement of the ſame work appeared in 1743, and a third was preparing when he died. This laſt being afterwards incorporated with the two former, the whole was publiſhed in quarto by his ſon in 1762.

In 1755 came out his *Flora Orientalis,* in 8vo., the materials of which were afforded by the very magnificent herbarium of Rauwolf, collected in his travels in the Eaſt during the years 1573, 1574, and 1575, and which, by favour of queen Chriſtina of Sweden, came afterwards into the hands of the learned Voſſius, who allowed the chief Britiſh botaniſts of his day to ſtudy and quote it, and after whoſe death it was purchaſed for the public library at Leyden, where, if not recently removed, it ſtill remains. This collection is one of the beſt preſerved, and more remarkable for the ſize and perfection of its ſpecimens, than any we have ever ſeen. Gronovius determined by it above 330 ſpecies of oriental plants, no doubt an inconſiderable part of the botanical riches of ſo various and fertile a ſoil, but a valuable addition to the knowledge of that day. The work is arranged after the Linnæan method, but trivial names, though invented and publiſhed in the firſt edition of the *Species Plantarum* two years before, are not adopted, nor does the author appear to have uſed this publication. He was however in frequent correſpondence with Linnæus, whom he furniſhed with numerous ſpecimens of American plants ſent by Clayton, and with whom he conferred on the ſubject of fiſhes amongſt others. Haller mentions him as having written learned notes to the 20th and following books of Pliny. He continued to enrich his muſeum, and to devote it to the uſe of all who were deſirous of conſulting it, as long as he lived. In the year 1750 Gronovius is repreſented as labouring under the gout, as well as a hernia, but he lived to the age of 72, dying in 1762. His herbarium was, after the death of his ſon, purchaſed by ſir Joſeph Banks. Hall. Bibl. Bot. and Epiſt.—Gronovii opera.

Gronovius, Laurence Theodore, ſon of the preceding, was born at Leyden in 1730. He took the degree of doctor of laws, and, like his father, attained to the chief civil honours of his native place. From him he imbibed a taſte for natural hiſtory, and, as we have already mentioned, edited the lateſt and completeſt edition of the *Flora Virginica.* He particularly excelled in the knowledge of fiſhes; but moſt departments of ſyſtematic zoology engaged his attention.

He publiſhed in 1754 his *Muſeum Ichthyologicum*, a handſome folio, with ample deſcriptions of the ſpecies. The ſecond part appeared in 1756, accompanied by deſcriptions of the ſerpents in his father's muſeum.

In 1763 appeared the *Zoophylacii Gronoviani faſciculus primus*, containing deſcriptions of a few quadrupeds, more *amphibia*, and a ſtill greater number of fiſhes, all from the ſame muſeum; the latter illuſtrated by 13 good plates, exhibiting 38 ſpecies. The ſecond faſciculus of the ſame work, publiſhed in 1764, deſcribes the inſects of his collection, of which numerous ſpecies are engraved on four copper plates. A third and laſt, with three plates, came out in 1781, after the death of the author, which happened in 1777.

He publiſhed in 1760 a very valuable work in quarto, entitled *Bibliotheca Regni Animalis atque Lapidei*, on the plan of the *Bibliothecæ Botanicæ* of Linnæus and Segnier, with an excellent *Index Rerum*, highly uſeful in ſuch a publication. He furniſhed moreover an appendix of 65 quarto pages to the ſaid work of Seguier.

GROOM, denotes a ſervant in ſome inferior poſt: in which ſenſe it amounts to the ſame with the old word, *garcio*, and the French *garçon*.

The word is formed from the Flemiſh, *grom*, *puer*, a boy.

Groom is the denomination of ſeveral officers and ſervants in the king's houſehold.

There are grooms of the almonry, grooms of the compting houſe, grooms of the great-chamber, the privy-chamber, and the bed-chamber, grooms of the robes, of the ward-robe, &c.

Groom *of the Stole.* See Stole.

Groom *Porter* is an officer of the houſehold, whoſe buſineſs is to ſee the king's lodging furniſhed with tables, chairs, ſtools, and firing; as alſo to provide cards, dice, &c. and to decide diſputes ariſing at cards, dice, bowling, &c.

Groom is more particularly uſed for a ſervant, appointed to attend on horſes in the ſtables. See Equery.

GROOVE, in *Architecture*, a channel cut in a piece of wood, by taking away a rectangular priſm adjacent to any of its ſuperficies, and thereby forming two internal angles and two external angles on the ſaid piece; and hence a groove differs from a rebate in this, that the ſame ſolid is taken away in both; the part taken away in the former always leaves the ſurface equally prominent on both ſides of the groove, whereas in the latter it is only ſo on one ſide, the arris being cut away, and has only one internal angle. Grooves are ſometimes uſed by way of ornament and ſometimes to inſert the tongue of ſome other piece of work, and by this means faſten the part which contains the groove to the other which contains the tongue.

Groove alſo denotes a gardener's tool for tranſplanting flowers.

Groove, or *Groof*, in *Mining*, ſignifies a mine or ſhaft, ſometimes alſo called a delf.

Groove-*cloaths*, are a dreſs of very coarſe flannel, which the miners wear when at work: often their whole dreſs conſiſts of a pair of ſuch trowſers and ſhoes; a practice which cannot be too much condemned in mines ſubject to fire-damp exploſions; ſince the univerſal though ſlight burning which naked men receive on ſuch occaſions often proves fatal, when if properly, or rather extra cloathed, on ſuch occaſions, they would ſcarcely have ſuffered any inconvenience, as juſtly obſerved by Mr. John L. Radley, in an excellent paper on the ſubject of Damps, written ſince that article in our work was publiſhed. See the Philoſophical Magazine, vol. 35, p. 1.

Groove-*fellows*, in *Mining*, ſignify the partners or fellow-workmen in a mine.

Groove-*ſpade* is a ſhort-handled ſpade uſed by miners and the dreſſers of ore.

GROOVERS, ſignify the miners or workmen in a mine.

GROOZDISHYS, in *Botany*, a name given by the Ruſſians to a ſpecies of muſhroom reſembling our pepper, or milky-muſhroom, deſcribed by Liſter, Ray, &c. but larger. The groozdiſhys is very broad and thick, and abounding with an acrid juice. The Ruſſians preſerve them in pickle, and eat them with their meats. When eaten freſh they inflame the mouth and throat; and endanger ſuffocation. Phil. Tranſ. N° 89.

GROPZIC, in *Geography*, a town of Germany, in the principality of Anhalt-Deſſau, on the Fuhne; 12 miles S.W. of Deſſau. N. lat. 51° 45′. E. long. 12° 1′.

GROS, Peter le, in *Biography*, an eminent ſculptor, was born at Paris in 1666. He was inſtructed by his father in the art of deſign, and at an early age he had made ſo much proficiency that he was nominated, among other young perſons, to be ſent to Rome, at the king's expence, to ſtudy the fine arts. He quickly obtained a high reputation, and had a ſhare in ſome conſiderable pieces of ſculpture that were carrying on. He remained at Rome a few years, and returned to France, where, during a reſidence of two years, he executed ſome works at Paris and Montmorenci, but the jealouſy of the artiſts rendered his life uncomfortable, which haſtened his return to Rome. He ſtood very high in his profeſſion, but was ſubject to the ſtone, for which, in the midſt of his labours, he underwent the uſual operation. He died in 1719, at the age of fifty-three. His works are chiefly found in the churches of Rome, and ſome of them are much admired. At the Thuilleries is a ſtatue of a Roman lady in a Grecian dreſs, of antique ſimplicity, which he copied, with ſome improvements, from an original at Florence.

Gros, Joseph le, a French ſinger with a very powerful, natural counter-tenor voice. We know not what effect the performing of the principal part in the operas of Gluck, Piccini, and Sacchini, may have had on this ſinger's ſtyle of ſinging; but in the year 1770, when we heard him at Paris, in the *Concert Spirituel*, ſinging a ſolo verſe in a motet, it was ſo much *à gorge déployer*, that he ſeemed crying out for help againſt aſſaſſins or wild beaſts, with which the audience, however, were extremely delighted. In the opera of Zaide, compoſed by Royer in 1739, who was formed entirely on the ſchool of Lulli, M. le Gros performed the principal man's part, in the national ſtyle of ſinging, of ſtill a higher period; yet ſo much improved was this ſinger in 1780, or his biographer, M. Laborde, was ſo partial to his talents, that we find the following ſplendid eloge in the third volume of Eſſais ſur la Muſique, p. 511.

“Joſeph le Gros, an excellent muſician, a good compoſer, and the firſt ſinger in the ſerious opera ever ſince the year 1764, began his vocal career by the part of Tithonus, in which he had the moſt brilliant ſucceſs, and ever ſince that time he has continued to merit new favour.

“He is the ſon of a country ſchoolmaſter, and was born in 1739. Having diſcovered early in his life a diſpoſition for muſic, he was received as a choriſter in the cathedral of Laon. It was there that he laid the foundation for becoming one of the firſt muſicians in Europe, by his aſtoniſhing manner of executing, at ſight, the moſt difficult muſic. It is wholly unneceſſary to extend our encomiums on his fine voice, which is ſo well known as to need no deſcription; we ſhall content ourſelves with obſerving, that ſuch a one, with all its perfections, was neceſſary to conſole the public for the loſs of the inimitable Jeliotte.

“M. le Gros was ſo well inſtructed in the firſt principles of muſic by the maitre de chapelle at Laon, that he has ſometimes attempted compoſition; and has even produced in partnerſhip with M. Deſormery, an act of an opera which had ſome ſucceſs. We know other works of his that would merit ſtill more praiſe.

“In 1777 he undertook the direction of the *Concert Spirituel*, and his efforts to render that eſtabliſhment intereſting and worthy of the patronage of the public, has hitherto been juſtly crowned with ſucceſs; as he neither ſpared trouble nor expence in engaging the firſt muſicians in Europe of every kind to exhibit their talents at theſe concerts.

“His zeal, abilities, profeſſional punctuality in the performance of his parts, his paſſion for his art, and his worth and good conduct, have juſtly rendered him one of the ſingers moſt beloved by the public.

All this may be very true, yet his ſtyle of ſinging remains offenſive to all but the natives of France.

GROS, a foreign money, in divers countries, anſwering to our groat.

GROS, a French weight, of the old ſyſtem, = 3 deniers or French penny-weights = 72 French grains = 87.7562 Engliſh grains = 3.8248 grammes of the new metrical ſyſtem = .012587 pounds avoirdupoiſe.

GROSBURG, in *Geography*, a town of Sileſia, in the principality of Breſlau; 15 miles S. of Breſlau.

GROSCA, a ſmall iſland in the Black ſea. N. lat. 44° 19′. E. long. 29° 14′.

GROSE, FRANCIS, in *Biography*, was born about the year 1731; his father was a jeweller at Richmond, who, at his death, in the year 1769, left the ſubject of this article an independent fortune, which he ſoon ſquandered away. His wants awakened in him a deſire to employ his talents in literary purſuits. He had received an excellent education, and poſſeſſed beſides a taſte for drawing, which induced him to commence his “Views of Antiquities in England and Wales.” This work, which was the ſource both of reputation and profit, he completed in the year 1776; and in the following year he added two other volumes to them, which include the iſlands of Guernſey and Jerſey. In 1789 he paid a viſit to Scotland, and in 1790 began to publiſh, in numbers, his views taken in that country. He next proceeded to Ireland, with the view of giving a ſimilar deſcription of that country; but on the 6th of May, 1791, he was ſeized with an apoplectic fit and expired. He was buried at Dublin. He was an ingenious and pleaſant writer, and a remarkably good natured and facetious man. He was author of many other works beſides thoſe already mentioned, as “A Treatiſe on Ancient Armour and Weapons;” “A Claſſical Dictionary of the vulgar Tongue;” “Military Antiquities, being a Hiſtory of the Engliſh Army from the Conqueſt to the preſent Time,” &c. &c.

GROSEN, in *Geography*, a town of the duchy of Courland; 28 miles S. of Goldingen.

GROS-FA, *Fr.* certain old muſic, conſiſting of breves, ſemibreves, and minims, was formerly ſo called in France. See ALLA-BREVE.

GROSIO, in *Geography*, a town of the Valteline; 12 miles S. W. of Bormio.

GROSLEY, PETER JOHN, in *Biography*, a lawyer and polite writer, the ſon of an advocate at Troyes, was born in 1718. He was brought up to the bar, and became an advocate in parliament, but his taſte for general literature rendered him more known than his profeſſional abilities. He was fond of foreign travel, and twice viſited Italy and England, he went likewiſe to Holland, and made annual viſits to the capital, where he was received in the beſt ſocieties. He preſented to his native city ſeveral marble buſts of eminent men born there. He died at Troyes in 1785, leaving behind him ſeveral valuable works, of which the principal are “Recherches pour ſervir á l'Hiſtoire du Droit François,” 1752; “Vie des Frères Pithou,” which gives an intereſting account of theſe friends of literature. “Obſervations de deux Gentil-hommes Suedois ſur l'Italie,” 4 vols. 12mo.; “Londres,” in three volumes, the reſult of obſervations made in his viſits to England, which are ſaid to be deſerving of much notice, though mixed with the miſtakes of a foreigner. “Eſſais Hiſtoriques ſur la Champagne;” “Ephemerides Troyennes.” He had a ſhare in the “Memoires Academ. de Troyes,” and the laſt tranſlation of Davila.

GROSS, NICHOLAS LE, a learned French prieſt, was born at Rheims in the year 1675. Here he received the elementary parts of a learned education, and at the univerſity he diſtinguiſhed himſelf by his proficiency in the learning of the times, particularly in rhetoric and philoſophy. In 1694 he was appointed claſſical tutor in the college of the univerſity: the duties of this office he performed with great diligence, which, however, did not prevent him from purſuing with ardour and avidity his theological ſtudies, to which he was zealouſly attached. He was elected rector and afterwards prior of the univerſity. In the year 1700 he was ordained prieſt, and created a doctor two years after. He obtained much preferment in the church, and was at length made canon of the collegiate church at Rheims. He now devoted much of his time to the gratuitous inſtruction of a number of young perſons in the claſſics, philoſophy, and theology, and uſing, at the ſame time, every means to form their minds to the love of piety and virtue. As a diſputant he entered warmly into the diſcuſſion relative to the bull “Unigenitus,” to which he was an active and ſpirited opponent. His zeal in this cauſe provoked the reſentment of the archbiſhop, M. Mailly, who excommunicated him, and even obtained a lettre de cachet to ſecure his perſon. M. le Gros obtained information of the fact in good time, and withdrew into Holland, where he continued till the death of Lewis XIV. In 1716 he returned to his canonry, and was in a ſhort time afterwards deputed to go to Paris, where he delivered a courſe of ſermons, which was attended by very crowded auditories. About the year 1720 he was perſecuted by the Jeſuits and the court on account of his zeal for Janſeniſm; a new lettre de cachet was iſſued for his apprehenſion, and for his baniſhment to the frontiers of Spain. He fortunately evaded the purſuit of the officers, and after remaining concealed ſeveral years in France, he embraced an opportunity of retiring into Holland. Here he lived the laſt twenty-five years of his life, and obtained a high reputation as a learned theologian. He died in the year 1751, aged about 76. Independently of his controverſial writings, he left behind him "A tranſlation of the Bible;" "The Chriſtian's Manual;" and other valuable theological works, and ſome pieces againſt uſury.

Gross, or *Groſſus*, in our *Ancient Law Writers*, denotes a thing abſolute, and not depending on another. Thus, *villain in groſs*, *villanus in groſſo*, was a ſervant who did not belong to the land, but immediately to the perſon of the lord; or a ſervile perſon not appendant or annexed to the land or manor, and to go along with the tenures as appurtenant to it; but like other perſonal goods and chattels of his lord, at his lord's pleaſure and diſpoſal.

Gross, *Advowſon in*. See Advowson.

Gross-*Bean*, in *Zoology*, a name by which we commonly call the *coccothrauſtes*, called alſo at other times the *hawfinch*. This is the *loxia coccothrauſtes* in the Linnæan ſyſtem.

Gross, *in common*. See Common.

Gross *Weight*, is the weight of merchandizes and goods, with their duſt and droſs, as alſo of the bag, caſk, cheſt, &c. wherein they are contained; out of which groſs weight allowance is to be made of tare and tret.

Gross *Average*. See Average.

Gross is alſo uſed for the quantity of twelve dozen.

GROSSA, a groat. "Conceſſa eſt regi una groſſa, quæ continet quatuor denarios, de quolibet viro et muliere." Knighton, ann. 1378.

Grossa, in *Geography*, an iſland in the Adriatic, twenty-five miles long and two wide, near the coaſt of Dalmatia. N. lat. 44° 18′. E. long. 15° 7′.

GROSSE Isle, an iſland ſituated in the river Detroit, in Upper Canada; containing ſeveral thouſand acres of excellent land, and plenty of good wood, in a high ſtate of improvement.

Grosse, *Iſle la*, the name given by the Canadians to the Michilimachinac.

GROSSETO, a town of Etruria, the ſee of a biſhop, ſuffragan of Sienna, on a branch of the Ombrone; 14 miles E. S. E. of Piombino. N. lat. 42° 49′. E. long. 11° 4′.

GROSSETTESTE, or Grosthead, Robert, in *Biography*, was born at Stradbrook, in Suffolk, about the year 1175. Of the early part of his life nothing is known, but being qualified for an univerſity courſe, he was admitted at Oxford, where he ſoon diſtinguiſhed himſelf by his proficiency in different branches of literature, particularly in the Greek language, at that time but little known in the country. From Oxford he went to Paris, and made himſelf maſter of the French language Upon his return he read lectures at Oxford on philoſophy and theology, and he was preſented with the prebend of Lincoln by the biſhop of that ſee, Hugh de Welles, who was, to him, a generous patron. Upon the death of this prelate he was appointed to ſucceed him, but he had ſcarcely taken poſſeſſion of the biſhopric, when a mandate, arriving from Rome, enjoined him to admit a nephew of the pontiff, who was under age, to the firſt canonry that ſhould become vacant in the ſee of Lincoln. This mandate he was reſolved to reſiſt, and accordingly ſet out to Rome, hoping that he ſhould be able to ſatisfy the pontiff that he could not, and ought not, to comply with the demand. He expected, likewiſe, that he ſhould be able, by perſonal application, to obtain relief from ſome exactions by which he, in common with the other Engliſh prelates, was burthened. With regard to the immediate objects of his journey he was unſucceſsful, and upon his return he wrote a letter to the pope's ſecretary, in which, while he acknowledged a moſt reſpectful ſubmiſſion to the apoſtolic orders of the Roman ſee, yet he ſaid that he ſhould deem it his bounden duty to reſiſt thoſe commands that tended to the deſtruction and not the edification of the church. He ſaid he would induct no perſons to incomes, appointed for the maintenance of paſtors, who were not capable of executing their offices, and that he ſhould conſider any commands to the contrary impoſſible to have been iſſued by the holy ſee. He then ſpoke in a different tone, and reflected moſt ſeverely on the degeneracy of the manners of the modern popes from the ſanctity of their predeceſſors, and ſolemnly adjured his holineſs to correct thoſe enormous vices, which, flowing from the court of Rome, as from a poiſoned fountain, contaminated the whole Chriſtian church. The pope threatened our worthy prelate with a heavy vengeance; he had been accuſtomed to iſſue his bulls, but never before to be admoniſhed by a perſon of inferior rank, and took every opportunity in his power of haraſſing him during the remainder of his life. The Engliſh biſhop had, however, counted the coſt before he undertook to reaſon with the biſhop of Rome, and he never once abandoned the high ground on which he ſtood; he was fortified by the principles of rectitude and honeſty, and was generally ſucceſsful in reſiſting the powers brought againſt him, and in preventing encroachments upon the Engliſh church. He died at Buckden in the year 1253, having preſided over the ſee of Lincoln nearly twenty years, with the moſt vigilant attention, and unremitting application, taking the greateſt care to have the parochial churches well ſupplied, and ſetting before his clergy an excellent example of the manner in which the paſtoral duties ought to be diſcharged. He had a clear head and a pure heart. He was undaunted in a right cauſe, his integrity was incorruptible, and the ſanctity of his manners was unimpeachable. He was the patron of learning and learned men, and his own acquirements are reckoned very extraordinary, conſidering the times in which he lived. As a friend he was eaſy of acceſs, and in company he was lively and affable; to thoſe who needed his help he was beneficent, and he was kind and hoſpitable to all. As a churchman his notions were very elevated; his biographer, Dr. Pegge, ſays of him, "he ſoars ſo high in his ideas concerning the privileges and prerogatives of the clerical order, that he even leaves archbiſhop Becket far behind him." He left numerous treatiſes on theological, philoſophical, and miſcellaneous ſubjects, ſome of which are printed, and the reſt are extant in MS. Among the former are "Opuſcula Varia," publiſhed at Venice in 1504: "Compendium Sphæræ Mundi:" "Commentarius in Lib. poſter. Ariſtotelis;" "Diſcourſes;" and "Letters."

GROSSO, *Ital. Grand*, great: as *concerto groſſo*, in *Muſic*, a grand concerto. Pl. *Concerti groſſi*, grand concertos. Trombone groſſo, great or double trumpet. Baſſo groſſo, a double baſe.

GROSSULARIA, in *Botany*, a Latin name, of no good authority, for the gooſeberry, borrowed undoubtedly from *groſſula*, a little unripe fig. Tournefort retained it for the whole genus of gooſeberries and currants, the *Ribes* of Linnæus, in which he and Plumier included the very diſtinct and diſſimilar South American genus, *melaſtoma*. See Melastoma and Ribes.

GROTESQUE, in *Painting* and *Sculpture*, a word adopted from the French, and ſignifies, together with the Italian *grotteſca*, the repreſentation of deformed and monſtrous objects, in which the utmoſt extravagance of imagination is allowed to revel, without regard to nature or probability. A taſte and ſtyle of ornament which has been employed to decorate walls, ceilings, furniture, &c. ever ſince the diſcovery of antique, monumental paintings, and ſculptures in ſubterranean chambers near Rome, and throughout Italy, which were adorned by it in the times of the ancient Romans. Hence the name is derived, the Italians calling all ſuch places *grotte*.

Its origin is diſcernible in the Egyptian hieroglyphic writing, where the heads and limbs of men and beaſts are attached to blocks of ſtone, to vaſes, or to foliage, &c. thereby characterizing the inclinations and the powers of the Deity, or perſon whoſe hiſtory they record, or whoſe peculiar tranſactions they are intended to preſerve in the remembrance of future ages.

With the Egyptians it remained rude and unpoliſhed; but when the Greeks adopted it, they made an ornamental uſe of it, and it became a medium to exhibit their general knowledge of nature. The taſte with which they united in one form, not only parts of various animals, but objects ſo totally diverſe in their nature and appearance, as the productions of the animal and vegetable kingdoms, is in the higheſt degree delightful to contemplate. The formation of chimerical beings, as the dragon, the ſphinx, the griffin, &c. owe their origin to this taſte; which received much of its force and intereſt in heathen days, from the mythological enigmas couched under theſe compound forms. Such is the character of that ornament ſo common on Egyptian ſtructures, the winged ſerpent ſurrounding an egg. Now, that theſe myſterious emblematic meanings are diſregarded, and no longer treated with reverence, groteſque painting and ſculpture are continued in uſe merely becauſe the forms they produce are pleaſing to the eye; and although the underſtanding is inſulted by them, yet ſuch is the power of the beauty of form, that we are gratified by it, in ſpite of our reaſon.

Groteſque work is at preſent chiefly confined in its application to monumental ſculpture, where it retains ſomewhat of its emblematic origin; to carvings or painting of furniture, wherein beauty of ornament is principally ſought for in it; and ſometimes it is employed in painting and ſtucco on the interior of rooms, but rarely to any great extent; a better and more ſimple taſte having in great meaſure ſuperſeded it.

Thoſe who wiſh to make themſelves acquainted with it, will find the beſt exemplars on ancient Greek ſarcophagi, altars, vaſes, friezes, &c. of which Piraneſi and Rocchegiani have given an ample ſtore to the public in their valuable works. Mr. C. H. Tatham has given likewiſe a taſteful and judicious ſeries of examples of this kind, in his collection of etchings of ornamental architecture from the antique at Rome. Le Roy's, Le Pôtre's, and many other works of the like kind, may alſo be conſulted with advantage.

We alſo extend the word groteſque to any thing whimſical, or wildly pleaſant, in a perſon's dreſs, diſcourſe, &c. Maſquerade habits are the more valued, the more groteſque they are. Our theatres preſent us with entertainment in groteſque characters, *i. e.* perſons quaintly dreſſed; as harlequins, ſcaramouches, &c. Planudes has given us a very groteſque picture of Æſop. Arioſto and the Italian poets are full of groteſque deſcriptions.

Groteſque is a light ſtyle of ornament, conſiſting of mixed repreſentations of foliage, animals, utenſils, implements of war, &c. or any mixture of theſe. This ſtyle was uſed by the ancient Romans in the decorations of their palaces, villas, baths, amphitheatres, temples, and ſometimes even in their tombs, and chiefly to be found in the vaulted apartments of their ruined ſtructures, moſtly covered with rubbiſh, which have been cleared away by the modern Italians, who gave theſe ornaments the name of grotte, and hence the modern term groteſque, and the Engliſh term grotto, ſignifying a cave.

This beautiful ſtyle of ornament was employed by Raphael and others in the decorations of the Logias, of the Vatican, the villas of Madama, Pampli, Caprarola, the old palace at Florence, and indeed in the moſt elegant finiſhings of modern Italy; and there is little doubt but the remains were much more ample in the time of Raphael and others, who firſt introduced them, than are now to be found.

GROTIUS, Hugo, in *Biography*, was born at Delft, April 10th, 1583. His father, John de Groot, was a learned and reſpectable citizen of Delft, of which he was burgo-maſter and ſheriff, and alſo curator of the univerſity of Leyden. Hugo was remarkable, from his earlieſt years, for great brilliancy of parts, and his application was as indefatigable as his talents were ſuperior. At the age of eight years, he compoſed Latin elegiac verſes, and at fourteen he maintained public theſes in mathematics, law, and philoſophy. He had been under the tuition of Francis Junius, and now the great Scaliger, ſtruck with the abilities of Hugo, condeſcended to direct his ſtudies. His reputation was quickly eſtabliſhed, and he is mentioned, at this early period, by the principal ſcholars of the age, as a prodigy of learning, and as one who was deſtined to make a conſpicuous figure in the republic of letters. In 1598, he accompanied Barneveldt, the ambaſſador extraordinary of the States, in a journey to France. Here he was introduced to Henry IV., who gave him a polite reception, and preſented him with his picture and a gold chain. He took the degree of doctor while he was in France; and during his reſidence there he received many attentions from men of the firſt eminence for rank and learning. He was deſirous of an interview with De Thou, whom, of all perſons, he moſt highly eſteemed in that country; but this he was unable to accompliſh. Upon his return, he addreſſed a complimentary letter to the venerable preſident, which was the commencement of an intimate correſpondence between them. In 1599, Grotius, who was deſtined to the profeſſion of the law, pleaded his firſt cauſe at Delft. He now publiſhed his "Capella," a work which was received with great admiration by the learned. This was followed by a Latin tranſlation of a treatiſe by Stevinus, containing directions for finding a ſhip's place at ſea. His edition of the "Phenomena of Aratus," which he publiſhed in the year 1600, obtained for him a high reputation for learning with Scaliger, De Thou, and Lipſius, and other great men of the age. We ſhall not be able to notice all the works of this great man, but it may be obſerved, that he had now, though only ſeventeen years of age, ſo thoroughly eſtabliſhed his character as a writer, that he was choſen hiſtoriographer to the United Provinces, in preference to ſeveral learned men who were candidates for the office. After this, the office of advocate-general of the treaſury for Holland and Zealand was conferred upon him unanimouſly. In 1608 he married Mary Reigerſberg, a lady deſcended from one of the beſt families in Zealand, and who, as we ſhall ſee farther on, was in every reſpect worthy of the man who had ſelected her, as the partner of his joys and his cares. In the following year he publiſhed his "Mare Liberum," aſſerting the right of the Dutch to trade to the Eaſt Indies, in oppoſition to the claims of Portugal. It alſo laid claim to the general liberty of the ſeas, in oppoſition to the demands of this country, which produced an anſwer from the learned Selden. His next work was a treatiſe "De Antiquitate Reipublicæ Batavæ;" the object of this performance was to prove the continued freedom and independence of the Batavian nation from the Roman times. A boaſt, alas! no longer to be made, the tyrant of the continent having annihilated the name, as well as the independence of the Batavian ſtates. Theſe now make a part only of the French empire: the ſame mighty potentate is contending for what he calls the liberty of the ſeas, by which he unqueſtionably means the ruin of Britain's independence, but we truſt that we have a multitude of practical Seldens, that, under providence, will ſay, hitherto thou mayeſt come, but no farther. In the year 1613, he was offered the poſt of penſioner of Rotterdam, which he accepted only on the condition that it ſhould be permanent during his life. This was readily acceded to, and the poſt gave him a ſeat in the aſſembly of the ſtates of Holland, and afterwards in the States-General. About this time ſome differences ſubſiſted between the Dutch and Engliſh, on account of the claim made by the latter of an excluſive right of fiſhery in the Greenland ſeas. Grotius was ſent over to adjuſt the matter in diſpute: he was received with kindneſs and reſpect by king James, and ſhewed himſelf an able defender of what he regarded as his country's rights. Here he contracted a friendſhip with the celebrated Caſaubon, then reſiding in England, who reſembled him by the depth of his erudition, and by his ardent deſire of procuring a fraternal union among Chriſtians. Grotius was early inſtructed in the principles of Arminianiſm, and he was now connected with the grand penſionary Barneveldt, whoſe brother he had ſucceeded in his poſt at Rotterdam. Hence he became of the party of Remonſtrants in the church, and of ſtrict republicans in the ſtate. After his return from England, he was appointed to draw up the edict of the States intended to reſtore tranquillity, but it was done with ſo much toleration as to give offence to the oppoſite party, which was ſupported by the majority of the people and clergy. He now became deeply involved in the political diſputes of the day, and was, by order of prince Maurice, arreſted, together with the grand penſionary. They were thrown into priſon at the Hague, and ſo cloſely confined, that even the wife of Grotius was denied acceſs to him, although he was dangerouſly ill. The city of Rotterdam petitioned for the liberation of their penſionary; but the prince refuſed to liſten to their prayers. He had contrived to overthrow the Arminian party, to depoſe and baniſh its miniſters, and now he determined to carry his plans farther, and to deſtroy Barneveldt. He accordingly brought him to trial, and, from a mock trial, he was obliged to aſcend the bloody ſcaffold. Grotius was intended as the next victim, but he eſcaped with his life, and was ſentenced to perpetual impriſonment. The place of his confinement was the fortreſs of Louveſtein, near Gorcum, in South Holland. His wife, with much difficulty, obtained permiſſion to be his fellow-priſoner, and in one of his Latin poems he has deſcribed moſt pathetically the conſolation which her preſence afforded him in his priſon-gloom. The greatneſs of her mind elevated her above feminine lamentation, and her ſole ſtudy was to alleviate the rigour of his fate. He now ſat down to ſtudy the law, with all the ardour of which his great mind was capable. Some part of his time was devoted to morality, and he ſpent his Sundays in reading arguments in favour of the Chriſtian revelation, and in drawing up notes on the New Teſtament. It was in priſon that he compoſed the ground-work of his famous work "De Veritate." He alſo wrote in Dutch "Inſtitutions of the Laws of Holland," thus conſulting the good of his countrymen, even while ſuffering under their harſhneſs and ſeverity. After he had been kept in priſon a year and a half, he was delivered by the advice and contrivance of his wife. She perſuaded him to conceal himſelf in a large cheſt, which ſhe ſent away under the pretence of ſending off a load of books, to prevent Grotius from killing himſelf with hard ſtudy. A ſervant, who was entruſted with the ſecret, accompanied the cheſt in a boat to Gorcum, and got it conveyed to a friend's houſe. Grotius quitted it uninjured, and immediately dreſſing himſelf like a maſon, and taking his rule, trowel, and other implements of the trade, he paſſed through the market-place, and ſtepping into a boat, was tranſported to Antwerp. This happy eſcape was effected on the 22d of March, 1621. His wife, in the mean time, kept up the belief that he was confined to his bed by ill health, till having heard of his ſafety, and that he was out of the reach of his perſecutors, when ſhe avowed the fact. She was immediately detained in cloſe cuſtody by the enraged commandant, but a petition to the States-General procured her diſcharge. There were not wanting ſome baſe ſpirits who voted for continuing her impriſonment, but the majority were aſhamed of puniſhing a woman for an act of conjugal fidelity, which could not but command univerſal applauſe.

He retired to France, and was furniſhed with letters of recommendation by Du Maurier, ambaſſador of that country at the Hague. He arrived at Paris in the month of April, where he met with a moſt gracious reception from that court, and from the king, Lewis XIII. who ſettled a penſion on him. The hatred of ſome of his countrymen followed him wherever he went, and they ſpread all ſorts of calumnies againſt him, which, in the true ſpirit of Chriſtianity, he generouſly repaid, by ſpeaking of his country with the attachment of a zealous citizen. He was particularly hurt by a report which they raiſed, of his intention to ſolicit a pardon of the States. This he publicly contradicted, obſerving, that it was not likely he ſhould acknowledge an offence now he was at liberty, which he refuſed to do while in priſon. In France he compoſed his celebrated work "De Jure Belli et Pacis." In the year 1625, the death of Maurice, prince of Orange, raiſed the hopes of Grotius, that he might be reſtored to his country. With the ſucceſſor of the prince, Frederic Henry, Grotius had been on intimate terms; they had even maintained a correſpondence with one another at the period when Grotius was moſt unpopular, but prudence on the part of the new prince prevented him from taking any decided meaſures in favour of the illuſtrious exile. The glory which he acquired by his book "De Jure Belli et Pacis," printed this ſame year, might recompenſe him for the diſappointment. It was received with admiration by the learned throughout Europe, was commented upon and criticiſed, tranſlated, and had all the honours of a work calculated to lead men to think deeply and freely upon a very important topic. When cardinal Richelieu became prime miniſter, he wiſhed to engage Grotius in his ſervice, and in that of France; but the noble-minded exile could not forget his country, and becauſe he would not give himſelf ſolely to France, he was made to feel all the mortifications of a dependant out of favour. He determined, after eleven years' exile, to return to Holland; but in a ſhort time he found that the animoſities of his enemies had not ſubſided, and his friends, timid and daſtardly, were afraid to ſhew him that reſpect and attachment to which he was juſtly entitled. A reward was offered for his apprehenſion, and the prince, who did not dare to avow himſelf his defender, refuſed to take meaſures for his ſecurity. Grotius, therefore, was obliged to ſeek an aſylum at Hamburgh, where he reſided two years. In 1634, queen Chriſtina of Sweden made him her counſellor, and ſent him ambaſſador into France. Thus aſſured of an honourable ſituation, he wrote to the prince of Orange and the States-General, that he wiſhed no longer to be conſidered as a

Dutchman; the wrongs which he had received from a tyrannical government, and the ſlights which he had experienced from thoſe who ought to have afforded him an aſylum againſt his avowed enemies, ſeem to have made a deep and laſting impreſſion on his mind, and to have rendered him indifferent to his country's concerns. After having diſcharged the duties of this office above eleven years, he obtained his recal, and ſet out, by way of Holland, to give to the queen an account of his miſſion. He left France in the ſpring of 1645, and proceeded to Holland, where he was now received with great honour. The city of Amſterdam entertained him at the public expence, and fitted out a veſſel to convey him to Hamburgh: thence, by the way of Lubec, where he had every mark of reſpect ſhewn him, he entered Sweden, and repaired to Stockholm. Chriſtina was eager to ſee him, not only as her ſervant, but as a man, highly diſtinguiſhed in the republic of letters, and ſhe gave him a long audience, with which he was well ſatisfied. He hoped for a reward for his long ſervices, but received only compliments; he would willingly have entered on ſome new employment, but could obtain none: he requeſted therefore a paſſport, that he might return to his own country; this ſmall boon was refuſed, in the hope, that he would conſent to remain at the court of Sweden as counſellor to the queen. He at length ſet out without the formality of a paſſport, but the news of his departure being carried to Chriſtina, ſhe ſent after him to requeſt another interview, which he readily granted, and this paſſed ſo amicably, that ſhe preſented him with a conſiderable ſum in money, and a handſome ſervice of plate. A veſſel was now provided for his conveyance, on board of which he embarked on the 12th of Auguſt. They had ſoon to encounter a violent ſtorm, which obliged him to go on ſhore, at a ſmall diſtance from Dantzic. From thence he travelled by land to Roſtock, where he died on the 28th of Auguſt, 1645. His body was carried to Delft, to be interred in the ſepulchre of his anceſtors. Three ſons, one daughter, and his wife ſurvived him. Few writers have diſtinguiſhed themſelves in more branches of literature than Grotius. "His great work, "On the Rights of Peace and War," was the firſt attempt to ſyſtematiſe the law of nations, which, though imperfect, is perhaps the moſt complete that the world has yet owed, at ſo early a ſtage in the progreſs of any ſcience, to the genius and learning of one man." As a divine, Grotius is known by his work "On the Truth of the Chriſtian Religion," which has been tranſlated into all languages. He is alſo greatly eſteemed as a commentator on the Scriptures.

GROTON, in *Geography*, a town of America, in the county of Grafton, New Hampſhire, 15 miles N.E. of Dartmouth college, containing 391 inhabitants.—Alſo, a townſhip in Caledonia county, Vermont, on Connecticut river, nine miles N.W. of Stephen's fort on the ſame river, containing 248 inhabitants.—Alſo, a poſt-town in Middleſex county, Maſſachuſetts, 35 miles N.W. of Boſton; containing 1802 inhabitants.—Alſo, a townſhip in New London county, Connecticut, ſeparated by Thames river from New London, to which it formerly belonged. It was incorporated in 1705, and conſiſts of two pariſhes, containing 4372 inhabitants.

GROTSKAW, a town of Servia; 15 miles S. of Belgrade.

GROTTA, a town of Italy, in the department of the Upper Po; ſeven miles N.W. of Cremona.

GROTTAGLIA, a town of Naples, in the province of Otranto; nine miles E. of Tarento.

GROTTA MENARDA, a town of Naples, in Principato Ultra; 12 miles E.S.E. of Benevento.

GROTTA ST. LORIA, a town of Naples, in Capitanata; 12 miles W. of Manfredonia.

GROTTARI, a town of Naples, in Calabria Ultra; ſix miles N. of Gierace.

GROTTGAU, or GROTTKAU, a town of Sileſia, and capital of a circle in the principality of Neiſſe, ſituated on the river Neiſſe; 14 miles N. of Neiſſe. N. lat. 50° 37'. E. long. 17° 20'.

GROTTO, or GROTTA, in *Natural Hiſtory*, a large deep cavern, or den in a mountain or rock.

The word is Italian, *grotta*, formed, according to Menage, &c. from the Latin *crypta*: Du Cange obſerves, that *grotto* was uſed in the ſame ſenſe in the corrupt Latin.

The ancient anchorets retired into dens and grottos, to apply themſelves the more attentively to meditation.

Okey-hole, Elden-hole, Pool's-hole, and the Devil's A—ſe in the Peake, are famous among the natural caverns or grottos of our country.

The entrance to Okey-hole, on the ſouth ſide of Mendip-hills, is in the fall of thoſe hills, which is beſet all about with rocks, and has near it a precipitate deſcent of near twelve fathoms depth, at the bottom of which there continually iſſues from the rocks a conſiderable current of water. The naked rocks above the entrance ſhew themſelves about thirty fathoms high, and the whole aſcent of the hill above is about a mile, and is very ſteep. As you paſs into this vault, you go at firſt upon a level, but advancing farther, the way is found to be rocky and uneven, ſometimes aſcending, and ſometimes deſcending. The roof of this cavern, in the higheſt part, is about eight fathoms from the ground, but in many particular places it is ſo low, that a man muſt ſtoop to get along. The breadth is not leſs various than the height, for in ſome places it is five or ſix fathoms wide, and in others not more than one or two. It extends itſelf in length about two hundred yards. People talk much of certain ſtones in it, reſembling men and women, and other things, but there is little matter of curioſity in theſe, being only ſhapeleſs lumps of a common ſpar. At the fartheſt part of the cavern there is a good ſtream of water, large enough to drive a mill, which paſſes all along one ſide of the cavern, and at length ſlides down, about ſix or eight fathoms, among the rocks, and then preſſing through the clefts of them, diſcharges itſelf into the valley.

The river within the cavern is well ſtored with eels, and has ſome trouts in it; and theſe cannot have come from without, there being ſo great a fall near the entrance. In dry ſummers, a great number of frogs are ſeen all along this cavern, even to the fartheſt part of it; and on the roof of it, at certain places, hang vaſt numbers of bats, as they do in almoſt all caverns, the entrance of which is either level, or but ſlightly aſcending or deſcending; and even in the more perpendicular ones they are ſometimes found, provided they are not too narrow, and are ſufficiently high. The cattle that feed in the paſtures, through which this river runs, have been known to die ſuddenly ſometimes after a flood: this is probably owing to the waters having been impregnated, either naturally or accidentally, with lead-ore. Philoſoph. Obſerv. N° 2. p. 2.

In the Philoſophical Tranſactions, N° 480. p. 223. we have an account of a ſubterranean grotto, or cavern, near Weredale, about twenty miles ſouth-weſt of Newcaſtle.

Elden-hole is a huge profound perpendicular chaſm, three miles from Buxton, ranked among the natural wonders of the Peak. Its depth is unknown, and is pretended to be unfathomable. Cotton tells us he ſounded 884 yards; yet the plumbet ſtill drew. But he might eaſily be deceived, unleſs his plumbet was very heavy; the weight of a rope of that length might well make the landing of the plumbet ſcarcely perceivable. Phil. Tranſ. N° 407. p. 24.

Peak's-hole, and Pool's-hole, called alſo the Devil's A—ſe, are two remarkable horizontal ſprings under mountains; the one near Caſtleton, the other juſt by Buxton. They ſeem to have owed their origin to the ſprings which have their current through them: when the water had forced its way through the horizontal ſiſſures of the ſtrata, and had carried the looſe earth away with it, the looſe ſtones muſt fall down of courſe: and where the ſtrata had few or no ſiſſures, they remained entire; and ſo formed there very irregular arches, which are now ſo much wondered at. The water which paſſes through Pool's-hole is impregnated with particles of lime-ſtone, and has incruſted the whole cavern in ſuch a manner that it appears as one ſolid rock. Martyn, in Phil. Tranſ. N 407. p. 27, et ſeq.

In grottos are frequently found cryſtals of the rock, ſtalactites, and other natural conglaciations, and thoſe often of an amazing beauty.

M. Homberg conjectures, from ſeveral circumſtances, that the marble pillars in the grotto of Antiparos vegetate, or grow. That author looks on this grotto as a garden, whereof the pieces of marble are the plants; and endeavours to ſhew, that they could only be produced by ſome vegetative principle. Mem. Acad. anno 1702.

At Foligno in Italy, is another grotto, conſiſting of pillars and orders of architecture of marble, with their ornaments, &c. ſcarcely inferior to thoſe of art; but they all grow downwards: ſo that if this too be a garden, the plants are turned upſide down. Mem. de l'Acad. anno 1711.

The Zirchinitzer-ſea, or lake, in Carniola, famous for being full of water, fiſh, &c. the beſt part of the year, and quite dry, and bearing graſs, corn, &c. the reſt proceeds from ſome ſubterraneous grotto, or lake; as it is made highly probable by Mr. Vavaſor. Phil. Tranſ. N 191.

Grotto, in *Geology*, is a term frequently applied to the natural caverns, opens, and ſhake-holes, which are met with in thick ſtrata, or rocks of lime-ſtone, as in the mountainous parts of Derbyſhire, in Mendip hills, and other places. The immenſely large empty ſpaces which are thus found at conſiderable depths below the ſurface, have much puzzled the learned to account for their formation: ſome have ſuppoſed, with little appearance of probability, that the lime-ſtone which once occupied theſe grottos has been diſſolved and waſhed out by the ſprings and ſtreams of water frequently found running through them. Mr. Farey, who has paid much attention to this ſubject, and prepared a liſt of all the principal caverns in or near to Derbyſhire, for his report on that county, is of opinion that the mineral veins both of the rake and pipe kind, have all had the ſame origin with the caverns in Derbyſhire, *viz.* the great ſhrinking of the maſs, as of lime-ſtone, at the time, or ſince their induration: while the baſaltic ſtrata, or toad-ſtone rocks, which inter-lay them, ſeem not to have been ſuſceptible of the ſame contraction; and hence the mineral veins frequently have a ſole and lid-ſtone of ſolid toad-ſtone, and ſometimes the caverns, or empty pipe veins, have a roof, or floor, of the ſame kind. The roofs of the wider caverns, like the entrance to Peak-hole at Caſtleton, are compoſed of a rude or imperfect cryſtallization of calcareous matter, as diſtinct from the lime-ſtone rocks in which ſuch caverns are ſituate, as the riders and vein-ſtuff of the mineral veins are from the ſame rocks. The ſides, or walls of the caverns, are alſo for the moſt part coated with ſimilar vein-ſtuff, and ſo are the faces of the greater part, if not all, of the natural cliffs, or façades of lime-ſtone, in theſe diſtricts (ſee Phil. Mag. vol. 31. p. 39.); which coatings have cemented the different beds of ſtone together, like one vaſt ſtone, or unſtratified rock, as may be ſeen in the face of the entrance to Caſtleton cave, of Matlock, High-Tor, &c. &c. and have deceived many perſons as to the ſtructure of theſe rocks. The water continually percolating through the roofs of moſt of the caverns has, and ſtill is accumulating ſtalactites pendent from the roofs, and ſtalagmites on the floor under the drippings of them: many of theſe have met, and formed numerous groteſque pillars, ſupporting the roof as it were. The more minute and beautiful ſtalactites and ſtalagmites have long ſince been ſtripped from the acceſſible caverns of this diſtrict to ſatisfy vulgar curioſity. Bagſhaw's, or Mule-ſpinner cavern, in Bradwell, near Caſtleton, lately diſcovered, and particularly Merlin's cave in Eyamdale, the private property of William Longſdon, eſq., are the places where the moſt perfect ſtalactites are now to be ſeen.

We have ſeveral grottos famous in natural hiſtory; as

Grotto *del Cani*, a little cavern near Pozzuoli, four leagues from Naples, the ſtreams whereof are of a mephitical, or noxious quality; whence alſo it is called *bocca venenoſa*, the poiſonous mouth. See Mephitis.

Two miles from Naples, ſays Dr. Mead, juſt by the Lago de Agnano, is a celebrated mofeta, commonly called *la Grotta del Cani*, and equally deſtructive to all within the reach of its vapours.

It is a ſmall grotto, about eight feet high, twelve long, and ſix broad; from the ground ariſes a thin, ſubtile, warm fume, viſible enough to a diſcerning eye, which does not ſpring up in little parcels here and there, but in one continued ſtream, covering the whole ſurface of the bottom of the cave; having this remarkable difference from common vapours, that it does not, like ſmoke, diſperſe itſelf into the air, but quickly after its riſe falls back again, and returns to the earth; the colour of the ſides of the grotto being the meaſure of its aſcent: for ſo far it is of a darkiſh-green, but higher, only common earth. And as I myſelf found no inconveniency by ſtanding in it, ſo no animal, if its head be above this mark, is the leaſt injured. But when, as the manner is, a dog, or any other creature, is forcibly kept below it; or, by reaſon of its ſmallneſs, cannot hold its head above it; it preſently loſes all motion, falls down as dead, or in a ſwoon; the limbs convulſed and trembling, till at laſt no more ſigns of life appear than a very weak and almoſt inſenſible beating of the heart and arteries; which, if the animal be left a little longer, quickly ceaſes too, and then the caſe is irrecoverable; but if it be ſnatched out, and laid in the open air, it ſoon comes to life again, and ſooner, if thrown into the adjacent lake.

The true explication of the noxious effects of this vapour may be ſeen under the articles *Fixed* Air, Azote, Damp, &c.

Grotto *del Serpi* is a ſubterranean cavern near the village of Saſſa, eight miles from the city of Braccano, in Italy; deſcribed by Kircher thus:

The Grotta del Serpi is big enough to hold two perſons: it is perforated with ſeveral fiſtula apertures, ſomewhat in manner of a ſieve; out of which, at the beginning of the ſpring-ſeaſon, iſſues a numerous brood of young ſnakes, of divers colours, but all free of any particular poiſonous quality.

In this cave they expoſed their lepers, paralytics, arthrities, and elephantiac patients, quite naked; where the warmth of the ſubterraneous ſtreams reſolving them into ſweat, and the ſerpents clinging variouſly all around, licking and ſucking them, they become ſo thoroughly freed of all their vicious humours, that upon repeating the operation for ſome time, they become perfectly reſtored. This cave Kircher viſited himſelf, and found it warm, and every way agreeable to the deſcription given of it. He ſaw the holes, and heard a murmuring hiſſing noiſe in them. Though he miſſed ſeeing the ſerpents, it not being the ſeaſon of their creeping out; yet he ſaw a great number of their exuviæ, or ſloughs, and an elm, growing hard by, laden with them.

The diſcovery of this cave was by the cure of a leper going from Rome to ſome baths near this place; who, loſing his way, and being benighted, happened upon this cave; and finding it very warm, pulled off his clothes; and being weary and ſleepy, had the good fortune not to feel the ſerpents about him till they had wrought his cure. Muſeum Wormian.

The ſalutary effects of this cavern were probably of the ſame nature, and to be aſcribed to the ſame cauſe with thoſe of the Pyrmont and Spa waters, abounding with a great quantity of the gas, or fixed air, which lies alſo to a certain height on the ſurface of the ground; and whither diſeaſed perſons reſort, and find relief in a variety of diſorders. The antiſeptic ſalutary quality of this air is now ſufficiently known.

Grotto, *Milky*, *Crypta Lactea*, a mile diſtant from the ancient village of Bethlehem, is ſaid to have been thus denominated on occaſion of the bleſſed Virgin, who let fall ſome drops of milk in giving ſuck to Jeſus in this grotto. And hence it has been commonly ſuppoſed, that the earth of this cavern has the virtue of reſtoring milk to women that are grown dry, and even of curing fevers.

Accordingly, they are always digging in it, and the earth is ſold at a good rate to ſuch as have faith enough to give credit to the fable. An altar has been built on the place, and a church juſt by it.

Grotto is alſo uſed for a little artificial edifice made in a garden, in imitation of a natural grotto.

The outſides of theſe grottos are uſually adorned with ruſtic architecture, and their inſide with ſhell-work, foſſils, &c. finiſhed likewiſe with jets d'eaus, or fountains, &c.

A cement for artificial grottos may be made thus: take two parts of white roſin, melt it clear, and add to it four parts of bees' wax; when melted together add two or three parts of the powder of the ſtone you deſign to cement, or ſo much as will give the cement the colour of the ſtone; to this add one part of flour of ſulphur; incorporate all together over a gentle fire, and afterwards knead them with your hands in warm water. With this cement the ſtones, ſhells, &c. after being well dried before the fire may be cemented.

Artificial red coral branches, for the embelliſhment of grottos, may be made in the following manner: take clear roſin, diſſolve it in a braſs-pan; to every ounce of which add two drams of the fineſt vermilion: when you have ſtirred them well together, and have choſen your twigs and branches, peeled and dried, take a pencil and paint the branches all over whilſt the compoſition is warm; afterwards ſhape them in imitation of natural coral. This done, hold the branches over a gentle coal fire, till all is ſmooth and even as if poliſhed.

In the ſame manner white coral may be prepared with white lead, and black coral with lamp-black.

A grotto may be built, with little expence, of glaſs, cinders, pebbles, pieces of large flint, ſhells, moſs, ſtones, counterfeit coral, pieces of chalk, &c. all bound or cemented together with the above deſcribed cement.

The grotto at Verſailles is an excellent piece of building. Solomon de Caux has an expreſs treatiſe of grottos and fountains.

GROTTOLA, in *Geography*, a town of Naples, in the Baſilicata; 4 miles S. W. of Matera.

GROVA, a town of Africa, on the Grain Coaſt; 10 miles N. W. of Cape Palmas.

GROVE, Henry, in *Biography*, was born at Taunton, in Somerſetſhire, in the year 1683. He was deſcended, both by his father and mother, from families of great reſpectability, and who had been remarkable for their ſteady attachment to religious liberty, and the rights of conſcience. Henry was formed to the love and practice of virtue, by the inſtructions and example of his parents. He was ſoon diſcovered to poſſeſs talents of a ſuperior order, and ſuch proficiency did he make in grammar learning that at fourteen years of age he was ſent to purſue his ſtudies under Mr. Warren of Taunton, with a view to the Chriſtian miniſtry. When he had completed the uſual courſe, under the ſuperintendance of this gentleman, he removed to London, and proſecuted his ſtudies under Mr. Rowe; here he was led to cultivate the Hebrew language, and here he embraced the Newtonian ſyſtem of philoſophy, in oppoſition to that of Deſcartes, to which his tutor ſteadily adhered. At this period he contracted an intimacy with Dr. Watts, which continued with mutual eſteem till his death; though on many points, warmly controverted in that day, as in this, they differed in opinion. In 1706 he ſucceeded his tutor, Mr. Warren, in the academy at Taunton, having previouſly commenced the office of preacher with ſingular reputation. The town of Taunton was now the place of his reſidence, and here he continued to preach for eighteen years to two ſmall congregations. His ſalary, as miniſter from both his charges, did not amount to 20*l.* a year, nevertheleſs he went through the duties with cheerfulneſs and aſſiduity, greatly beloved by thoſe who were brought up under his inſtructions. "An exact judgment," ſays his biographer, "a lively imagination, a warmth of devotion, and a rational and animated repreſentation of Chriſtianity, made his ſermons, delivered by a voice, which, though not ſtrong, was ſweet and well governed, generally admired." As an author, his firſt publication was a treatiſe entitled "The Regulation of Diverſions," this was printed in 1708, and ſoon after he engaged in a correſpondence with the celebrated Dr. Clarke, on the ſubject of the being and attributes of God. The doctor had drawn his proof from our neceſſary ideas of ſpace and duration, by which the mind of Mr. Grove was by no means ſatisfied; he wrote for an explanation, but after the interchange of ſeveral letters, the correſpondence was dropped with expreſſions of mutual eſteem. Mr. Grove next appeared as a writer in the Spectator, and is known to be the author of Nos. 588, 601, 626, and 635: the laſt was afterwards republiſhed by Dr. Gibſon, biſhop of London, in the treatiſe commonly known by the title of "Addiſon's Evidences of the Chriſtian Religion." In 1718 Mr. Grove publiſhed an "Eſſay towards the Demonſtration of the Soul's Immateriality," in which he relies on the argument that Dr. Clarke had urged in his debate with Mr. Collins. Hitherto he had engaged chiefly, as a tutor, in moral philoſophy, and thoſe branches of knowledge connected with it; but now, on the reſignation of Mr. Darch, one of his colleagues, he undertook the department of mathematics and natural philoſophy, which conſiderably extended his labours, and is thought to have contributed to injure his conſtitution, which was naturally weak and tender. In a very few months the ardour of his ſtudies brought on a fever, attended with extreme languor, which threatened his valuable life ; the diſorder, however, did not prove fatal, and upon his recovery he compoſed "An Ode," which was afterwards printed, and has been greatly admired for the harmony of the numbers, and the exalted piety of the ſentiments. Small as his income was for the ſupport of an increaſing family, he refuſed ſeveral invitations, which would have rendered his circumſtances much eaſier, in a pecuniary point of view, but which would probably have expoſed him to ſome diſquiet, owing to the controverſy at that time agitated among the diſſenters. He loved Chriſtianity for its ſimplicity, as well as for the excellence of its doctrines, and for the rules of action which it enforces, as tending to the happineſs of man, but he was totally averſe from thoſe inventions of weak and fallible creatures, which in all caſes are highly injurious to the cauſe of ſcriptural truth. For adhering to the doctrines of the Bible, he was expoſed to the cenſures and anathemas of thoſe violent men who had ſet up, or embraced, a ſyſtem of their own, and then went to the oracles of heaven for detached paſſages in its ſupport. Many of his brethren, whoſe names ſhall not be called from the oblivion to which they have juſtly paſſed, aſſuming to themſelves the excluſive title of orthodox, repreſented Mr. Grove as indifferent to the truths of the goſpel ; but their calumnies produced no change in his conduct, nor any alteration in his firm conviction, that the interpoſition of the authority and deciſions of fallible men was an improper method of determining controverſies of faith, or eſtabliſhing divine truth. He gave his reaſons for this conduct in "An Eſſay on the terms of Chriſtian Communion." In the year 1723, at the requeſt of ſeveral miniſters, he publiſhed a treatiſe on "Secret Prayer," being the ſubſtance of many ſermons on this important ſubject ; in this work the wiſdom and advantage of that practice are eſtabliſhed by weighty and irrefragable arguments. In 1725, the office of divinity tutor devolved on him ; the duties of which he diſcharged with the moſt exemplary zeal, and greatly to the advantage of thoſe young men who ſtudied under his direction. His next publication in 1728, conſiſted of two ſingle diſcourſes, one entitled the "Friendly Monitor," intended to point out the errors and imperfections in the conduct of ſome Chriſtians, by which they not only injure their own reputation, but bring diſcredit on the religion which they profeſs: the other was entitled, "The fear of death, as a natural paſſion, conſidered, both with reſpect to the grounds of it, and the remedies againſt it." We may alſo notice another or two of his publications, particularly "A diſcourſe concerning the nature and deſign of the Lord's Supper :" and "Wiſdom, the firſt ſpring of action in the Deity." In this latter piece, which appeared without the author's name, he endeavours to prove, that the moral perfections of God, as well as moral virtue and goodneſs in man, are founded in the unalterable relation of things, and the eſſential fitneſs and unfitneſs of actions and diſpoſitions ariſing hence. He died in February 1737, deeply regretted by all the wiſe and the good who knew him. He was in every reſpect amiable and excellent, beloved by his pupils and honoured by his contemporaries, who had an opportunity of appreciating his worth. His learning and general knowledge were various, deep, and extenſive : his judgment was ſolid, and his imagination ſtrong and lively.

Grove, in *Gardening*, a ſort of avenue formed by trees of ſtately growth, diſpoſed in rows, in graſs grounds, gardens, and parks, on, or contiguous to, ſpacious lawns, &c. deſigned for ornament, ſhade, and ſhelter. Theſe ſorts of walks are much leſs in eſtimation at preſent than formerly, in conſequence of their very formal appearance.

In extenſive gardens or grounds they may be formed in different parts ; a large one contiguous to the dwelling, where it may be conſpicuous, is often proper, both to effect ornament, and that it may afford convenient ſhade for occaſionally walking in the heat of ſummer ; others may be ſtationed more remote, on the boundaries of lawns, or other open ſpaces of graſs ground, and near garden buildings, ſuch as ſummer-houſes, temples, and other ſtructures, as whereever they are ſituated they always exhibit an air of grandeur, and are great ornaments to ſpacious gardens. Such gardens are indeed incomplete without one or more of ſuch plantations.

The trees, in forming groves, are uſually diſpoſed in ſeveral ſtraight rows, and at ſuch diſtances that their branches may ſo far approach each other, as to afford a moderate ſhade from the ſummer's ſun, yet ſo diſtant that each tree may have full ſcope to ſpread its branches all around, ſo as to exhibit their ſtraight trunks and ſpreading heads diſtinct, according to their natural growth, and that a due proportion of air and light may be admitted to promote the growth of the graſs between and under them, ſo as to form a cloſe, firm ſward, and conſtant verdure ; they are alſo ſometimes formed with the trees placed irregularly, and the ſpaces between planted with various ſorts of ſhrubs to form underwood, and with ſerpentine gravel walks variouſly winding through the whole. The trees and ſhrubs that are moſt proper for this uſe are thoſe of the occiduous and ever-green tall growing kinds, which form handſome heads.

They are diſtinguiſhed into two ſorts, *open groves*, and *cloſe groves*.

For the firſt ſort, the handſomeſt growing ornamental foreſt trees, with the moſt ſpreading heads, ſhould be choſen, and diſpoſed in ranges from fifteen to twenty or thirty feet wide, and the ſame diſtance between the trees in each row, that each tree may have full ſcope to form a ſpreading head, and ſo as to admit of the growth of graſs under them without injury. Where a ſhady grove is required to be formed as ſoon as poſſible, it may be planted contiguous, but diſtinct from the above, arranging the rows only at ten or fifteen feet diſtance, by which it will afford ſhade ſeveral years ſooner than the other ; and as exhibiting a darker and more gloomy ſhade, will afford the greater variety in contraſt with it. Open groves, chiefly for ſhade, may alſo be formed by diſpoſing all the trees irregularly, that they may produce an imitation of a natural grove, and ſooner afford a perfect ſhade and gloomineſs, which they effect conſiderably ſooner than in ſtraight rows.

The latter ſort of groves are formed of large trees, ſome planted in ſtraight lines, others irregularly diſpoſed, having the ground between them filled with various under ſhrubs, and gravel or ſand-walks continued through them in winding or ſerpentine turns ; and are ſometimes continued round the outer boundaries of pleaſure grounds, parks, &c. as ornamental plantations, and to afford ſhady and private walking, as well as ſhelter from the inclemency of cold cutting winds. The various ſhrubs forming the underwood have a delightful effect in the whole of the walks quite round. In forming groves in general, it ſometimes happens, when gardens or pleaſure-grounds are laid out, that large old trees are found growing in a proper ſituation to conſtitute a grove, which, if they do not too greatly approach to the habitation, or obſtruct any principal proſpect or diſtant view, ſhould be preſerved with care ; and although they ſhould ſtand ever ſo irregularly or cloſe, they may be ſomewhat regulated by grubbing up the moſt irregular and ill formed, or thinning out ſome, where they form too cloſe a thicket for the deſign, either for an open or cloſe grove. By proper care in this reſpect a grove may often be formed in a very ſhort ſpace of time, and with but very little trouble.

Groves have been in all ages held in great veneration. The *proſeuchæ*, and high-places of the Jews, whither they reſorted for the purpoſes of devotion, were probably ſituated in groves. (See Joſhua, xxiv. 26.) The proſeuchæ in Alexandria, mentioned by Philo, had groves about them, becauſe he complains that the Alexandrians, in a tumult againſt the Jews, cut down the trees of their proſeuchæ: that at Rome, in Egeria's grove, was of the ſame ſort. The veneration which the ancient druids had for groves is well known. See Druids.

The ancient Romans had a ſort of groves near ſeveral of their temples, which were conſecrated to ſome god, and called *luci*, by Antiphraſis, *á non lucendo*, as being ſhady and dark: theſe groves are expreſsly enjoined by the twelve tables as a part of the public religion. The inſtitution of conſecrated groves is ſuppoſed to be as ancient as the patriarchal ages; for we are informed, that "Abraham planted a grove in Beerſheba, and called there on the name of the Lord." (Gen. xxi. 33.) But it cannot be juſtly inferred from this paſſage, that the patriarch planted the grove for any religious purpoſe. However this be, the inſtitution of conſecrated groves is ſo ancient, that ſome have thought it to be antecedent to that of temples and altars. At firſt theſe groves had neither temples nor altars; they were ſimple retreats to which the profane had no acceſs; meaning by profane thoſe who were not devoted to the ſervice of the gods. Afterwards, they built chapels and temples in them: and they alſo took care, whenever it was practicable, to encloſe them with walls, hedges, or ditches; and theſe groves were not only conſecrated to the gods, in honour of whom the temples in the centres of them had been built, but they were themſelves a place of ſanctuary for criminals, who fled thither for refuge. As the idolatrous nations worſhipped in groves, Moſes, under divine inſtruction, with a view of guarding the Iſraelites from idolatry, expreſsly forbade "the planting a grove of trees near his altar." (Deut. xvi. 21.) Nor would he ſuffer them to offer their ſacrifices on the tops of hills and mountains as the heathens did; but ordered that they ſhould be brought to one altar, in the place which God appointed. (Deut. xii. 13, 14.) And as for the groves which the Canaanites had planted, and the idols and altars which they had erected on the tops of high mountains and hills for the worſhip of their gods, the Iſraelites are commanded utterly to deſtroy them. (Deut. xii. 2, 3.) The groves and high places ſeem to have been the ſame places, or groves planted on the tops of hills, probably round an open area, in which the idolatrous worſhip was performed. See Hoſea, iv. 13.

Various conjectures have been offered in order to account for the reaſon and origin of planting ſacred groves. Some have imagined this was done in order to render the ſervice more agreeable to the worſhippers by the pleaſantneſs of the ſhade, whilſt others ſuppoſe that the gods were thus allured to be preſent. This ſeems, according to Virgil, to have been the reaſon of Dido's building the temple of Juno in a delightful grove:

"Lucus in urbe fuit mediâ, lætiſſimus umbrâ:
Hic templum Junoni ingens Sidonia Dido
Condebat." Æn. l. i. v. 445.

The one or other of theſe reaſons ſeems to be intimated in the paſſage of Hoſea above cited. Others conceive their worſhip was performed in the midſt of groves, becauſe the gloom of ſuch a place is apt to fill the mind with a religious awe (ſee Seneca, Ep. xli. And Virgil's Æn. viii. v. 347 et ſeq.); or elſe, becauſe ſuch dark concealed ſituations ſuited the lewd myſteries of their idolatrous worſhip. In proof of the lewdneſs and obſcenity of many of the religious rites of the heathens, we may refer to Herodot. Euterpe, v. 64. et Clio § 199. Diod. Sic. l. iv. init. Valer. Max. l. ii. c. 6. § 15. Juv. Sat. ix. v. 24. and to what Euſebius ſays of a grove on mount Libanus, dedicated to Venus, in his "Life of Conſtantine," l. iii. c. 55. See alſo 1 Kings, xiv. 23, 24.

There remains to be mentioned another conjecture which ſeems as probable as any; *viz.* that this practice began with the worſhip of dæmons or departed ſouls. It was an ancient cuſtom to bury the dead under trees, or in woods. (See Gen. xxxv. 8. 1 Sam. xxxi. 13.) An imagination prevailed among the heathens, that the ſouls of the deceaſed hover about their groves, or at leaſt delight to viſit their dead bodies; and hence the idolaters, who paid divine honours to the ſouls of their departed heroes, were led to erect images and altars for their worſhip in the ſame groves where they were buried (ſee Plato de Republ. l. v.); and from thence it became afterwards a cuſtom to plant groves, and build temples near the tombs of departed heroes (2 Kings, xxiii. 15, 16. Arrian de Exped. Alex. l. vi.); and to ſurround their temples and altars with groves and trees. From this cuſtom of planting trees near temples, the poets, as Strabo informs us (Geog. l. ix.) ſtyled all their temples groves, even thoſe which had no plantations around them. The ſacred groves being conſtantly furniſhed with the images of the heroes or gods that were worſhipped in them, a grove and an idol came to be uſed as convertible terms. (2 Kings, xxiii. 6.) Theſe ſacred groves were uſually planted on the tops of hills or mountains, from which circumſtance they were called in Scripture בָמוֹת, (bamoth) or "high places." Perhaps, ſuch an exalted ſituation was choſen by idolaters in reſpect to their chief god, the ſun, whom they worſhipped, together with their inferior deities, on the tops of hills and mountains, that they might approach as near to him as they could. To this purpoſe, Tacitus (Annal. l. xiii. § 57.) ſpeaks of ſome places which were thought "maximè cœlo propinquare, preceſque mortalium á Deo nuſquam propius audiri." It is no improbable conjecture concerning the Egyptian pyramids, that they were intended as altars to the ſun, as well as for ſepulchral monuments, like thoſe ancient groves. Accordingly they are all flat at the top, to ſerve the purpoſes of an altar. It is ſaid, that altars to the ſun, of the ſame form, though not ſo large as the pyramids, were found among the American idolaters. (See Young's Hiſtorical Diſſertation on idolatrous Corruptions in Religion, vol. i. p. 222—223.) Another reaſon for planting the ſacred groves on the tops of hills and mountains, was the benefit of retirement from noiſe and interruption in acts of worſhip: "Lucos et ipſa ſilentia adoramus," ſays Pliny (Nat. Hiſt. l. xii. c. 1.). It was probably on this account that the worſhippers of the true God had alſo their proſeuchæ, or places of retirement for worſhip, generally on hills or high places. Thus we read (Matt. xiv. 23.) that Chriſt "went up into a mountain apart to pray." At his transfiguration he retired with three of his "diſciples to the top of a high mountain apart." (Matt. xvii. 1.) Hence it appears, that we have no reaſon for concluding that the high places mentioned in the Old Teſtament, where holy men and worſhippers of the true God paid their devotion, were the ſacred groves of the idolaters; but that they were rather Jewiſh proſeuchæ, or ſynagogues. (See 1 Sam. ix. 12—14. x. 5—13. 1 Kings, iii 4, 5. Jennings's Jewiſh Ant. vol. ii) See Proseuchæ and Synagogue.

Grove-*wood*, in *Mining*, ſignifies very ſtout underwood, or the thinnings of plantations, of which the puncheons, ſtemples, ſtauncheons, or poſts are made, which are uſed to ſupport the roof or ſhafts of mines.

GROUND, in *Agriculture*, a term commonly applied to land, whatever the nature of it may be. It is alſo occaſionally uſed to ſignify a graſs-land incloſure which lies out of the way of floods; and ſometimes in contradiſtinction to meadow-land. See Soil.

Ground, in *Mining*, ſignifies the ſpace or field occupied by a mine; thus, mining ground ſignifies a place where there are mineral veins or ſeams.

Ground *Angling*. See Angling.

Ground *Arms*, in *Military Language*, a word of command, on which the ſoldiers lay down their arms upon the ground: but this term is exploded, and ſoldiers are now ordered "to pile their arms."

Ground, *To Take*. A battalion or company is ſaid to take ground, when it extends in any given direction. A ſimilar expreſſion is uſed in duelling, *e. g.* they took their ground at eight or ten paces from one another.

Ground-*bailiff of a Mine*, or under-ground agent, is the foreman, overlooker, or perſon having the charge of the works in a mine; in ſome places ſuch perſon is called the overman.

Ground *Baſe*, a term in *Muſic*, for a few bars, or notes, repeated in the baſe as a foundation to different trebles: ſuch were the ſounds upon which the *Chaconne* was uſually built, during the 17th and part of the 18th century. See Stradella and Purcell.

Ground *Battable*. See Battable.

Ground, among *Bowlers*. See Bowling.

Ground *Breaking*. See Breaking.

Ground, *Commanding*. See Commanding.

Ground-*drove*, *in a Mine*, is ſaid of ſuch parts as have been worked, or excavated for the ore or minerals.

Ground-*end of a Mine*, ſignifies the forefield or foremoſt place of working, in the whole or foot ground.

Ground, in *Etching*, denotes a varniſh ſmeared over the ſurface of the metal to be etched, to prevent the aquafortis from eating, or having effect, except in places where this ground is cut through, or pared off, with the points of needles. For the method of preparing it, ſee Etching.

Ground *Ivy*, in *Botany*, &c. See Glechoma.

Ground *levelling Machine*, in *Agriculture*, the name of an implement contrived for the purpoſe of reducing land into a level and even ſtate. See Machine.

Ground *Line*, in *Perſpective*, is the interſection of the picture with the ground plane.

Ground, in the *Manege*. See Terrain.

Ground, *Manuring*. See Manuring.

Ground *Niche*. See Niche.

Ground *Nut*. See Earth-*nut*.

Ground, *Oazy*. See Oazy.

Ground *Officer*, in *Agriculture*, the name of a perſon who has the managing and overlooking of land.

Ground *Paſture*. See Pasture.

Ground *Pine*, in *Botany* and *Medicine*, &c. See Germander.

Ground *Plane*, in *Perſpective*, is the ſituation of the original plane in the ſuppoſed level of our horizon; it only differs from horizontal plane in this, that the horizontal plane is any plane parallel to our horizon, whether above or below it; whereas ground plane is ſuppoſed to be at one diſtance only from the centre of the earth: and this diſtance, the ſuppoſed level on which the object to be drawn, is placed on the earth's ſurface.

The ground plane is ſtill more confined with regard to ſituation than the original plane, which may be either parallel or inclined in all poſitions to the ground plane; we ſhall therefore, in reſpect of the original object, the interſection of the picture, the directing, and other lines ſituated in the original plane, refer our readers for further information to *Original* Plane, and to the article Perspective.

Ground *Plate*, or *Ground-ſill*, the loweſt horizontal timbers on which the exterior walls of a building are erected. It chiefly occurs in timber buildings, or buildings, the outſide walls of which are of brick, ſurrounded by timber framings.

Ground *Plot*, a piece of ground ſelected for building upon. For dwellings its chief properties are, a healthy ſituation, a convenient ſupply of water and of all other neceſſaries of life, and an agreeable ſituation: if for trade or manufacture, its communication muſt be ready for receiving the materials, and exporting the articles of manufacture.

Ground *of a ſhield*, or *eſcutcheon*, in *Heraldry*, is properly called the *field*.

Ground, in *Painting*, is the ſurface upon which the figures, and other objects, are raiſed or repreſented. See Painting.

Ground is properly underſtood of ſuch parts of the piece as have nothing painted on them, but retain the original colour, upon which the other colours are applied, to make the repreſentations.

A drapery, piece of building, or the like, are ſaid to ſerve as a ground to a figure, when the figure is painted on the drapery or building.

In the like ſenſe, we alſo ſay, the ground of a piece of tapeſtry, of an embroidery, of a medal, coin, &c.

Ground *Steward*, a perſon who has the direction of land.

Ground *Tackle*, a *Sea Term*, denoting a ſhip's anchor, cables, &c. with what is neceſſary to make her ride ſafe at anchor in a proper *ground*.

Ground *Timbers*, in a *Ship*, are thoſe whoſe timbers lie on her keel, and are faſtened to it with bolts through the keelſon. They are ſo called, becauſe the ſhip lies at reſt upon them when ſhe is aground.

Ground-*work*, in *Building*. See Foundation.

Ground-*worm*. See Worm, and Earth-*worm*.

GROUNDAGE, a cuſtom or tribute, paid for the ſtanding of a ſhip in a port. Blount.

GROUNDING *of a Ship*, is the bringing her on *ground*, to be trimmed, made clean, or to have ſome leak ſtopped in her.

The term is alſo applied to a ſhip's running aground accidentally, when under ſail, or driving in a tempeſt.

GROUNDLING, an Engliſh name for a ſmall ſpecies of the *cobitis*; which ſee.

GROUNDSEL, in *Botany*. See Senecio.

Groundsel, *African*. See *Foreign* Coltsfoot.

Groundsel, *German*. See Stellera.

Groundsel *Tree*, in *Gardening*, the common name of a plant. See Baccharis.

GROUP, in *Painting* and *Sculpture*, is a combination of objects in one maſs, to prevent diſtraction or confuſion in a work of art. The word is French, *grouppe*, from the Italian *groppo*, a knot or cluſter.

A group has ſomewhat in it of the nature of a ſymphony, or concert of voices: as, in the one, the voices muſt ſuſtain each other, in order to fill the ear with an agreeable harmony from the whole; whence, if any part were to ceaſe, ſomething would neceſſarily be miſſed; ſo in the other, if the parts, or figures, be not well balanced, ſomething will be found diſagreeable.

Group, in *Muſic*, is one of the kinds of diminutions of long notes, which in the writing forms a ſort of group, or cluſter.

The group uſually conſiſts of four crotchets, quavers, or ſemiquavers, tied together at the diſcretion of the compoſer.

GROUPADES is corruptly uſed in the *Manege* for croupades.

GROUPED Columns, or *Pilaſters*, are thoſe of which more than two are conjoined; precedents of this deſcription are not to be found among the ruins of the ancients, nor are they conformable to the ſtrict rules of architecture, and though ſome few examples exiſt in modern buildings, they are not very numerous.

GROUPING, in *Painting* and *Sculpture*, is in fact the ſame as the art of compoſing, or combining the objects of a picture, or piece of ſculpture. So much has been ſaid upon this ſubject under the article Composition *in the Arts of Deſign*, that little can here beneficially be added. We ſhall only obſerve, that in a work of great extent in painting, there ſhould not only be found well compoſed groups, but alſo groups of groups. That is, the larger maſſes ſhould be diviſible into ſmaller ones, and all the groups ſhould unite to form the whole; and the parts ſhould alſo be ſo connected in their approximation to each other, that the eye may be readily conveyed from each to each, and unite them agreeably in one view.

The nature of the ſubject propoſed to be treated is the only guide for the formation of groups; which may conſiſt of two or more figures, according to what is required for the illuſtration of it.

GROUSE, or Grous, in *Ornithology*, is a general name comprehending ſeveral ſpecies of birds, which Linnæus has claſſed under the genus of *Tetrao*; which ſee.

The wood-grous, called alſo the *urogallus major*, and cock of the mountain, or wood, is the *tetrao urogallus* of Linnæus. The male of this ſpecies ſometimes weighs fourteen pounds: its bill is of a pale yellow colour; the noſtrils are covered with duſky feathers; the head, neck, and back, are elegantly marked with ſlender lines of grey and black, running tranſverſely. The feathers on the hind part of the head are long, and beneath the throat is a large tuft of long feathers. The upper part of the breaſt is of a rich gloſſy green; the reſt of the breaſt and belly black, mixed with ſome white feathers; the ſides are marked like the neck; the coverts of the wings are croſſed with undulated lines of black and reddiſh brown: the exterior webs of the greater quill-feathers are black, and at the ſetting on of the wings in both ſexes is a white ſpot; the tail conſiſts of eighteen black feathers, marked on each ſide with a few white ſpots; the legs are covered with brown feathers, and the edges of the toes pectinated. The bill of the female is duſky; its throat red; its head, neck, and back, marked with tranſverſe bars of red and black; the breaſt has ſome white ſpots on it, and the lower part is of a plain orange colour; the belly is barred with pale orange and black; the tips of the feathers are white; the feathers of the back and ſcapulars are black, the edges being mottled with black and pale reddiſh brown; the ſcapulars are tipt with white; the tail is of a deep ruſt-colour, barred with black, tipt with white, and conſiſts of ſixteen feathers. The female is conſiderably leſs than the male. Theſe differences between the male and female led ſome writers to make the male and female of this ſpecies two different ſpecies; and Geſner has diſtinguiſhed them in this manner, calling the female the *grygallus minor*, and the male the *grygallus major*. This ſpecies is found in no other part of Great Britain except the Highlands of Scotland, where it is known by the name of *capercalze*, and in the old law books *caperkally*, the horſe of the woods. It inhabits woods and mountainous countries, and feeds on the tops of pines and birch-trees, and the berries of juniper. Theſe birds are common to Scandinavia, Germany, France, and ſeveral parts of the Alps; and are generally reckoned well-taſted food.

Another ſpecies of the grouſe is the black game, heath-cock, or black cock, being the *tetrao tetrix* of Linnæus; the male, which is called the *urogallus minor*, has a duſky bill; the plumage of the whole body is black, gloſſed over the neck and rump with a ſhining blue; the coverts of the wings are of a duſky brown, the inner coverts white; the thighs and legs are covered with dark brown feathers, and on the former are ſome white ſpots; the tail conſiſts of ſixteen black feathers, and is much forked; the feathers under the tail are of a pure white. The weight of an old black cock is about four pounds. The female weighs about two pounds; the head and neck are marked with alternate bars of dull red and black; the breaſt with duſky black and white; the back, coverts of the wings, and tail, are of the ſame colours with the neck; the inner coverts of the wings are white; and in both ſexes form a white ſpot on the ſhoulder; the tail conſiſts of eighteen feathers, variegated with red and black, and ſlightly forked. This ſpecies of birds frequent the ſame ſituations with the former: they feed on bilberries and other mountain fruits, and in winter on the tops of the heath: in ſummer they often deſcend from the hills to feed on corn. They never pair, but in ſpring the male gets on an eminence, crows, and claps his wings; on which ſignal, all the females within hearing reſort to him. The hen lays from ſix to eight eggs, which are hatched late in the ſummer. The young males, which quit their mother in the beginning of winter, keep together in flocks of ſeven or eight till ſpring, during which time they inhabit the woods. There is another variety of the black cock, which differs from the common ſort in being ſpotted on the neck, breaſt, wings, and thighs, with red: ſuch is alſo the *tetrao hybridus* of Linnæus. Pennant.

Another ſpecies of grouſe is the red-game, moor-cock, or gor-cock, a variety of the tetrao *lagopus*. A fourth ſpecies is the white game, tetrao *lagopus* of Linnæus, or *ptarmigan*. For other ſpecies that paſs under the denomination of grouſe, ſee Tetrao.

GROUT, in *Engineery*, is a thin or ſemi-liquid mortar, of quick lime, with a portion of fine ſand, which is prepared and poured into the internal joints of the walls of locks, bridges, &c. and over the tops of arches on canals, &c. for cementing the whole more firmly together; the proceſs is called *grouting*.

Grout, or *Growt*, in *Building*, is a very thin coarſe mortar; when it is mixed with bullock's hair, it is called *hair grout*. See *Extinguiſhing of* Fire. Alſo *Calcareous* Cement.

GROWA, in *Geography*, a town of Africa, on the Slave coaſt. N. lat. 4° 25′. W. long. 7° 20′.

GROWAN, in *Natural Hiſtory*, a word uſed by the miners in Cornwall to expreſs a ſort of coarſe and gritty ſtone, which they are uſually obliged to dig through before they come to the veins of ore. This is uſually grey or whitiſh, but ſometimes it is of various colours, often yellowiſh, and ſometimes ſpotted with iron colour, and an inky black; and often its texture is ſo looſe and ſpongy, that there are holes in it of the ſize proper to receive a pea or a horſe-bean; theſe are ſometimes empty, but more uſually they are filled up either with chalk or with ſpar. Beſide the ſtrata of this ſtone that lie over the ore, there is alſo a large quantity of it placed by its ſide. They have this, and two other ſorts of ſtone, lying in the way to the tin ore in Cornwall. The firſt of the others they call *moor-ſtone*, a very uncertain name, as it is alſo given by ſome to the common white granite of that country; but the miners only mean by it a looſe ſort of free ſtone, ſomewhat ſofter than that uſually employed in building. The other ſtone is called *killos*: this is a grey ſtone of the ſlate kind, eaſily ſplitting into thin plates, and is very full of talcy flakes: this *killos* is, however, a very indeterminate name, as well as the other, for the ſame people ſometimes uſe it alſo to ſignify a white earth common among them; this laſt, however, they ſometimes diſtinguiſhed by the epithet *white*. The word growan ſeems the only name they have kept to any determinate ſignification, for they never expreſs by this word any other ſubſtance than the ſtone above deſcribed.

GROWERS, in *Agriculture*, a term provincially applied to farmers.

GROWING, in *Sea Language*, denotes the direction of the cable from the ſhip toward the anchors: thus, the cable *grows* on the ſtarboard bow, when it ſtretches out forward on the ſtarboard or right ſide.

GROWME, in our *Old Writers*, an engine to ſtretch woollen cloth after it is woven; it is mentioned in the ſtatute 43 Edw. III. cap. 10.

GROWTH HALFPENNY, a rate ſo called, and paid in ſome places for the tithe of every fat ox or other unfruitful cattle.

GRUAPET, in *Geography*, a town of Hindooſtan, in the Carnatic; 15 miles N.N.W. of Bomrauzapollam.

GRUARII, in our *Old Writers*, the principal officers of the foreſt in general. The word comes from the old French *gruyer*, which ſignifies the ſame.

GRUB, the Engliſh name of the hexapode worms or maggots hatched from the eggs of beetles. (See SCARABÆUS.) Grubs are an excellent bait for many kinds of fiſh. In angling for the grayling, the aſh-grub is to be preferred to all others. This is plump, milk white, but round from head to tail, and has a red head. There is alſo another grub, which is very common, and is longer and ſlenderer than the aſh-grub; it is yellower and tougher, and is known by having a red head, and two rows of legs all along the belly. The trout and grayling uſually frequent the ſame places, and it is not uncommon to take the trout, while fiſhing for the other. Theſe grubs are to be kept in bran, in which they will grow tougher than they were at firſt; but the aſh-grub is always ſo tender, that it is difficult to make a good bait of it. The beſt method is to wrap it in a piece of ſtiff hair with the arming, leaving it ſtanding out about a ſtraw's breadth at the head of the hook, ſo as to keep the grub from totally ſlipping off when baited: the horſe-hair that the hook is faſtened to ſhould be as white as poſſible, that it may reſemble the colour of the bait, and not be ſuſpected.

GRUB, in *Agriculture*, the name of a large maggot produced from the *ova* of a certain ſpecies of inſect; and which is of a large ſize, and frequently does great injury to grain crops, by undermining and feeding upon the roots of the plants. It is a ſort of beetle, which by ſome is denominated the rook-worm, in conſequence of the rooks being extremely fond of it. Such ground as has been newly brought into cultivation is in common the moſt ſubject to this inſect. It is probable that the beſt mode of deſtroying grubs, is by good and frequent ploughing, rolling, and the uſe of lime in pretty large proportions in its more cauſtic ſtate, which generally clears the land for ſeveral years, however it may be infeſted with this ſort of grub.

In the Farmer's Magazine it is ſtated, that there is a ſort of grubs "met with in wet ſituations every year, in greater or ſmaller numbers, in proportion to the heat or cold of the preceding ſeaſon. While the inſect remains in the egg ſtate, no inclemency of weather can hurt it; a fact, of which laſt year, it is ſaid, affords a convincing proof; for, notwithſtanding the ſeverity of the winter 1799, and the coldneſs and inclemency of the following ſpring, immenſe numbers were produced, which, by their ravages upon the oat crop, contributed not a little to increaſe the public diſtreſs. While in the grub ſtate, it is likewiſe invulnerable; and the fly produced is equally hardy. The only ſtage of its exiſtence, in which it appears ſuſceptible of injury, is, it is ſuppoſed, in paſſing from the grub to the aurelia ſtate, when rains and cold weather are fatal to it; and as, in ordinary years, that change takes place about the end of May, or beginning of June, a period at which rain commonly falls in conſiderable quantity, nearly the whole race periſh every year, except ſuch as have taken up their reſidence in the ſoft dry mole hills that are met with in meadows, or in the ſides of ditches; for, upon all the arable lands, it is believed, very few remain to propagate the ſpecies, unleſs in ſeaſons when the weather is uncommonly dry during the whole of the period they remain in the aurelia ſtate, as was the caſe in 1798. A part of May, and the whole of June, paſſed over with very little rain; in that way, a great proportion of the eggs, depoſited in the arable lands, ſurvived, and became grubs."

But "in tracing the hiſtory of an inſect ſo very deſtructive, and which, were every ſeaſon alike favourable to its production, would ſoon render the world a deſart, we are ſtruck with the circumſtance of its being ſo readily deſtroyed by moiſture, at the time when the rains, to it ſo fatal, are ſo highly neceſſary and uſeful to the crops."

However, "this grub is not the only one by which the crops are injured. There are ſeveral others, pretty numerous, and equally deſtructive, produced in dry ſoils, and in all ſeaſons: theſe, like that already noticed, reſiſt every injury of the weather throughout the year, and in every ſtage of their exiſtence, except when they are in the aurelia ſtate, when cold and moiſt weather kills them. The whole of the grubs bred upon dry lands are of the moth tribe. One of the moſt deſtructive of theſe comes into exiſtence, if the autumn has been very warm, about the end of October, and continues to increaſe in ſize, as long as any tolerable degree of vegetation is going on; after which, owing evidently to the want of food, it remains ſtationary till the following ſpring; at an early period of which, its depredations are obſerved. About the end of February it begins to grow, and continues increaſing in ſize till the beginning of May, when it is upwards of an inch in length, and about one-third of an inch in circumference. It is then exceedingly deſtructive, and eats through the roots of the ſtrongeſt ſtalks of grain in a very ſhort time." The writer "this year took one of them, and put it into the earth, which conſiſted of ſoft black loam, at the root of a plant of oats that had ſent out thirty-ſeven offſets, and had been well earthed up. The grub was put in about mid-day, and well covered up. The plant was examined next day about the ſame hour; when the leaves were found hanging down, ſeemingly in a dying ſtate. Upon looking at the root, he found not only the main ſtem, but the whole of the offſets, ſo much injured, that there appeared little hopes of their recovery. Accordingly, in a few days thereafter, they were all dead." He ſtates, in addition, that, "in ſeaſons when they are numerous,

rous, the miſchief they occaſion is certainly very great: fortunately, however, nearly the whole race periſh every year; and the ſtock is kept up from the eggs depoſited in the ſides of ditches, in plantations, and amongſt coarſe-fogged herbage, which preſerve the aurelia from being injured by moiſture. In deſcribing an inſect ſo very deſtructive, it would afford him great ſatisfaction to be able to point out a remedy for the evil; of that, however, he confeſſes himſelf in a great meaſure ignorant. Lime, in the act of ſlacking, is certainly fatal, not only to the grub, but to inſects of every deſcription, which come within the reach of its influence. But, though it is thus baneful in a hot active ſtate (a circumſtance that well deſerves the attention of all farmers), he does not find it equally ſo, after it has re-abſorbed a proportion of carbonic acid, ſufficient to reduce it to a powder. It is certain that grubs are leſs numerous in fields that have been recently limed, than in lands of the ſame quality, to which no lime has been applied. Still, however, they live in ſuch ſoils, and propagate their kind; and he is inclined to think, that after the lime has completely ſaturated itſelf with fixed air, and got into a mild ſtate, the vermin will thrive equally well in ſuch fields, as if no lime had been applied. One mode of prevention certainly is in the power of every farmer, namely, that of keeping the tops of ditches and hedge ſides clean and free from that rough noxious herbage with which they are for the moſt part covered, and which, along with their ſerving as a nurſery for grubs, and many other kinds of vermin, are a fruitful ſource of miſchief, from the numerous weeds yearly produced upon them, the ſeeds of which are wafted into the adjoining fields by the winds, and, in ſpite of fallowing, and every other attention that can be paid, furniſh a freſh ſtock annually, by which the ſoil is conſtantly kept in a dirty ſtate, and much labour and expence incurred, that might, with a ſmall degree of attention, be avoided."

Notwithſtanding theſe judicious obſervations, there ſtill remains much to be done, in order to perfect our knowledge of the nature and modes of deſtroying theſe very deſtructive and miſchievous grubs.

GRUB, in *Rural Economy*, a term ſignifying to dig up by the roots, as in the caſe of trees, &c.

Grub *of the box*, or *box-puceron*, in *Natural Hiſtory*, a name given to a ſort of inſect approaching to the nature of the puceron of the elder and other trees, but differing from that animal in ſome eſſential characters, and being more properly of the ſame genus with the fig-inſect or falſe puceron. Reaumur's Hiſt. Inſ. vol. vi. p. 100. See Fig-*inſect*.

Theſe inſects change their ſkin ſeveral times, in the manner of the pucerons, and they change their colour at the ſame time. They are at firſt reddiſh, but they are then extremely ſmall; after this they throw off a ſkin and become yellowiſh; after this they are of a deeper yellow, ſpotted with black; and finally, when at their full growth, they are greeniſh, and have black antennæ. The exuviæ which theſe creatures leave behind them, have often a grain of the excrement remaining fixed to them.

Mr. Reaumur, who took great pains to know the hiſtory of theſe minute animals, found that they finally became flies of a peculiar kind, reſembling thoſe of the fig-inſect; they hopped in the manner of graſshoppers, but only a little way at a time, and he was able to diſcover the parts peculiar to the male and female ſex, in the different individuals, but never could find any eggs or embryo-animals in the latter.

Grub, *Vine*, in the *Hiſtory of Inſects*. See Vine.

Grub-*felling*, in *Rural Economy*, a term applied to the method of felling trees by means of grubbing them up by the roots.

GRUBBIA, in *Botany*, ſo named by Bergius, Pl. Cap. 90, in compliment to his friend Michael Grubb, a director of the Swediſh Eaſt India company, and member of the Academy of Stockholm, who furniſhed him with his whole collection of Cape plants. Juſſieu conſiders it as very nearly, if not entirely, the ſame genus with *Empetrum*. However that may be, it is certainly the very ſame plant as the *Ophira ſtricta* of Linnæus, to which we refer the reader.

GRUBBING, in *Agriculture*, the work of extirpating and clearing land from trees, roots, ſtumps, ſtones, buſhes, ſhrubs, &c. It has long ſince been noticed by Worlidge, that the beſt and cheapeſt mode of grubbing up thorns, broom, gorſe, &c, is adviſed by Platt, and is that of wrenching them up by means of a ſtrong lever all at once. The tool recommended for this purpoſe has much the reſemblance of a three-pronged ſtrong fork, but conſiderably larger and ſtronger in every way, ſo as to ſuit the ſtrength of the objects it has to contend with. The handle conſtitutes the lever. In working, it is placed about half a foot from the root of the trees, &c., which it is to raiſe, and driven to a good depth by means of a good hedging-beetle; then the root is raiſed by placing ſomething as a fulcrum, and forcing down the handle by fixing a rope or other ſimilar ſubſtance to the end of it. In this way the root or buſh is at once wrenched up. See *Clearing of* Land.

Grubbing *a cock*, a term uſed by cock-fighters, for the cutting off the feathers under the wings. It is a thing not allowed by cockpit-law, nor to cut off his feathers in any handling place.

Grubbing *Mattock*, the name of a tool of the pick kind, with two broad cutting ends, formed in different directions.

GRUBE, Herman, in *Biography*, was born at Lubec, in October, 1637, his father exerciſed the trade of a ſhoemaker. He qualified himſelf to attend ſome young gentlemen in the quality of tutor, in their ſtudies at Lubec and Kiel, and applied himſelf zealouſly to medicine, while he ſuperintended the progreſs of his pupils. He was made maſter of arts at Jena in 1663, and being afterwards at Leyden, the profeſſors, in conſideration of his inability to pay the expences of his promotion, and his acknowledged merit, conferred the degree of M. D. upon him gratuitouſly. After this honourable advancement he ſettled in Denmark, where he died in February, 1698. He left the following works: 1. "Analyſis mali citrei compendioſa," Copenhagen, 1668.—2. "Commentarius de modo ſimplicium Medicamentorum Facultates cognoſcendi," 1669.—3. "De arcanis Medicorum non arcanis commentatio," 1673.—4. "De tranſplantatione Morborum analyſis nova," Amſt. 1674.—5. "De ictu Tarantulæ, et vi Muſices in ejus curatione," Frankfort, 1679. Eloy. Dict.

Grube, in *Geography*, a town of the duchy of Holſtein; 12 miles N. N. E. of Ciſmar.

GRUBEN, a town of Sileſia, in the principality of Neiſſe; 8 miles S. E. of Grockau.

GRUBENHAGEN, a town and caſtle of Weſtphalia, ſituated on a mountain in a principality of the ſame name; 6 miles N. W. of Nordheim.

Grubenhagen, a principality of Weſtphalia, formerly belonging to the electorate of Hanover, containing ſome fertile land, but for the moſt part mountainous and woody. The inhabitants raiſe a great number of horned cattle and ſheep, cultivate flax, and carry on ſome linen manufactures, but their principal wealth conſiſts in wood; the foreſts, particularly that of Hartz, abounding in oak, beech, firs, elms, &c. Here are alſo quarries of ſlate, limeſtone, marble, alabaſter, and various ſorts of jaſper; ſalt-ſprings, mines of ſulphur, calamine, and ſome mines of gold; alſo rich mines of ſilver, copper, iron, and lead. The rivers of this country are the Leine, the Ruhme, the Soſe, and the Ocker. The inhabitants are Lutherans. The capital is Eimbeck.

GRUDACK, a town of Auſtrian Poland, in Galicia; 28 miles S. W. of Lemberg.

GRUDECK, a town of Poland, in the palatinate of Podolia; 32 miles W. of Kaminiec.—Alſo, a town of Poland, in the palatinate of Braclaw; 28 miles E. of Braclaw.—Alſo, a town of Poland, in the palatinate of Kiev; 50 miles W. N. W. of Bialacerkiev.

GRUDGINGS, in *Agriculture*, a term applied provincially to pollard or bran of a fine kind.

GRUDOLO, La, in *Geography*, a town of Naples, in Abruzzo Citra; 14 miles S. E. of Salmona.

GRUDZEA, a town of Pruſſia, in the palatinate of Culm, on the Viſtula; 12 miles N. of Culm.

GRUES, in *Ornithology*. See Grus.

GRUINA, the *crane-fly*, a name given by ſome authors to the *tipula*, or father-long-legs, from its legs being like thoſe of a crane. See Crane-*fly*.

GRUINALES, in *Botany*, from *Grus* or *Gruis*, a Crane, a natural order of plants, the 14th of Linnæus's *Fragmenta*, which includes *Geranium* and its allies, along with *Linum*, *Aldrovanda*, *Droſera*, and ſeveral genera related to it, *Guaicum*, *Quaſſia*, *Zygophyllum*, *Fagonia*, *Tribulus*, and *Averrhoa*, certainly all together an unnatural aſſemblage, notwithſtanding the ingenious train of reaſoning offered by Linnæus in his *Prælectiones*, p. 320—325, for bringing them together. It may be doubted nevertheleſs whether Juſſieu has been more fortunate in the places he has choſen, for *Droſera* and *Averrhoa* at leaſt; though in founding his order of *Rutaceæ*, an order but imperfectly known to himſelf, he has led the way to further improvement reſpecting moſt of the other genera.

GRULICH, in *Geography*, a town of Bohemia, in the circle of Konigingratz; 10 miles E. of Geyerſberg.

GRULING, Philip, in *Biography*, was a native of Stolberg, in Thuringia, a magiſtrate of that place, and phyſician to the count. He was a laborious man, and cultivated medicine from a taſte for the ſcience; and he took pleaſure in communicating the reſults of his ſtudies to the public. He died at his native place in the year 1667, at the age of 74. He left ſeveral publications on medical ſubjects, which were collected together, and reprinted at Leipſic, in 1680, under the title of "Opera Omnia." Eloy. Dict. Hiſt.

GRUMBACH, in *Geography*, a town of France, in the department of the Sarre, and chief place of a canton, in the diſtrict of Birkenfeld. The place contains 1061, and the canton 5892 inhabitants, in 38 communes.

GRUMBERG, a town of Moravia, in the circle of Olmutz; 6 miles N. of Hohenſtadt.

GRUME, Grumus, in *Medicine*, &c. a little maſs or lump of blood, milk, or other fluid, which is coagulated, thickened, hardened, &c.

Phthiſical people frequently ſpit up *grumes*, i. e. clots of blood.

Grumes of milk are what we popularly call *curds*.

GRUMAGNA, in *Geography*, a ſmall iſland in the gulf of Venice. N. lat. 44° 9′. E. long. 15° 18′.

GRUMOSE Roots, are thoſe which are compoſed of ſeveral ſmall knobs; ſuch are thoſe of the anemones, and of the little celandine.

GRUMOUS Blood, denotes that ſtate, or conſiſtence, of the blood, wherein it is too viſcid and thick, for a due, briſk circulation; the effects whereof are, that it ſtagnates in the capillary veſſels, and produces divers diſeaſes.

GRUNBERG, in *Geography*, a town of Germany, in the principality of Upper Heſſe; 10 miles E. of Gieſſen. N. lat. 50° 35′. E. long. 8° 58′.—Alſo, a town of Sileſia, in the principality of Glogau, ſurrounded with vineyards, and containing two churches. It has a manufacture of cloth; 20 miles N. of Sagan. N. lat. 51° 58′. E. long. 15° 35′.

GRUND, a town of Weſtphalia, ſituated in the Hartz foreſt; 12 miles S. W. of Goſlar.

GRUNDEL, or Grundling, *Grundulus*, in *Ichthyology*, a name uſed by ſome for the common loach, or loche, a ſmall freſh-water fiſh, known among writers by the names of *cobitis* and *fundulus*. See Cobitis *Barbatula*.

GRUNDLING, a name given alſo by the Germans to the *gobio fluviatilis*, or common gudgeon. See Cyprinus *Gobio*.

GRUNDSUND, in *Geography*, a town of Sweden, in Angermanland; 64 miles N. N. E. of Hernoſand.

GRUNEBERG, a town of Germany, in the New Mark of Brandenburg; 20 miles N. N. W. of Cuſtrin.

GRUNHAGEN, a town of Pruſſia, in Oberland; 6 miles S. of Holland.

GRUNHAYN, a town of Saxony, in the circle of Erzgeburg; 46 miles W. S. W. of Dreſden. N. lat. 50° 32′. E. long. 12° 45′.

GRUNIE, one of the ſmaller Shetland iſlands, in the cluſter called Out-ſkerries. N. lat. 60° 42′. W. long. 0° 44′.—Alſo, one of the ſmaller Shetland iſlands, S. of Unſt. N. lat. 61° 2′. W. long. 1° 8′.

Grunie *Half*, one of the ſmaller Shetland iſlands, S. of Unſt. N. lat. 61° 3′. W. long. 1° 5′.

GRUNINGEN, or Groningen, a town of Switzerland, and capital of a bailiwick, in the canton of Zuric; 12 miles S. E. of Zuric.—Alſo, a town of Weſtphalia, in the principality of Halberſtadt, on the river Boden; 15 miles E. of Halberſtadt. N. lat. 51° 55′. E. long. 11° 27.

GRUNNIENS Piscis, the *grunting fiſh*, the name of a fiſh caught in many parts of the Eaſt Indian ſeas, and called by the Dutch there *knorre-pot*. It ſeems of the gurnet or gurnard kind, and nearly related to the guabi-coara of the Braſilians. When it is firſt taken out of the water, it makes a remarkable *grunting-noiſe*. It has two ſide-lines on each ſide, running from the gills to the tail; the one of which is brown, and the other yellow; it is covered with very ſmall ſcales, and is a very fat and fleſhy fiſh; it grows to about ſix or ſeven inches long, and its head is large and ill-ſhaped; it is a very well taſted fiſh.

GRUNSTADT, in *Geography*, a town of France, in the department of Mont-Tonnerre, and chief place of a canton, in the diſtrict of Spire; 22 miles N.N.W. of Spire. It has three churches for Catholics, Lutherans, and Calviniſts. The place contains 2294, and the canton 14,727 inhabitants, in 29 communes. N. lat. 49° 32′. E. long. 8° 7′.

GRUNTHAL, a town of Saxony, in the circle of Erzgeburg; 17 miles S. of Freyberg.—Alſo, a town of Sileſia, in the principality of Breſlau; 4 miles N.N.E. of Newmarkt.

GRUNTTA, a town of Pruſſia, in the palatinate of Culm; 17 miles N.E. of Culm.

GRUPELLO, a town of Italy, in the department of the Gogna; 7 miles W. of Pavia.

GRUPPO, or Shake, in *Muſic*, was introduced into England by a gentleman who learned it of the famous Scipione del Palla, in Italy. It conſiſts in the alternate prolation of two tones in juxta-poſition to each other, with a cloſe on the note immediately beneath the lower of them. This is the chief grace both in vocal and inſtrumental performances.

GRUS, in *Antiquity*, a dance performed yearly by the young Athenians, around the temple of Apollo, on the day of the Delia.

The motions and figures of this dance were very intricate, and variouſly interwoven; ſome of them being intended to expreſs the windings of the labyrinth wherein the Minotaur was killed by Theſeus.

GRUS, in *Aſtronomy*, a ſouthern conſtellation, not viſible in our latitude. The number of ſtars in this conſtellation, according to Mr. Sharp's Catalogue, is 13. See CONSTELLATION.

GRUS, in *Ornithology*, a family of the Ardea or Heron genus; the grues of Buffon, and cranes of Engliſh authors.

Briſſon places the grues with the ſtorks, theſe collateral tribes forming, in the opinion of that naturaliſt, a genus diſtinct from the herons. The grues of ſome other continental authors differ from the ſtorks, their characteriſtic diſtinction being taken from the form of the feet, the true grues having only the middle and outer toe connected by a membrane, while in the ſtorks, the three anterior toes are united by a common membrane. The grues agree, in the ſtructure of the feet, with the heron, and differs in the internal conformation of the body; the grues having a double cœcum, the herons only one; the former are alſo larger, and rather diſſimilar in their manners of life. Some writers confine the term grues entirely to the cranes, a tribe known, according to Gmelin, by the baldneſs of the head; others adopt it in a more general manner, including among the grues the demoiſelle, or Numidian crane, and alſo the crowned or Pavonian heron, in both which the head is creſted. See HERON.

Species.

VIRGO. Behind each eye a tuft of long white pendent feathers. *Ardea virgo,* Linn. *La grue de Numidie, ou demoiſelle,* Briſſ. *Numidian crane,* Albin. *Demoiſelle of Numidia,* Edwards.

A large ſpecies, being about three feet three inches in length; the bill ſtraight, yellowiſh, with the baſe green, and tip red; irides crimſon; head, and primary quill-feathers black; feathers of the breaſt long and pendulous; creſt over the eyes turned back, and pendulous; body blueiſh-aſh; crown cinereous; head, neck, throat, breaſt, and legs black. This beautiful bird is found in Africa and Aſia, and is frequently kept in European menageries, being of a docile diſpoſition, and ſo eaſily inured to our climates and the rigours of confinement as to breed in that ſtate of captivity. Its natural food is fiſh, worms, inſects, and the ſmaller kinds of reptiles.

PAVONIA. Creſt briſtly, erect; temples with two naked wattles. *Ardea Pavonia,* Linn. *L'oiſeau Royal,* Briſſ. *Balearic crane,* Ray. *Crowned African crane,* Edwards. *Crowned heron,* Lath.

The ſize of this ſpecies is equal to that of the common heron; the bill two inches and a half long, ſtraight and browniſh; irides grey. Crown covered with ſhort, ſilky, black feathers; creſt yellowiſh, tipped with black, and globular; the ſides of the head bare of feathers, reddiſh, and kidney-ſhaped; and on each ſide of the throat a wattle of the ſame colour; the plumage generally blueiſh-aſh; wing-coverts white, the greater ones reddiſh, thoſe next the body blackiſh; tail and greater quill-feathers black; and the legs duſky. Thoſe parts of the female which are cinereous blue, in the male are black; in the former the wattles are wanting, and the long feathers on the breaſt leſs conſpicuous. This elegant bird inhabits Africa, and is often kept in our menageries; in its native ſtate, worms, reptiles, and vegetables conſtitute its chief food; it runs and flies well, and often ſleeps on one leg. The fleſh is ſaid to be very tough.

CANADENSIS. Forehead naked and papillous; body cinereous; wings teſtaceous on the outſide. *Ardea Canadenſis,* Linn.. *La grue de la baye d'Hudſon,* Briſſ. *Blue crane,* Phil. Tranſ. *Brown and aſh-coloured crane,* Edwards. *Brown crane,* Lath.

Length three feet three inches; the bill three inches and three quarters long, and duſky, with the tip of the upper mandible fleſh-coloured; naked part of the head red; back, wings, and ſcapulars reddiſh; greater quill-feathers dark brown; legs black.

Inhabits North America, is of the migratory kind, and feeds on corn and inſects. The fleſh is in ſome eſteem. A ſuppoſed variety is deſcribed of a cinereous colour, with the greater quill-feathers black.

GRUS. Hind-head papillous; cap and quill-feathers black; body cinereous; innermoſt tail-feather jagged. *Ardea grus,* Linn. &c. *La grue,* Briſſ. *Crane,* Ray, &c.

The crane is a bird of conſiderable ſize, often weighing ten pounds, and being in length above five feet: the bill is almoſt four inches and a quarter long, the colour greeniſh-black; the forehead to the middle of the crown covered with black down or hair, the hind part of the head bare and red, with a few ſcattered hairs on the nape, and below this a bare aſh-coloured ſpace; temples and upper parts of the neck white; general colour of the plumage grey; the legs black.

This ſpecies inhabits various parts of Europe and Aſia, migrating in autumn towards the ſouth, and in the winter viſiting the northern regions, ſometimes even as far as Britain. It flies in vaſt flocks, and frequently ſo high as to be ſcarcely viſible. Its food conſiſts of reptiles and fiſhes, and the green corn among the latter of which it is ſaid to make great havock. A variety, the colour of which is white, with the lower part of the neck and quill-feathers black, is deſcribed as a native of Japan.

AMERICANA. Crown, nape, and naked temples papillous; front, nape, and primary quill-feathers black; body white. *Ardea Americana,* Linn., &c. *La grue d'Amerique,* Briſſ. *La grue blanche,* Buff. *Hooping crane,* Cateſby.

Native of North America; the length four feet ſix inches; bill yellowiſh, and ſerrated at the tip; crown red, covered with black hair, head beneath as far as the lower jaw red; legs black. The ſpecies inhabits marſhes, and feeds on worms and inſects.

ANTIGONE. Naked; head and papillous collar red; body cinereous; primary quill-feathers black. Linn. *La grue des Indes Orientales,* Briſſ. *Greater Indian crane;* Edwards.

A larger bird than the common crane. The bill greeniſh yellow, with duſky tip; irides reddiſh hazel; crown of the head and ſpot behind the eyes white; the quills black; ſecondaries and tail aſh-colour; legs red, with white claws. Inhabits India and the adjacent parts of Ruſſia, to the weſtern extremity of the Gobean plains. A variety of this ſpecies, rather leſs in ſize, is found in the Eaſt Indies, the body of which is blueiſh-aſh; the bill and tail black, and the legs duſky. Another kind, recently diſcovered in New South Wales, has the bill and lower part of the head yellow, the reſt of the head naked and red; throat covered with black hairs; plumage in general pale blue; wings and tail black, legs blackiſh.

Leucogeranos. White, temples and front naked, red, and wrinkled; the firſt ten quill-feathers ſhining black, bill and legs red. Pallas Travels. *Ardea gigantea*, Lath. *Siberian crane.*

The length of this bird is about four feet ſix inches; the bill like that of the crane, but larger, red, with the mandibles ſerrated near the tip; irides pale whitiſh; tail with twelve nearly equal feathers. The plumage ſnowy white, except the quill-feathers and coverts.

This ſpecies inhabits the vaſt marſhes of Siberia; feeds on reptiles, worms, and fiſhes; and builds its neſt upon riſing graſſy tufts, in the moſt inacceſſible places. The neſt is compoſed of herbs and graſs; the eggs are two in number, the ſize of thoſe of a gooſe, of an aſh-colour, and ſpotted with brown. It is of a ſhy diſpoſition, and aſſociates in large flocks, each of which has a centinel conſtantly on the watch, to apprize their companions of the approach of danger. The Ruſſians know this bird by the name of *Sterchi.*

Grus *Balearica*. See Grues and Pavonina.

GRUSUE, in *Geography*, a town of Norway, in the dioceſe of Aggerhuus, on the Glanmen; ſix miles N. of Berga.

GRUTER, John, in *Biography*, an eminent philologiſt, was born at Antwerp in 1560. His father, who was burgomaſter there, was obliged, in the troubles of his country, to take refuge in England. He was educated by his mother, who was a very excellent ſcholar, and was miſtreſs of many of the modern, as well as the ancient languages. He ſtudied ſome years at Cambridge, and thence he went to Leyden, where he attached himſelf ſolely to polite literature, and at a very early age he publiſhed works on criticiſm. After travelling very much he became profeſſor in the univerſity of Heidelberg, and had the direction of its famous library. At the ſack of this city, in 1622, he ſuffered the loſs of his own library worth 12,000 crowns, together with moſt of his other property. When the affairs of the palatinate were ſomewhat ſettled, he took a country-houſe near Heidelberg, where he died in 1627, having upon his death-bed received an invitation to the Greek and hiſtory profeſſorſhip at Groningen. He wrote many works, of which the moſt conſiderable are; 1. "A Collection of ancient Inſcriptions;" 2. "Theſaurus Criticus;" 3. "Deliciæ poetarum Gallorum, Italorum, et Belgarum," &c.

GRUTLIN, in *Geography*, a plain of Switzerland, near the lake of the four cantons, in the canton of Uri, celebrated as the place where the three firſt cantons made a league for the defence of their liberty, in the year 1307.

GRUYERES, a bailiwick of the canton of Friburgh in Switzerland. The cheeſe, well known under the name of Gruyeres, which is exported in large quantities, is made on a chain of mountains about 10 leagues in length and four in breadth, extending from the bailliage of Schwartzenburgh to the diſtricts of Vevay and Aigle, in the canton of Bern. The whole diſtrict is divided into greater or leſſer farms, let out by the proprietors on leaſes of three or ſix years, at a certain annual rate during five months for each cow, according to the nature or elevation of the ground. Each farmer, having rented a mountain, hires from the different peaſants in the cantons from 40 to 60 cows from May 15th, to October 8th; each cow yields at an average daily from 20 to 24 quarts of milk, and ſupplies 200lbs. of cheeſe during the five months. The cows are then reſtored to the different proprietors. As the mountains in the canton of Friburgh afford paſture for at leaſt 15,000 cows, it may be eſtimated that they annually ſupply about 30,000 hundred weight of cheeſe fit for exportation; beſides 2000 or 3000 after their return from the mountains, excluſive of a thinner ſort, made in various parts of the canton. The cheeſes fit for exportation weigh from 40 to 60 pounds each, and are ſold from 1*l*. 17*s*. to 2*l* per cwt. Theſe cheeſes are exported in caſks containing 10 of them. Thus packed they will bear being tranſported into the moſt diſtant countries; but they ſhould be kept in a damp place, and frequently waſhed with white wine, to preſerve them from inſects. Gruyeres is 15 miles S. of Friburgh. N. lat. 46° 36′. E. long. 6° 53′.

GRY, a meaſure containing one-tenth of a line.

A line is one tenth of a digit, and a digit one-tenth of a foot, and a philoſophical foot one-third of a pendulum, whoſe diadromes, or vibrations, in the latitude of forty-five degrees, are each equal to one ſecond of time, or one ſixtieth of a minute.

GRYGALLUS, in *Ornithology*. See Grouse.

GRYHITTE, in *Geography*, a town of Sweden, in Weſtmanland; 58 miles W.N.W. of Stroemſholm.

GRYLLE. See Colymbus *Grylle.*

GRYLLOTALPA, in *Entomology*. See Gryllus.

GRYLLUS, the name of an extenſive genus of the Hemiptera order in the Linnæan ſyſtem; a genus of Ulonata in that of Fabricius, and one of the Orthoptera of Lamarck and other late writers.

The Linnæan character of the gryllus tribe conſiſts in having the head inflected, and armed with jaws; feelers filiform; antennæ ſetaceous or filiform; wings four, deflected and convoluted, the lower ones plaited; poſterior legs formed for leaping, and the claws double on all the feet.

This diffuſe and very general character includes ſeveral diſtinct families, and ſome of theſe ſo exceedingly diſſimilar, that Linnæus was conſtrained to divide his grylli into no leſs than five ſections or ſubdiviſions for their reception; theſe are his acridiæ, bullæ, achetæ, tettigoniæ, and locuſtæ, the characters aſſigned reſpectively to each of which are as follow.—The *acridiæ* have the head conic, and longer than the thorax; and the antennæ enſiform or ſomewhat reſembling a ſword.—The *bullæ* are diſtinguiſhed by a kind of creſt or elevation on the thorax, and the ſize as well as ſtructure of the antennæ, which are ſhorter than the thorax, and filiform.—The *achetæ* are thoſe furniſhed with two briſtles above the extremity of the abdomen.—*Tettigoniæ*, in which the extremity of the abdomen in the females are diſtinguiſhed by a kind of tube, through which they depoſit their eggs in the ground; the antennæ in both ſexes ſetaceous.—*Locuſtæ* have the tail ſimple or without briſtles, as in the achetæ, or the tube that terminates the tail of the females in the tettigoniæ; the antennæ in this family are filiform.

Geoffroy conſiders moſt of theſe families as generically diſtinct, and accordingly ſeparates them. The achetæ of Linnæus he retains under the name of gryllus, adding at the ſame time to the Linnæan character that they have three ſtemmata, (or little eyes on the back of the head,) and that the feet conſiſt of three articulations. The Linnæan locuſtæ are the acrydiæ of Geoffroy, with the additional obſervation, that the antennæ are one-half ſhorter than the abdomen, the ſtemmata three in number, and the joints of the feet alſo three, as in the preceding. The *locuſtæ* of Geoffroy are the tettigoniæ of Linnæus, or at leaſt thoſe which have the antennæ filiform and longer than the abdomen; and the feet containing

containing four joints. This ſubdiviſion of the Linnæan grylli is adhered to by Schæffer without material variation.

In the Fabrician claſſification, the Linnæan grylli are divided into five genera, nearly after the example of Geoffroy. The diſtinctions of his genera are however different, theſe being conſtructed according to his manner from the ſtructure of the feelers, lip, and antennæ. Thus his genus *acrydium* has the feelers equal and filiform; the lip ovate with the tip ſplit; and the antennæ filiform. *Acheta*, feelers unequal and filiform; lip quadrifid, the lateral pieces dilated and rounded, and the antennæ ſetaceous. *Locuſta*, feelers unequal and filiform; jaws three-toothed at the tip; lip bifid, the projections ſubulate briſtles, and the antennæ filiform. *Gryllus*, feelers equal and filiform. Beſides the above, Fabricius forms a new genus under the name of *truxalis*, conſiſting of thoſe which have the feelers filiform; the lip bifid, with the projections equal, and the antennæ enſiform. Thunberg previouſly to the publication of the Fabrician Ent. Syſt. inſtituted another genus under the name of *Pneumora*, but theſe Fabricius rather inconſiderately incorporates in the laſt-mentioned work, as appertaining to the grylli of his ſyſtem; we however agree with Thunberg, and with Gmelin, the latter of whom introduces it as a diſtinct genus between the blattæ and mantes, in his edition of the Linnæan Syſtema Naturæ.

Latreille forms three diſtinct families of the grylli as comprehended under the Linnæan term, and which he denominates grylliæ, locuſtariæ, and acrydiana. The grylliæ are divided into three genera, tridactylus, gryllotalpa, and gryllus. The locuſtariæ contains only the locuſta genus. And the acrydiana four genera; namely, pneumora, truxalis, acrydium, and tetrix.

Hence it will appear that in the progreſſive advancement of natural ſcience ſince the time of Linnæus, the inſects which that naturaliſt deſigned to unite in one genus have been gradually ſeparated into five, ſix, and laſtly into eight ſeveral genera. It muſt however be recollected, that the number of ſpecies known to Linnæus was comparatively ſmall, not amounting altogether to one-tenth portion of thoſe deſcribed by Fabricius and other late authors. The arrangement he propoſed might therefore with ſome propriety be deemed adequate to the diſtribution of the ſpecies known to that author, though it may not be entirely admiſſible at this period. Our knowledge of theſe natural tribes of inſects has been indeed ſo much extended of late years, as to leave reaſon in our own opinion to doubt the propriety, or rather the neceſſity of adopting ſeveral of the genera recently eſtabliſhed, with ſome degree of modification. Theſe, to avoid a ſomewhat unneceſſary diſtribution of the articles, we propoſe to conſider under one general term, and none appears more applicable to the purpoſe than that of gryllus, the extenſive acceptation of which is generally underſtood by every ſtudent in entomology.

Moſt of the grylli feed on vegetables, except thoſe of the tribe truxalis, which prey on other inſects. In the larva and pupa ſtate they nearly reſemble the perfect inſect; the larvæ differing only in being entirely deſtitute of wings and wing-caſes; and the pupæ in poſſeſſing merely the rudiments of thoſe members; they are active and voracious, and ſubſiſt, as in the adult ſtate, on vegetables.

Genus ACHETA.

Antennæ ſetaceous, and compoſed of many joints; feelers unequal and filiform; lip four-cleft; head ſmall; thorax rounded; no ſcutel; body thick and cylindrical, the tail with two briſtles; legs ſhort and thick; the anterior feet generally formed for digging.

GRYLLOTALPA. Wings tailed, and longer than the abdomen; anterior feet palmated. Linn. *Mole-cricket*, Donov. Brit. Inſ. &c.

Inhabits gardens, where it burrows under the ſurface of the ground like the mole, and occaſions conſiderable miſchief by gnawing and devouring the roots of plants. The length is about three inches; the body livid brown, and hairy; wing-caſes ſhort and reticulated. This kind inhabits Europe; an apparent variety of the ſame is found in America.

MONSTROSA. Wing-caſes and wings terminated in a convoluted tail. Fabr. Donov. Inſ. India.

Much larger than the foregoing ſpecies, and very ſingular in form; the antennæ are longer than the body; ſhanks ſpinous; feet dilated and divided into lobes.

DOMESTICA. Wings tailed, longer than the wing-caſes; body glaucous. Linn. Degeer, Donov. Brit. Inſ. &c.

The common or domeſtic cricket is an inhabitant of houſes about ovens and kitchen chimneys, preferring theſe ſituations for the ſake of warmth; the preſence of the cricket is eaſily known by its continual chirping, the ſound of which is vulgarly ſuppoſed to be loudeſt before rain. It is very common throughout Europe, and ſeems in many parts to have obtained a kind of indulgent reſpect from the peaſantry, who conſider its reſidence in their houſes as a token of good fortune.

ASSIMILIS. Wings tailed, and longer than the wing-caſes; abdomen with two ſtyles, the tip cleft. Fabr.

Size of the common cricket; the antennæ pale; thorax and head black with a pale edge; wing-caſes rounded, and brown; abdomen black; ſtyles or ſpinous projections filiform, and as long as the abdomen; legs brown. Native of Jamaica.

RETICULATUS. Black; wing-caſes reticulated with rufous; antennæ annulated with white. Fabr.

Inhabits Africa. The antennæ are twice the length of the body, black, with ſeven white rings; head yellowiſh; crown black; thorax black, with a yellow ſpot in the middle; wing-caſes ſhort and obtuſe; abdomen black; ſtyles two, villous, with an aſcending ſpine.

BRASILIENSIS. Wings tailed, and longer than the wing-caſes; body brown, paler on the back; tail aſcending, and as long as the body. Fabr.

The head is brown, paler on the crown; thorax browniſh at the ſides, and pale above; wing-caſes with a lateral black ſpot; abdomen with a yellowiſh projection, brown at the end. Native of South America.

ORIENTALIS. Wings tailed, longer than the wing-caſes, and white; body deep black; head and legs teſtaceous. Fabr.

Native of Tranquebar. Thorax rounded; wings brown at the tip; ſtyles longer than the abdomen; legs ſimple and yellowiſh.

FLAVIPES. Wings tailed green, and longer than the wing-caſes; legs yellowiſh. Fabr.

Inhabits St. Thomas's iſland in America. The head and thorax are yellowiſh; wing-caſes green, with a yellowiſh margin; filaments of the tail as long as the abdomen, black, thick at the tip and bifid.

CAPENSIS. Wings tailed, and longer than the wing-caſes; body black; wing-caſes brown, the baſe yellow. Fabr.

Reſembles the field cricket, and inhabits Africa.

MORIO. Wings tailed, longer than the wing-caſes; white with the tip black; body deep black. Fabr.

Native of Africa. The eyes teſtaceous; wing-caſes rounded at the tip; tail with a long filiform ſpine.

Campestris. Wings ſhorter than the wing-caſes; body blackiſh; ſtyle linear. Linn.

Inhabits Europe, and chirps from the beginning of May till the equinox.

Umbraculata. Black; wing-caſes white at the tip; front covered with an obovate deflected membrane. Linn.

Smaller than the laſt, and inhabits Barbary. Head ferruginous, the deflected membrane black; ſtyles villous; legs black. This ſpecies is deſtitute of wings.

Hospes. Wings tailed, and longer than the wing-caſes, white with a brown rib; wing-caſes white ſpotted with black. Fabr.

Native of America. The antennæ brown, and a little longer than the body; head and thorax black; abdomen black; tail with a ſpinous recurved projection, nearly as long as the body; legs brown; poſterior ſhanks ſpinous at the tip.

Crucis. Wing tailed, and longer than the wing-caſes; body brown; margin of the wing-caſes dotted with black. Fabr.

Inhabits the iſland of Santa Cruz. The head and thorax fuſcous, the margin of the latter yellow; wings whitiſh; antennæ thrice as long as the body.

Guadeloupensis. Wings without tails; body brown; legs pale. Fabr.

Small; thorax marked with a large yellowiſh ſpot; wings and wing-caſes equal; legs yellow; hind claws ſerrated. Inhabits Guadaloupe.

Italica. Head and thorax yellowiſh; wing-caſes aqueous, and as long as the wings. Fabr.

Antennæ longer than the body; eyes black; anterior legs yellowiſh, the poſterior ſpinous, with ſpinous ſhanks. Native of Italy.

Minuta. Thorax rounded and yellowiſh; wings tailed; tail with two briſtles; poſterior ſhanks three-ſpined. Linn.

Inhabits America.

Sylvestris. Apterous, black; wing-caſes vaulted, very ſhort, and cinereous with fuſcous lineations. Fabr.

Thorax pale with the edge blackiſh; abdomen black, with a recurved ſpine longer than the two ſtyles. A ſmall ſpecies found in France.

Fossor. Wing-caſes very ſhort, with the tip deep black; anterior legs palmated. Fabr. App.

Native of the Cape of Good Hope. This ſpecies is ſmall; head and thorax grey and immaculate; wings long, at the baſe white, tip brown; abdomen banded above with black and white, beneath grey; anterior legs ſhort.

Maculata. Wings tailed, rather longer than the wing-caſes, and brown; head and thorax teſtaceous with black ſpots. Fabr. App.

The antennæ are brown; head gibbous and black, the crown teſtaceous, with five black lines; thorax teſtaceous, varied with ſpots and dots of black; wings white; body brown, the tail furniſhed with two briſtles, and without ſtyles. Inhabits the Eaſt Indies.

Aquea. Wing-caſes white and hyaline; wings ſhort; body yellowiſh. Fabr. App.

Inhabits Ruſſia. The body entirely yellowiſh, and immaculate; wing-caſes ovate.

Genus Locusta.

Antennæ ſetaceous, and of many joints; feelers unequal, and filiform jaw tridentated at the tip; lip bifid; head large and ovate; no ſcutel; wing-caſes compreſſed and membranaceous; abdomen elongated and compreſſed, that of the male terminated in four ſhort ſtyles, the female with an enſiform tube; poſterior legs long and formed for leaping; tarſi of four joints.

Species.

Amboinensis. Green; thorax quadrangular, with the angles dentated; ſcutel large, brown-green; wing-caſes leaf-formed, and very broad. Donov. Inſ. India.

A new ſpecies, and in point of ſize one of the moſt conſiderable of its family; the length, from the front of the head to the extremity of the wing-caſes, being about ſeven inches, the legs long, and the antennæ about the ſame length as the body. The individual ſpecimen deſcribed and figured in the above work is at preſent in the magnificent collection of A. M'Leay, eſq. and is probably unique. It was originally received from Amboyna by governor Holford, then reſident in India, and has for that reaſon been generally conſidered as a native of that iſland.

The wing-caſes, and alſo the poſterior part of the thorax, are of a fine and delicate green; the anterior part of the thorax yellowiſh-brown; and the head and body ſtill paler. The wing-caſes, as uſual in this tribe, bear no very diſtant reſemblance to the leaves of certain plants, not only in colour, but alſo in outline, and ſtill more ſo in the conformation of the nerves, which ariſe and branch off towards the extremities, exactly in the ſame manner as the nerves ariſe and ramify from the mid-rib in the far greater number of plants. One peculiarity in the ſtructure of the wing-caſes in this new ſpecies deſerves remark; the ſcutel, or rather that portion of the wing-caſes on the left ſide which folds over the back when at reſt, is of a much ſtronger texture than any other part of the inſect, except the thorax, and ſerves as an external covering or defence to the correſponding lobe of the other wing-caſe, which is of a more delicate nature, conſiſting only of a thin and pellucid membrane, the ſurface of which is hyaline or glaſſy. The wings are remarkably tender, whitiſh, and ſemi-tranſparent. Vide Donov. Ind.

Citrifolia. Thorax nearly quadrangular, the angles crenated. Fabr. *Thorace tetragono angulis ſcabro*, Linn. *Locuſta viridis*, Degeer. *Citron-leaved locuſt*, Donov. Inſ. India.

About half the ſize of the laſt.

Wing-caſes green with reddiſh nerves, and in form reſembling the leaf of a plant; antennæ long. Native of the Spice iſlands.

Laurifolia. Thorax nearly quadrangular and ſmooth; wings lanceolate, and longer than the wing-caſes. Fabr. *Gryllus laurifolius*, Linn. *Locuſta oblongifolia*, Degeer. *Tucurubi*, Marcgr.

Deſcribed by Sloane as a native of Jamaica, and is alſo found in other American iſlands. The wing-caſes are gibbous and green, with reddiſh nerves, and in appearance reſembles a leaf; legs greeniſh.

Myrtifolia. Thorax nearly triangular and ſmooth; wings deflected, and longer than the wing-caſes; ſword very ſhort and recurved. Fabr. Drury.

Native of America, and ſmaller than the preceding; tail of the male with a clavated, forked lamina; ſword of the female very ſhort, and recurved.

Fenestrata. Thorax ſmooth; wing-caſes green, with a tranſparent ocellar ſpot at the baſe; legs ſpinous. Fabr.

Large, and inhabits the Eaſt Indies; the antennæ are very long and brown; head varied with black and brown; thorax green, behind rounded and black; wing-caſes with two ſpots in the middle and three ſmall ocellated ſpots; body greeniſh, with a ſharp tooth on the back.

Camellifolia. Thorax deflected; wing-caſes concave, rounded at the tip, and longer than the wings. Fabr. *Locuſta ſiccifolia*, Degeer.

Middle ſize; head large, greeniſh; thorax of three ſegments, deflected at the ſides, and rounded behind; wing-caſes large and green; wings large and greeniſh; abdomen greeniſh; ſword aſcending, green, with the tip brown; legs green; thighs ſpinous. Native of America.

Oleifolia. Front pointed; thorax ſub-carinated; wing-caſes concave, green, and ſhorter than the wings. Fabr.

Native of Tranquebar. Size moderate; antennæ yellowiſh; body brown.

Thymifolias. Thorax quadrangular and ſmooth; wing-caſes nearly linear, dotted with brown, and ſhorter than the wings. Fabr.

Inhabits New Holland. Thorax greeniſh, with a lateral brown line, and emarginate behind; wings whitiſh, with the tip greeniſh.

Graminifolia. Head pointed; thorax ſquare; wing-caſes filiform, brown and ſhorter than the wings. Fabr.

A ſmall ſpecies, found at the Cape of Good Hope; the antennæ ſhorter than the body; abdomen greeniſh; the ſword ſtraight and green, tipped with brown.

Lilifolia. Thorax ſquare and ſmooth, with two yellow lines; wing-caſes green and ſhorter than the wings. Fabr.

Native of Italy and ſmall; antennæ twice the length of the body; head green; wing-caſes longer than the body; ſword very ſhort, recurved, brown and finely ſerrated each ſide; legs green; ſhanks ſpinous.

Salvifolia. Thorax ſmooth; wing-caſes lanceolate, concave, and green; wings rounded and red. Linn. Tranſ.

Country unknown.

Perspicillata. Thorax deflected; wing-caſes concave and green, with an ocellar dorſal tranſparent ſpot at the baſe. Fabr.

Inhabits America. Head pale; antennæ fuſcous; thorax green; wing-caſes large; legs green and ſpinous.

Serripes. Thorax rounded and green; wing-caſes and wings equal; fore-legs very ſpinous. Fabr.

Native of Amſterdam iſland. The antennæ long and pale; head between the eyes pointed; thorax immaculate; wing-caſes greeniſh; wings pale.

Spinipes. Thorax rounded; wing-caſes green, hyaline, and ſhorter than the wings; anterior legs ſpinous. Fabr.

A Braſilian ſpecies of ſmall ſize; antennæ length of the body; head rather pale; eyes very prominent; wing-caſes obtuſe; body brown; anterior thighs and ſhanks armed with long ſpines.

Maxillosa. Green; antennæ and jaws yellow. Fabr.

Native of America. Head pointed, with a yellow dot at the tip; antennæ as long as the body; thorax glabrous; wing-caſes and wings twice the length of the body; poſterior ſhanks denticulated.

Elongata. Thorax nearly ſquare and ſmooth; wing-caſes and wings grey, and the ſame length as the abdomen. Linn.

Inhabits India.

Femorata. Thorax rough and grey; wings lanceolate, and ſhorter than the obtuſe wings; thighs membranaceous, and toothed beneath. Fabr.

Thorax rounded before and behind, and ſcabrous, with ſharp raiſed dots; ſword ſtraight, ſhort and black, with the ſides rufous. Native of Tranquebar.

Italica. Thorax deflected; wing-caſes green, and as long as the wings; head whitiſh. Fabr.

A ſmall ſpecies found in Italy. The antennæ are ferruginous; thorax ſmooth and greeniſh; wing-caſes flat and browniſh on the back; body yellowiſh; ſword ſtraight and longer than the body.

Specularis. Thorax rounded; wing-caſes grey, with a tranſparent ocellar dorſal ſpot at the baſe; antennæ very long.

Native of South America.

Perforata. Thorax deflected; wing-caſes linear and grey, with the ocellar dorſal ſpot at the baſe perforated; wings white and black, varied. Fabr.

A ſpecies of moderate ſize, found at the Cape of Good Hope.

Ocellata. Thorax rounded; wings with an ocellar mark. Linn.

Inhabits India.

Lanceolata. Thorax rounded and ſmooth; wing-caſes oblong, and length of the wings; front advanced and lanceolate; beneath with a ſingle tooth. Fabr.

Native of Sierra Leona.

Pallens. Thorax ſmooth and whitiſh; wings lanceolate, and longer than the wing-caſes. Fabr.

A ſmall ſpecies found in Cayenne.

Acuminata. Thorax rounded, and emarginate at the ſides; crown ſubulate; wings greeniſh, and as long as the abdomen. Linn. Donov. Inſ. China, &c.

Inhabits China and other parts of Aſia.

Conocephala. Thorax rounded and ſmooth; wing-caſes oblong, and ſhorter than the wings; head conic and obtuſe. Linn.

Body green; head and thorax with a fuſcous dorſal line; ſword ferruginous. Native of Africa.

Triops. Crown pointed, with an ocellar black dot beneath; wing-caſes and wings equal. Linn.

Inhabits India.

Coronata. Thorax crowned with erect ſpines; wing-caſes with large hollow fuſcous dots; wings fuſcous. Linn. Degeer, &c.

Native of India. The antennæ pale yellow and grey varied.

Coriacea. Thorax rounded and ſmooth; wing-caſes coriaceous; wings pale; antennæ very long. Fabr.

Inhabits the ſame country as the latter.

Melanoptera. Thorax rounded and ſmooth; wing-caſes half as long as the abdomen; wings black. Linn.

Wing-caſes ovate; wings black at the margin, the baſe teſtaceous. The ſpecies inhabits India.

Reticulata. Thorax of three ſegments; wing-caſes reticulated; wings fuſcous; antennæ very long. Fabr.

A large ſpecies, found in Guadaloupe.

Albifrons. Thorax ſmooth and rounded behind; wing-caſes cinereous and black varied; head pale; ſword ſerrated at the tip. Fabr.

Native of Madeira. The body large and brown; head obtuſe; thorax brown with pale margin; wings hyaline.

Falx. Thorax ſmooth, fuſcous, and rounded behind; head pale; ſword falcated and black. Fabr.

Native of the ſame place as the former.

Grisea. Fuſcous; thorax carinated behind and rounded; ſword falcated, black at the baſe, and pale each ſide. Fabr.

Inhabits Italy.

VIRIDISSIMA. Green and without ſpots ; antennæ very long. Linn. *Locuſta viridis cantatrix*, Degeer. *Agrigoneus*, Liſt. *Green locuſt*, Donov. Brit. Inſ. &c.

Inhabits Europe, chiefly among graſs.

VERRUCIVORA. Green ; wings ſpotted with brown ; antennæ as long as the body. Linn.

Like the former inhabits Europe, and is chiefly found among graſs.

GLADIATOR. Thorax rounded ; wings linear, pointed, longer than the wing-caſes ; poſterior thighs with a black ſpot at the tip. Fabr.

Native of Tranquebar. Antennæ much longer than the body, and with the head teſtaceous ; thorax rounded, teſtaceous, with black dorſal blotches ; wing-caſes hyaline and reticulated ; ſword advanced, ſtraight, narrow, and teſtaceous.

VARIA. Thorax green, with a yellow line down the middle ; front pointed ; antennæ very long. Fabr. *Locuſta thalaſſina*, Degeer. *Variable locuſt*, Donov. Brit. Inſ.

About half the ſize of the common green locuſt or graſs-hopper. The antennæ yellowiſh ; crown of the head elevated and acute ; wing-caſes green ; ſword aſcending and brown. Inhabits Britain and other parts of Europe.

BRACHYPTERA. Grey-brown ; wing-caſes and wings half as long as the body. Fabr. *Gryllus brachypterus*, Linn.

Inhabits Europe, eſpecially the northern part, and feeds on graſs ; ſword elongated and curved.

SERRATA. Thorax ſmooth and green ; thighs and ſhanks of the anterior legs ſerrated ; body apterous. Fabr.

According to Hybner a native of Hungary. The body is large ; thorax green, at the ſides yellowiſh ; antennæ longer than the body, and teſtaceous ; ſword ſtraight, and ſhorter than the abdomen.

FUSCA. Green ; wing-caſes fuſcous, and as long as the wings ; front advanced and obtuſe. Fabr.

Native of France ; in ſize and appearance reſembles the ſpecies Varia ; the antennæ as long as the body and fuſcous ; head green, with a black dorſal line ; thorax deflected ; wings hyaline ; body green ; ſword teſtaceous, and as long as the abdomen.

PUPA. Thorax ciliated with ſpines ; abdomen tuberculated, and ſpinous ; body apterous. Linn. &c. *Locuſta pupa ſpinoſa*, Degeer.

Inhabits Ethiopia. The ſcutel large, and rounded ; poſterior thighs armed beneath with four ſpines or teeth.

SPINULOSA. Thorax thorny, and ſurrounded with ſpines ; body apterous. Linn. &c.

Native of the Indies. Antennæ as long as the body ; abdomen black, with teſtaceous ſpots ; ſword recurved.

ONOS. Thorax ſmooth and black ; ſides grey ; body apterous. Pallas, &c.

Inhabits Siberia. Sword the length of the abdomen.

EPHIPPIGER. Thorax elevated behind ; wing-caſes very ſhort and vaulted. Act. Berol.

Found in the ſouthern parts of Europe. Antennæ thrice the length of the body ; head green, behind grey ; thorax yellowiſh at the ſides, the poſterior margin dilated ; abdomen cylindrical, and black ; the ſword recurved and yellowiſh at the tip ; legs fuſcous, thighs yellow beneath.

APTERA. Wing-caſes very ſhort, vaulted, and whitiſh ; front black, with ferruginous dots. Fabr.

Native of Italy. The antennæ black, and twice the length of the body ; head black ; thorax on the back flat, and teſtaceous, the ſides black, and the margin teſtaceous ; abdomen pale, with the ſides black ; legs black, poſterior thighs edged at the baſe with pale.

PEDESTRIS. Thorax ſmooth, and rounded behind ; wing-caſes very ſhort, the tip with the head whitiſh. Fabr.

Inhabits ſame country as the former. The antennæ are ſetaceous, as long as the body, brown, with the baſe pale ; abdomen fuſcous, with two dorſal lines of ferruginous dots.

LAXMANNI. Thorax dentated at the poſterior margin ; ſword recurved, the tip deflected ; female apterous. Pallas.

Native of Siberia.

SERRICAUDA. Green ; thorax with a lateral ferruginous line ; wing-caſes very ſhort ; ſword recurved and ſerrated. Fabr.

Inhabits Italy.

HEMIPTERA. Wing-caſes green, compreſſed, half the length of the abdomen ; ſword recurved, the margin entire. Fabr.

Native of the iſle of France.

MARGINATA. Apterous and black ; thorax flat, with ſerrated dilated margin. Fabr.

Inhabits Ruſſia. Small and entirely black ; antennæ ſetaceous ; thorax large, abdomen very ſhort.

Genus GRYLLUS.

Antennæ filiform ; feelers equal and filiform ; lip rounded and bifid ; head vertical ; thorax flat above, and ſometimes carinated, the ſides deflected ; body elongated ; no ſcutel ; wing-caſes the length of the abdomen, and membranaceous ; poſterior legs long and formed for leaping ; the tarſi of three joints.

Species.

ELEPHAS. Thorax carinated and entire ; body apterous. Linn.

A large ſpecies, found in Africa ; the general colour pale brown, varied with fuſcous ; ſurface ſprinkled with elevated dots, and pointed prominencies, and the poſterior legs very ſpinous.

SUCCINCTUS. Keel and hind margin of the thorax, with the dorſal margin of the wing-caſes, yellow ; throat horned. Linn.

Antennæ pale yellow ; poſterior ſhanks ſpinous, pale yellow, and deep black at the tip. An Indian inſect.

CRISTATUS. Thorax creſted ; keel four-cleft ; wings fuſcous at the tip. Linn.

Length about eight inches, and meaſuring in breadth nearly ten inches when the wings are expanded ; the wing-caſes are dull green, with yellow ſpots ; wings pale, with ſtreaks of greeniſh ; body and legs red. Inhabits the Arabian deſerts.

DUX. Thorax carinated and rough ; wing-caſes green ; wings rufous, ſpotted with brown. Fabr.

Native of South America ; the antennæ black ; head yellowiſh ; thorax greeniſh with pale raiſed dots ; wing-caſes with yellow nerves ; poſterior margin of the wings brown ; body and legs greeniſh.

CARINATUS. Thorax carinated ; creſt trifid ; wings with a black band. Fabr. Donov. Inſ. India.

Firſt diſcovered in the Eaſt by Forſkall. The thorax is rough ; wing-caſes greeniſh ; poſterior thighs carinated each ſide, rough and reticulated with raiſed lines ; ſhanks very ſpinous.

LUNUS. Segments of the thorax with ſemi-orbicular creſt ; wing-caſes black with white bands. Linn.

Native of South America ; wings black, and without ſpots.

RETICULATUS. Thorax boat-ſhaped, lengthened, and acute behind ; wing-caſes reticulated. Fabr. Donov. Inſ. India.

Deſcribed by Fabricius from the example in the Bankſian cabinet, delineated in the laſt mentioned work. This ſpecimen was found in Tranquebar ; the head is ferruginous, the mouth ſpotted with black ; antennæ ferruginous, the firſt and laſt joints black ; thorax with a trifid creſt, its colour ferruginous, with the keel, and ſhort line on each ſide, black ; wing-caſes dark, the reticulations yellow; legs black, beneath rufous.

Gallinaceus. Thorax boat-ſhaped, very large, lengthened at each end, and with the wing-caſes brown and immaculate ; poſterior thighs compreſſed and ſerrated. Fabr.

Native of the Eaſt Indies ; the antennæ are very ſhort, and brown ; thorax compreſſed, covering the head and more than half the body ; wing-caſes flexuous at the outer margin ; wings yellowiſh, pointed and brown at the apex ; poſterior ſhanks ſpinous at the tip.

Serripes. Thorax boat-ſhaped, and produced behind ; wing-caſes fuſcous ; poſterior thighs ſerrated. Fabr.

Deſcribed from the cabinet of Daldorff. This kind of locuſt inhabits India. The front is flat ; head and thorax brown, varied with paler; carination of the thorax much elevated, acute, and impreſſed each ſide ; poſterior thighs cinereous, and ſerrated above ; ſhanks ſpinous.

Serratus. Thorax boat-ſhaped, carinated, ſerrated, lengthened, and ſharp behind. Fabr. *Gryllus ſerratus*, Linn. *Acrydium ſerratum*, Degeer.

Head pointed ; abdomen blue. Native of Africa.

Turcicus. Thorax boat-ſhaped ; body cinereous ; wing-caſes with a brown band, and baſe ; wings at the baſe black. Fabr.

One of the ſmalleſt of this family. The head is cinereous, and without ſpots ; thorax cinereous, with ſmooth teſtaceous keel ; tip of the wings, with the legs cinereous. Native of India.

Miliaris. Thorax nearly ſquare, and warty ; wing-caſes with white callous dots. Linn. *Acrydium verrucoſum*, Degeer.

Native of America.

Morbillosus. Thorax ſquare, warty, and red, wing-caſes brown, dotted with yellow ; wings red with black dots. *Gryllus morbilloſus*, Linn. Donov. Inſ. China.

A beautiful ſpecies, and of conſiderable magnitude, found in various parts of China in great plenty, and thence extending over other Aſiatic countries, and into Africa. The antennæ are filiform and black ; the head and legs ſcarlet.

Cinctus. Thorax ſpinous ; wing-caſes obſcure ; wings rufous with black ſpots. Fabr.

Native of Senegal ; the antennæ black ; head yellowiſh ; thorax yellowiſh, with many ſpines of various ſize, the poſterior part rounded and fringed with ſpines ; ſpots on the wings numerous.

Leprosus. Thorax ſomewhat ſpinous, with two tubercles before ; wing-caſes varied with blueiſh and yellow. Fabr.

Deſcribed from a ſpecimen in the Bankſian cabinet ; the head is pale, and ſpotted anteriorly with black ; antennæ black ; thorax rounded behind ; legs pale, thighs dotted with black without. Country unknown.

Punctatus. Thorax verrucoſe ; wing-caſes black, with yellow dots ; wings black. Fabr. *Gryllus punctatus*, Donov. Inſ. India.

Native of the Eaſt Indies. Abdomen green, with rufous rings ; ſize moderate.

Scabiosus. Thorax ſquare, warty, and black, the whole margin yellow ; wing-caſes green, dotted with yellow. Fabr.

Native of Tranquebar, in the cabinet of Seheſtedt. The ſize of the laſt ; antennæ black ; head black, with a broad yellow crown, reaching on the ſides to the edge of the thorax ; body black, with the edges of the ſegments red ; breaſt ſpotted with red.

Squarrosus. Thorax ſomewhat three-jointed, the diviſions ſpinous each ſide ; wings red, dotted with black. Fabr. *Gryllus ſquarroſus*, Linn. Mant. Inſ.

An African ſpecies, figured by Drury. The head and thorax dull green ; wing-caſes green, ſpotted with brown.

Hæmatopus. Thorax ſomewhat carinated and warty ; head obtuſe ; thighs ciliated with hairs. Linn. *Acrydium rubripes*, Degeer.

Native of India. Wing-caſes cinereous ; wings hyaline, reticulated with black veins.

Flavicornis. Thorax ſomewhat carinated, and green ; wing-caſes immaculate ; wings at the baſe rufous ; poſterior ſhanks ſanguineous, ſerrated with yellow. Fabr. Donov. Inſ. China.

A large ſpecies, very abundant in China. The antennæ are yellow ; abdomen greeniſh with duſky rings, and the legs green.

Flavescens. Thorax ſomewhat carinated, and greyiſh ; wings yellowiſh at the baſe, with an abbreviated band at the tip, and dots brown. Fabr.

Inhabits Tranquebar ; in ſize correſponds with the laſt ; head and thorax with yellowiſh lineations ; wing-caſes grey, or varied with cinereous and brown ; poſterior ſhanks ſpinous, red, and black at the tip.

Pictus. Wing-caſes green, dotted with white, and reddiſh at the tip ; body variegated with blue and yellow Fabr.

Native of South America.

Tartaricus. Thorax with three ſegments ; front impreſſed ; mandibles the colour of the body. Linn.

Wing-caſes pale greyiſh, ſpotted with brown. Inhabits Africa.

Migratorius. Thorax ſomewhat carinated, of one ſegment, mandibles blue. Linn.

The migratory locuſt is a native of Tartary, from the eaſtern parts of which it ſometimes emigrates over the adjacent countries in ſuch immenſe legions, as to occaſion the moſt incredible miſchief. Theſe hoſts of depredators are oftentimes ſo numerous, as to darken the air at noon-day in their flights. Wherever they ſettle, the moſt fertile regions are, in a few days, rendered deſolate ; and the very putrefaction ariſing from the number of their dead, becomes the ſource of peſtilence to man and animals. It is ſeldom, except in eaſtern countries, that theſe calamities are experienced to ſuch a dreadful extent, though they ſometimes are, as the viſitation of the locuſt in Europe, about the middle of the eighteenth century, very clearly proves. The ravages committed by locuſts in the ſouth of Europe, about the period laſt mentioned, are deſcribed at great length by Roeſel, from which the more material part of the curious information on that ſubject, detailed in the 46th volume of the Tranſactions of the Royal Society, ſeems to be ſelected. This account relates to the myriads of locuſts that over-ran Walachia, Moldavia, Tranſylvania, Hungary, and Poland, in 1747 and 1748, and which, being recorded by an eye-witneſs of unqueſtionable accuracy, explains the hiſtory of that deſtructive creature in a ſatisfactory manner : the following is the ſubſtance of the obſervations alluded to.

The firſt ſwarms of the locuſts entered Tranſylvania in Auguſt, 1747: theſe were ſucceeded by others, which were ſo ſurpriſingly numerous, that when they reached the fortification called the Red Tower, they were full four hours in their paſſage over that place; and they flew ſo cloſe, that they made a ſort of noiſe in the air by the beating of their wings againſt one another. The width of the ſwarm was ſome hundreds of fathoms, and its height or denſity ſo conſiderable, as to hide the ſun, and darken the ſky to that degree when they flew low, that people could not know one another at the diſtance of twenty paces. Arriving at the river that runs through the vallies of the Red Tower, they could neither find reſting place nor food, and being at length tired with their flight, one part of them ſettled on the unripe corn on the hither ſide of the Red Tower, ſuch as the millet and Turkiſh wheat, &c. and the other pitched on a low wood, where, having miſerably waſted the produce of the land, they continued their journey, as if a ſignal had actually been given for a march.

The guards of the Red Tower attempted to ſtop their irruption into Tranſylvania, by firing at them; and indeed, where the balls and ſhot ſwept through the ſwarm, they gave way and divided, but having filled up their ranks in a moment, they proceeded on their journey. In the month of September, ſome troops of them were thrown to the ground by great rains and other inclemency of the weather, and thoroughly ſoaked with wet, they crept along in queſt of holes in the earth, dung, and ſtraw; where, being ſheltered from the rains, they laid a vaſt number of eggs, which ſtuck together by a viſcid juice, and were longer and ſmaller than what is commonly called an ant's egg, or very like grains of oats. The females, having laid their eggs, die, like the ſilkworm. When they entered the fields of Tranſylvania, they did not ſeem to intend remaining there, but were thrown to the ground by the force of the wind, and there laid their eggs, a vaſt number of which being turned up and cruſhed by the plough, in the beginning of the enſuing ſpring, yielded a yellowiſh juice. In the ſpring of 1748, certain little blackiſh worms were ſeen lying in the fields, and among the buſhes, ſticking together and collected in cluſters, not unlike the hillocks of moles or ants. As nobody knew what they were, ſo there was little or no notice taken of them, and in May they were covered by the ſhooting of the corn ſown in winter; but the ſubſequent June diſcovered what theſe worms were; for then, as the corn ſown in ſpring was pretty high, theſe creatures began to ſpread over the fields, and became deſtructive to the vegetables by their numbers. Then, at length, the country-people, who had ſlighted the warning given to them, began to repent of their negligence; for as theſe inſects were now diſperſed all over the fields, they could not be extirpated without injuring the corn. At that time they differed very little from our common graſshoppers, having their head, ſides, and back of a dark colour, with a yellow belly, and the reſt of a reddiſh hue. About the middle of June they were generally a finger's length, but their ſhape and colour continued as before. Towards the end of June they caſt off their outward covering, and then it plainly appeared they had wings, but as yet unripe, and unexpanded, the body being alſo tender and of a yellowiſh green: then, in order to render themſelves fit for flying, they gradually unfolded their wings with their hinder feet, and as ſoon as any of them found themſelves able to uſe their wings they ſoared up, and by flying round the others, enticed them to do the ſame; and thus their numbers increaſed daily: they took flights in a circular manner of twenty or thirty yards ſquare, until they were joined by the reſt; and after miſerably laying waſte their native fields, they proceeded elſewhere in large troops. Wherever theſe bodies of locuſts happened to pitch, they ſpared no ſort of vegetables: they eat up the young corn, and the very graſs: but nothing was more diſmal than to behold the lands in which they were hatched; for they ſo greedily devoured every trace of herbage before they could fly, that they left the ground quite bare. There is nothing to be feared in thoſe places to which this plague did not reach before the autumn; for the locuſts have not ſtrength to fly to any conſiderable diſtance but in the months of July, Auguſt, and the beginning of September; and even then, in changing their places of reſidence, they ſeem to tend to warmer climates.

Different methods are to be employed according to the age and ſtate of theſe inſects for their deſtruction. Some will be effectual as ſoon as they are hatched; others when they begin to crawl, and others when their wings appear. Experience teaches us, that it is of great ſervice to ſeek out the places where the females had lodged, about March and April, and to deſtroy their eggs, or little worms, with ſticks or briars. In the ſummer, when they have invaded the corn-fields, it is almoſt impoſſible to extirpate them without thoroughly threſhing the whole piece of land that harbours them with ſticks and flails, and thus cruſhing the locuſt with the produce of the land. Finally, when the corn is ripe, or nearly ſo, there is no other method of getting rid of them but to ſurround the piece of ground with a multitude of people, who may fright them away with bells, braſs veſſels, and all other ſorts of noiſe. But this will not ſucceed till the ſun is pretty high, ſo as to dry the corn from the dew; for otherwiſe they will either ſtick to the ſtalks, or lie hid under the graſs; but when they happen to be driven to a waſte piece of ground, they are to be beat with ſticks or briars; and if they gather together in heaps, ſtraw or litter may be thrown over them and ſet on fire. It will be likewiſe of uſe, where a large troop of them has pitched, to dig a long trench of an ell wide, and the ſame in depth, and place ſeveral perſons along the edges, provided with brooms and ſuch like things, while a number of people form a ſemicircle that takes in both ends of the trench, and encompaſſes the locuſts, and by making the noiſe above-mentioned drive them into the trench, out of which, if they attempt to eſcape, thoſe on the edges are to ſweep them back, and then cruſh them with their brooms and ſtakes, and bury them, by throwing in earth upon them. But when they begin to fly there ſhould be horſemen upon the watch in the fields, who, upon any appearance of the ſwarm taking wing, ſhould immediately alarm the neighbourhood by a certain ſignal, that they might come and frighten them away by all ſorts of noiſe, and if tired with flying they happen to pitch on a waſte piece of ground, it will be very eaſy to kill them with ſticks and brooms in the evening or early in the morning, while they are wet with dew, or any time of the day in rainy weather, for then they are unable to fly.

The devaſtations of locuſts in various parts of the world, at different periods, are recorded by many writers, ſome examples of which are very remarkable. Thus in the year 593 of the Chriſtian era, after a great drought, theſe animals appeared in ſuch vaſt legions as to cauſe a famine in many countries. In 677 Syria and Meſopotamia were overrun by them. In 852 immenſe ſwarms took their flight from the eaſtern regions into the Weſt, flying with ſuch a ſound, that they might have been miſtaken for birds: they deſtroyed all vegetables, not ſparing even the bark of trees, and the thatch of houſes; and devouring the corn ſo rapidly as to deſtroy, on computation, an hundred and forty acres in a day: their daily marches or diſtances of flight were computed at twenty miles; and theſe were regulated by leaders or kings, who flew firſt, and ſettled on the ſpot which was to be viſited at the ſame hour the next day by the whole legion: the marches were always undertaken at ſun-riſe. Theſe locuſts were at length driven by the force of the winds into the Belgic ocean, and being thrown back by the tide and left on the ſhore, cauſed a dreadful peſtilence by their ſmell. In 1271 all the corn-fields of Milan were deſtroyed; and in 1339 all thoſe of Lombardy. In 1541 incredible hoſts afflicted Poland, Walachia, and all the adjoining territories, darkening the ſun with their numbers, and ſpreading deſolation throughout the land.

The evidence of hiſtory aſſures us, that Britain has been occaſionally ſubject to the viſitation of the locuſts; yet it has never, we apprehend, appeared here in numbers ſufficiently formidable to commit great depredation. From the Philoſophical Tranſactions we learn, that in the year 1693 ſome ſwarms of locuſts (probably of this ſpecies) ſettled in Wales; two vaſt flights of which were obſerved in the air, not far from the town of Dol-ghelly, in Merionethſhire, and many about the ſame time fell in South Wales, in the county of Pembroke. The ſpecies that viſited this country in the year 1748, (and of which ſome ſmall flocks were ſeen in the environs of London,) was certainly of this kind, as appears from the teſtimony of Mr. G. Edwards, whoſe work on birds contains a repreſentation of the inſect in queſtion, under the name of the great brown locuſt. We are not aware that the locuſt appeared again in Britain after that period till within about the laſt ten years, when its exiſtence at leaſt, in this country, was again diſtinctly aſcertained, as an example of this deſtructive creature in a living ſtate came at that time under our own inſpection. The particulars relative to the capture of the laſt mentioned inſect are recorded in the "Natural Hiſtory of Britiſh Inſects," and as this affords, we apprehend, the lateſt teſtimony of the ſpecies being obſerved at large in England, the following extract from that publication may not be conſidered altogether unacceptable, or devoid of curious information: "In the month of September 1799, lady Aylesford moſt obligingly communicated a living ſpecimen of the migratory locuſt, (Gryllus migratorius,) and we deem ourſelves peculiarly fortunate in the opportunity it affords us to aſcertain the difference, however inconſiderable, that prevails between the variety found in England, and thoſe of warmer climates. It is repreſented for this reaſon both in a reſting poſition, and with the wings expanded. This ſpecimen was found in a barley field near Packington in Warwickſhire. It lived ſeveral days after its arrival in London, and would probably have ſurvived much longer had it not been injured in the journey, and weakened by long confinement. We remarked, that, in feeding, it cut the ſtalk of the graſs, or other tender plants on which it ſubſiſts, aſunder in the middle, or near the root, and tearing off the leaves eat only the pith: this may, therefore, in ſome meaſure account for the great miſchief and depredation theſe inſects commit, when they ſettle in vaſt numbers on any tract of cultivated land." Donov. Br. Inſ. v. viii.

Ruficornis. Thorax black on the back; keel yellow; antennæ and ſhanks yellow. Fabr.

Nativa of Sierra Leona; and rather leſs than the former. The antennæ reddiſh; wing-caſes varied with brown and cinereous.

Lineola. Thorax ſomewhat carinated and fuſcous, with a rufous dorſal line; poſterior thighs ſanguineous within; ſhanks blueiſh. Fabr.

An Italian ſpecies, the ſize of G. migratorius, deſcribed by Fabricius from a ſpecimen in the cabinet of Dr. Allioni.

Variegatus. Thorax lineated with yellow; wing-caſes green; wings blue. Linn.

Native of America. Antennæ black with red rings; front red with black dots.

Vocans. Thorax carinated; wing-caſes pale with ocellar brown ſpots; wings ferruginous at the baſe. Fabr.

Head pale brown; mandibles black; thorax ferruginous with yellow margin; wing-caſes rounded. Inhabits New Holland.

Luridus. Thorax ſub-carinated and black; ſpot on the breaſt, and belts on the abdomen, ſanguineous; front projecting. Fabr.

Native of Africa. The antennæ black, with the laſt joint but one yellowiſh; head black; front above the antennæ advanced, obtuſe, and flat; thorax rough and immaculate; legs black.

Nervosus. Greeniſh; thorax black on the back with a yellow line; wing-caſes greeniſh, with a yellowiſh, or ſanguineous ſub-marginal nerve. Fabr.

Leſs than gryllus migratorius; the antennæ ſhort, yellow, or ferruginous; head greeniſh, furrowed each ſide; body green; poſterior ſhanks dentated, the teeth white, at the tip ferruginous. Inhabits Guinea.

Musicus. Thorax carinated; wing-caſes anteriorly black, with a white band; behind grey, varied with black. Fabr.

Native of New Holland.

Tuberculatus. Thorax ſcabrous; wings red, with cinereous tip; poſterior thighs above and beneath carinated. Fabr.

Found in ſandy places in Jutland.

Cisti. Thorax ſcabrous; creſt bifid; wings red, with a black band; poſterior thighs canaliculated. Fabr.

Diſcovered by Vahl on the ciſtus hamifolius.

Stridulus. Thorax carinated; wings red, with the tip black. Linn.

Inhabits ſandy places in Europe.

Morio. Obſcure; thorax ſub-carinated; wings black and immaculate. Fabr.

Native of Africa.

Ferrugineus. Thorax tuberculated; wing-caſes duſky and immaculate; wings ferruginous; head pointed. Fabr.

An African ſpecies. The antennæ are black, with two yellow rings; mouth brown, with red ſpots; body annulated with brown and yellow; thighs beneath, and all the ſhanks rufous.

Surinamus. Thorax with four yellow lines; wings blue; wing-caſes fuſcous. Linn.

Native of South America.

Italicus. Fuſcous; thorax carinated; wings red, with the tip hyaline. Linn.

Inhabits the ſouth of Europe.

Germanicus. Teſtaceous; wings ſanguineous, with hyaline tip; poſterior thighs dotted with black. Roeſ. &c.

Found in Germany. The thorax is ſub-carinated; ſhanks of the hind-legs ſanguineous.

Thalassinus. Thorax ſmooth and green; wings hyaline, inner ſide green, with the tip brown. Fabr.

Native of Italy.

Virginianus. Thorax carinated; wing-caſes with a green-rib; wings black, with the baſe greeniſh. Fabr.

A ſmall ſpecies, found in North America. Thorax and wing-caſes dull rufous.

Cœrulans. Thorax ſmoothiſh; wing-caſes pale, ſpotted black; wings blueiſh on the thinner edge. Linn.

An European ſpecies.

Carolinus. Thorax ſub-carinated; wings black; the poſterior margin cinereous. Linn.

Native of North America.

Obscurus. Thorax ſmooth; wings red in the diſk, with black band and hyaline tip. Linn.

Inhabits ſandy places in Africa.

Fasciatus. Thorax unequal; wings at the baſe red, the tip hyaline, with fuſcous ſpots. Fabr.

A ſmall ſpecies, found in France; the antennæ ſhort, fuſcous, with the tip darkeſt; head duſky, with an impreſſed line in the middle.

Sibiricus. Thorax ſub-carinated; antennæ clavated; anterior ſhanks ovate-clavated. Linn. *Gryllus clavimanus*, Pallas.

Native of Siberia.

Cærulescens. Thorax ſub-carinated; wings greeniſh-blue, with a black band. Linn.

An inhabitant of the ſouth of Europe.

Cinerascens. Thorax carinated; wing-caſes green on the thinner margin; wings yellowiſh at the baſe, at the tip cinereous. Fabr.

Front greeniſh; mouth ferruginous; wing-caſes dotted with white. Native of Italy.

Sulphureus. Duſky; thorax carinated; wings bright yellow, with blackiſh tip. Fabr.

A ſmall ſpecies, found in America. The head, thorax, and wing-caſes dull ferruginous; poſterior thighs annulated with yellow and black within; ſhanks blue, and paler at the baſe.

Flavus. Thorax carinated; wings yellow, with black band, the tip cinereous. Linn.

Native of America. Antennæ ſhort and yellowiſh; wing-caſes brown, with a whitiſh band or two at the baſe; poſterior ſhanks ſanguineous.

Cyanipes. Brown, with a yellow dorſal line; poſterior ſhanks yellow, tipped with blue. Fabr.

Inhabits America.

Rusticus. Grey; wing-caſes brown, at the baſe ſpotted with yellow, the tip varied with cinereous and brown. Fabr.

Thorax generally with a yellow dorſal line, and black lateral ſpots; wings cinereous, reticulated with brown. Native of America.

Lateralis. Thorax brown, with a yellow margin, and dot each ſide; ſhanks yellow. Fabr.

Inhabits America.

Velox. Thorax flat; body brown; margin of the thorax and legs greeniſh. Fabr. Donov. Inſ. China.

A ſmall ſpecies, found in China.

Biguttulus. Thorax carinated; wing-caſes clouded, with an oblong white dot near the tip. Linn. Donov. Brit. Inſ.

Native of Britain and the more northern parts of Europe, frequenting ſandy plains.

Viridulus. Thorax carinated; body above green; margin of the wing-caſes whitiſh. Linn. Donov. Brit. Inſ.

Frequent in ſandy places in Britain, Sweden, and Germany.

Grossus. Thighs ſanguineous; wing-caſes greeniſh; antennæ cylindrical. Linn. *Acrydium rubripes*, Degeer.

An European ſpecies.

Captivus. Thorax cruciate; body brown; poſterior thighs and ſhanks with a white band. Fabr.

Native of New Holland.

Clavicornis. Greeniſh, with a black lateral ſtripe; antennæ clavated. Fabr.

A ſmall ſpecies, found in Surinam.

Rufus. Fuſcous, with rufous abdomen; antennæ ſub-clavated. Linn.

Inhabits ſandy places in Europe.

Pedestris. Body fleſh-coloured and apterous. Linn. *Acrydium apterum*, Degeer.

Native of Europe and Siberia.

Perspicillatus. Rudiments of the wings with an ocellar black ſpot; eyes golden. Linn.

Inhabits India, and is probably only the larva of ſome other ſpecies.

Obscurus. Duſky, with a yellow dorſal line. Fabr. Suppl.

Size of G. nervoſus, and inhabits North America. The thorax is rough, behind rounded; wings duſky; legs greeniſh; the poſterior ſhanks armed with yellow ſpines with black tips.

Muricatus. Thorax thorny; creſt behind armed with two teeth; wings cinereous, with black band. Fabr. Suppl. Pallas.

Deſcribed as an inhabitant of the ſouth of Ruſſia, in ſize and appearance reſembling gryllus ſtridulus.

Sanguinipes. Greeniſh; thorax on the back, and wing-caſes fuſcous; ſhanks ſanguineous. Fabr. Suppl.

Size of the laſt, and inhabits North America. The antennæ are ferruginous with the tip black; ſtripe of brown on the thorax broad; abdomen greeniſh; teeth on the poſterior ſhanks blank.

Tamulus. Fuſcous; wing-caſes at the baſe and marginal line green, tip hyaline, and ſpotted; poſterior legs variegated. Fabr. Suppl.

Native of India; ſize of the laſt; wings fuſcous with yellowiſh baſe; poſterior thighs without fuſcous, with white tip; within varied with white rings, rufous, and black.

Ciliatus. Thorax carinated and duſky; wings ſanguineous; poſterior thighs ciliated. Fabr. Suppl.

A ſmall ſpecies found in India. The head is fuſcous, the front ſcarcely prominent; wing-caſes teſtaceous and immaculate.

Scaber. Rough, fuſcous, with abbreviated wing-caſes. Fabr. Suppl.

Native of the Eaſt Indies; wing-caſes ſhorter than the body.

Genus Pneumora.

Antennæ ſhort and cylindrical; head ſmall, inflected, and armed with jaws; thorax convex, and carinated beneath; body ovate, inflated and diaphanous; wing-caſes membranaceous, and deflected; legs formed for running.

The inſects of this genus appear like a hollow inflated membrane or bladder, and are nearly as tranſparent; they emit a ſhrill noiſe morning and evening by rubbing, as it is imagined, their ſerrated legs together. The ſpecies of this remarkable genus, amounting to three in number, are natives of the Cape of Good Hope, and were firſt made known to the world by profeſſor Thunberg in the Tranſactions of the Swediſh Academy.

Species.

Immaculata. Green ſpotted with white; wing-caſes immaculate. Thunb.

Head green; orbits white; three red ſhining dots between the eyes, and above theſe two ſhort denticles; antennæ green; thorax rough with a ſhort tooth before, and an impreſſed wrinkle in the middle; wing-caſes grey, reticulated with green.

Maculata. Wing-caſes green, with quadrangular white ſpots. Thunb.

The antennæ in this ſpecies are reddiſh; wing-caſes reticulated with white dots.

6-Guttata. Wing-caſes green, with two white ſpots; abdomen with three white ſpots each ſide. Thunb.

Large; antennæ green, with two denticles each ſide under the antennæ; thorax green with white margin, and two denticles before, one in the margin, the other before the middle; in the middle a deep ridge.

Genus Truxalis.

Antennæ ſomewhat priſm-ſhaped or enſiform, and inſerted above the eyes; head pyramidal or conic, and longer than the thorax; body elongated; no ſcutel; wing-caſes membranaceous, flexile, and as long as the body; legs ſhort; poſterior pair elongated; tarſi on the fore feet with three joints, poſterior ones, with four.

Species.

Nasutus. Head conic; body green. Linn. β *Gryllus turritus*, Linn. Donov. Inſ. China.

Inhabits China, and thence extends to Africa. The mouth is placed at the baſe of the head, the antennæ at the tip; wings hyaline, greeniſh towards the baſe. This is the largeſt of its family, and is about four or five inches in length.

Conicus. Head conic; body fuſcous; half the rib of the wing-caſes green, with a line of white dots. Fabr. Donov. Inſ. New Holland.

The antennæ are brown and longer than the thorax; head brown, the ſides green at the baſe.

Vittatus. Head prominent; body teſtaceous; head, thorax, and poſterior thighs with a lateral ſilvery ſtripe. Fabr. Donov. Inſ. China.

Antennæ teſtaceous; a blueiſh fillet, and line of ſilvery dots on the poſterior thighs; length about two inches.

Hungaricus. Head conic, and green; antennæ and legs teſtaceous. Herbſt.

A ſpecies of middle ſize, found in Hungary.

Brevicornis. Head prominent and green; antennæ compreſſed, and the length of the thorax. Linn.

Native of America.

Crenulatus. Head prominent and green, with the inner margin roſy. Fabr.

Inhabits Tranquebar.

Genus Acrydium.

Antennæ filiform, and inſerted under the eyes; feelers filiform and equal; lip ovate and cleft at the tip; head ovate and inſerted; thorax carinated; ſcutel produced behind to the end of the abdomen, and covering the wings; wing-caſes none; legs ſhort, poſterior pair long, formed for leaping, the tarſi conſiſting of three joints.

Morbillosum. Scutel flat, pointed, and as long as the abdomen. Fabr.

Native of Sierra Leona. The body duſky; thorax carinated; legs blackiſh; poſterior thighs compreſſed and carinated.

Bipunctatum. Dark brown; ſcutel as long as the abdomen. Geoff.

Inhabits ſandy places in Europe.

Subulatum. Dark brown; ſcutel longer than the abdomen. Geoff. Donov. Brit. Inſ.

Native of Britain, and other parts of Europe.

Bifasciatum. Brown ſpotted with white, with two lateral ochraceous bands. Herbſt.

Inhabits Berlin.

Bimaculatum. Thorax brown with an ochraceous lunule each ſide. Herbſt.

Inhabits Berlin.

Granulatum. Varied with grey, green, and blackiſh; rough with raiſed dots and flattened at the ſides; thorax ſub-oval and gibbous. Herbſt.

Inhabits Berlin.

Binotatum. Grey; a ferruginous ſpot each ſide the ſcutel towards the tip of the lamina of the wings. Gmel.

Gryllus, in *Ichthyology*, a name given by ſome to the *conger*, or ſea-eel. Ritterſhuſius, who has given commentaries on Oppian's Halieutics, has given this word as the tranſlation of the gongros of that author, which is the name of the ſame fiſh with the congrus of Ariſtotle, and the other ancient Greeks. Artedi has avoided the occaſion of any ſuch errors for the future, by not allowing it any generical name at all. He makes it a ſpecies of his genus of *muræna*, and diſtinguiſhes it from all the others by the name of the *muræna* with the rim of the back-fin black.

Gryllus *Vulgaris*, a name given by Geſner, Bellonius, and others, to the *ophidion* of the generality of authors; diſtinguiſhed by Artedi by the name of the *ophidion* with four cirri, or beards, at the lower jaw. Pliny has mentioned this under the name of the *piſciculus congro ſimilis*.

GRYNÆUS, Simon, in *Biography*, ſon of a Suabian farmer, was born at Veringen in the year 1493. He diſcovered an early inclination to learning, and was ſent to ſchool at Pfortſheim, at which he had the celebrated Melancthon for a fellow ſtudent, with whom he contracted an intimacy and friendſhip that laſted during life. From Pfortſheim he went for improvement to Vienna, where he was admitted to the degree of maſter in philoſophy, and afterwards appointed to the profeſſorſhip of the Greek language. Soon after this he embraced the Proteſtant religion, and was on that account expoſed to the perſecutions of the Catholics, particularly at Buda, where he was thrown into priſon. He was much beloved by the Hungarian nobility, at whoſe interceſſion he obtained his liberty, and retired to Wittemberg, where he found Luther and Melancthon, and held repeated conferences with them on religious and other topics. In 1523 he was appointed Greek profeſſor at Heidelberg, the duties of which office he performed till 1529, when, at the perſuaſion of Œcolampadius, he undertook the profeſſorſhip at the univerſity of Baſil. In 1531 he took a journey to England, where, with the recommendations of Eraſmus, he was kindly received by the lord chancellor, ſir Thomas More, who, notwithſtanding his principles, took him into his houſe, and made him his conſtant companion. He likewiſe moſt liberally defrayed his expences, and ſent him to Oxford, with ſuch powerful recommendations to the heads of the univerſity, that he had free acceſs to all the public libraries, which was the principal object of his miſſion to this country. Before he left England he was preſented by ſir Thomas More with ſome MSS. of Proclus. In 1536 he returned to Baſil, juſt in time to witneſs the laſt moments of his excellent friend, the illuſtrious Eraſmus. He died of the plague at Baſil in the year 1541. His ſocial virtues, and his piety towards God, were as highly reſpected, as his great acquirements as a ſcholar. He was the firſt perſon who publiſhed the "Almageſt" of Ptolemy, in Greek, to which he added a preface concerning the uſe to be made of the author's doctrine. He was likewiſe the editor of "Euclid," "The Works of Plato," with ſome "Commentaries of Proclus." He was author of the "Life of Œcolampadius."

GRYNAU, in *Geography*, a town of Switzerland, in the canton of Glarus, on the Linth, where it empties itſelf into the lake of Zurich, with a harbour for boats.

GRYPHITES, a name given by Luid to a ſpecies of foſſil bivalve ſhells, which are referred by Linnæus to *anomia*, and by Bruguière to *oſtrea*. They have obtained the name gryphites from a ſuppoſed reſemblance to the bill of a fabulous bird; but may, perhaps, be more aptly compared to an ancient bark with high and curved ſtern. (See Shells, *Foſſil.*)

Theſe ſhells, of different ſizes, ſeem to have a place in four different parts of the Britiſh ſeries of ſtrata, *viz.* 1ſt. In the clunch clay, immediately below the Woburn ſand, mixed with belemnites: ſome of theſe gryphites are very large, and great numbers of them have been perforated partly or wholly through, apparently by ſome fiſh having the habits of the pholas (ſee Phil. Mag. vol. xxxv. p. 259).

2d. In the Bedford lime-ſtone, ſmaller than the above: of this ſtone, a bolder, containing a gryphites, was found in that remarkable aſſemblage of bolders and gravel, on Bladon hill in Newton-Solney, in Derbyſhire.

3d. In one of the ſtrata of lime-ſtone near Bath; a figure of this ſhell is given in Walcott's "Petrifactions found near Bath," *fig.* 34, pages 25 and 51.

4th. In blue clay at Cheltenham, with belemnites: which perhaps may, however, be alluvial or moved.

The gypſum quarries at Chellarton, S. of Derby, are covered by a conſiderable thickneſs of alluvial clay, among whoſe numerous ſtones and foſſils many gryphites, apparently from the clunch clay, are found; and doubtleſs it was from hence that the ſpecimen came, which the late Mr. William Martin mentions, p. 14. of the ſyſtematic arrangement at the end of his "Petrificata Derbienſia," vol. i., and not from any of the Derbyſhire ſtrata.

GRYPHIUS, Christian, in *Biography*, born in Sileſia in the year 1649, was ſon of Andrew, a celebrated German dramatic writer. In 1674 Chriſtan became profeſſor of eloquence at Breſlau, and was made, in 1686, principal and profeſſor of the Magdalen college in the ſame city, and afterwards librarian. He was a man of extenſive erudition, and was very learned in the modern and ancient languages. He died in 1706, having, juſt before he expired, cauſed to be performed, in his chamber, a piece of poetry of his own, ſet to muſic, expreſſive of the conſolation received by the dying, from meditating on the death of Chriſt. He was author of "Poems in German;" "A Hiſtory of the Orders of Knighthood;" "A Treatiſe on the Origin and Progreſs of the German Language;" "Diſſertatio de Scriptoribus, Hiſtoriam Sæculi xvii. illuſtrantibus."

Gryphius, Sebastian, a learned printer, was a native of Reutlingen, in Suabia, but he exerciſed his profeſſion at Lyons, and obtained great reputation for the beauty and accuracy of his works. He was very converſant in the learned languages, and employed men of erudition as his correctors. Julius Scaliger, and Conrad Geſner thought highly of his talents. One of his fineſt works is a Latin bible, in two volumes folio, printed in very large types. He died in 1556, at the age of about ſixty-three.

Gryphius *Pes*, the *griffon's claw*, a name of a chirurgical inſtrument deſcribed by Ambroſe Pare, and uſed for extracting moles from the uterus.

GRYPHUS, in *Surgery*, a ſort of crooked pincers uſed by ſurgeons.

Gryphus, or *Griphus*, is alſo a kind of enigma, or an artful obſcure deſcription of a thing.

The word γρῖφος ſignifies a net, and accordingly was the name given to certain enigmatical queſtions which were ſportively propoſed during an entertainment, and which the gueſts were frequently puzzled to unravel. Thoſe who were unable to anſwer them were ſubjected to a forfeit. Of theſe gryphi there were different kinds. Some were properly ænigmas: ſuch is the following: "I am very large at my birth, and likewiſe in old age; but very ſmall when at maturity." *A ſhadow.* Such is alſo this: "There are two ſiſters, who inceſſantly beget each other." *Day* and *Night*, both which words are feminine in the Greek. Other gryphi turn on the reſemblance of names; *e.g.* "What is that which is at once found on the earth, in the ſea, and in the heavens?" The *dog*, the *ſerpent*, the *bear*. The names of theſe animals have been given to certain conſtellations. Others were formed by a play on letters, ſyllables, or words. Travels of Anacharſis, vol. vii. p. 116, 8vo.

GRYPOSIS, an incurvation of the nails. The word is derived from γρυποω, *to incurvate.*

GRYS, in *Geography*, a river of America, which runs into lake Erie. N. lat. 41° 45′. W. long. 82° 2′.

GRYSINGARDE, a town of Norway, in the dioceſe of Drontheim; 76 miles S.E. of Drontheim.

GRYSON, a new county of Virginia, taken from Montgomery, which bounds it on the N. It has the ſtate of N. Carolina S., of Henry and Wythe counties on the E. and W.

GRYTSKAR, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 62° 33′. E. long. 20° 53′.

G-SOL-RE-UT, the name of the eighth note, octave to gammut, in the ſcale of Guido. See Gammut, Scale, and Guido.

GSUVIE, a town of Arabia Felix; 16 miles S. of Loheia.

GUA, a town of the iſland of Cuba; 36 miles S.W. of Bayamo.

Gua *Suba*, a river of Bengal, which runs into the bay. N. lat. 21° 25′. E. long. 89° 8′.

GUACA, a town of South America, in the province of Quito; 70 miles N.N.E of Quito.

GUACAGUACU, in *Ornithology*, the Braſilian name of a bird of the larus, or gull kind, the Larus *hibernus*; which ſee.

GUACAPA, in *Geography*, a town of Mexico; 70 miles E.S.E. of Guatimala.—Alſo, a river of Mexico, in Nicaragua, which runs into the Pacific ocean.

GUACARA, a town of S. America, in the province of Caraccas; 65 miles S.W. of Leon de Caraccas.

GUACARI, in *Ichthyology*. See Loricaria *Plecoſtomus.*

GUACATARA, in *Geography*, a town of S. America, in the province of Tucuman, chiefly inhabited by Indians, under the juriſdiction of an Indian magiſtrate; 50 miles N. of St. Salvador de Jugai.

GUACHIAYACHU, a town of S. America, in the audience of Quito; 60 miles E.S.E. of Macas.

GUACHO, a ſea-port of Peru, in the audience of Lima, between the iſland of St. Martin and Callao.

GUACHUCO, a town of New Mexico, in New Navarre.

GUACOCINCA, a town of Mexico, in the province of Tlaſcala, containing about 600 inhabitants, of whom about 100 are Spaniards.

GUACOTITLAN, a town of Mexico, in New Biſcay; 80 miles S. of Parral.

GUACUCUJA, in *Ichthyology*, the name of a very remarkable Braſilian fiſh, called alſo by ſome the *veſpertilio aquaticus*, or water-bat. See Lophius *veſpertilio.*

GUADAGNI, Gaetano, in *Biography*, a native of Vicenza, one of the moſt celebrated opera ſingers of the laſt century.

But his ſinging was not more admired than his figure, dignity, grace, and intelligence, as an actor.

He firſt came into England with a company of burletta ſingers, brought hither by Croza, an adventurous impreſario, in 1748, at which time there was no ſerious opera in meditation.

It was the firſt company of comic ſingers that tried its fortune in London. Guadagni, then very young, wild, and idle, with a very fine counter-tenor voice of only ſix or ſeven notes compaſs, performed the ſerious man's part in theſe burlettas, and was but little noticed by the public; till Handel, pleaſed with his clear, ſweet, and full voice, engaged him to ſing, in Samſon and the Meſſiah, the fine airs which he had compoſed for Mrs. Cibber's ſweet and affecting voice of low pitch: ſuch as, "He ſhall feed his flock like a ſhepherd;" "Return O God of Hoſts;" and "He was deſpiſed and rejected," &c.

Ciampi was then the opera compoſer, who, beſides burlettas, furniſhed ſeveral ſerious operas, in which Guadagni had the firſt man's part, and Fraſi that of firſt woman; but both being regarded only as ſecond-rate ſingers, the ſucceſs of theſe dramas was neither flattering to the compoſer nor the ſingers; and the profits to the impreſario, ſig. Croza, were ſo inconſiderable, that *one fine morning* he decamped juſt time enough to eſcape impriſonment, after ſweeping the treaſury of the opera-houſe, and leaving actors, trades-people, and all perſons connected with the theatre at the mercy of the bailiffs, whoſe ſearch he had had the addreſs to elude, in ſpite of an advertiſement, which appeared in the Daily Advertiſer, May 15th 1750, ſigned Henry Gibbs, a tea-merchant, in Covent-garden, offering a reward of 30*l.* to any one who would ſecure his perſon. This event put an end to operas of all kinds, for ſome time.

However, though the opera-houſe was ſhut up, Guadagni remained in England, ſinging for Handel, and in ſummer at the triennial meeting, in oratorios under the direction of Mr. Harris in Saliſbury cathedral, &c. and laſtly at Drury-lane with Fraſi in the Engliſh opera of the "Fairies," ſet to muſic by the late Mr. Smith, the aſſiſtant and ſucceſſor of Handel in carrying on oratorios. This opera, written by Garrick on the plan of Shakeſpear's Midſummer Night's Dream, had conſiderable ſucceſs. In 1753, when the run of this muſical drama was over, Guadagni returned to Italy, where he remained till 1754, when he went to Liſbon as ſecond man, under Gizziello, and, in 1755, very narrowly eſcaped deſtruction during the earthquake. After this dreadful calamity, Gizziello, ſeized with a fit of devotion, retired into a monaſtery, where he ſpent the reſt of his life. Having a friendſhip for Guadagni, and being pleaſed with his voice and quickneſs of parts, he perſuaded the young ſinger to accompany him in his retreat, where, during a conſiderable time, he took great pains in directing his ſtudies; and it is from this period that Guadagni's great reputation, as a refined and judicious ſinger, may be dated. His ideas of acting were taken much earlier from Garrick, who, when he performed in an Engliſh opera called the Fairies, took as much pleaſure in forming him as an actor, as Gizziello did afterwards in poliſhing his ſtyle of ſinging. After quitting Portugal, he acquired great reputation as firſt man in all the principal theatres in Italy, and the year before his return to England, he excited great admiration by his talents, as well as diſturbance by his caprice, at Vienna. The higheſt expectations of his abilities were raiſed by rumour before his arrival here for the winter ſeaſon; and as an actor, he ſeems to have had no equal on any ſtage in Europe: his figure was uncommonly elegant and noble; his countenance replete with beauty, intelligence, and dignity; and his attitudes and geſtures were ſo full of grace and propriety, that they would have been excellent ſtudies for a ſtatuary. But though his manner of ſinging was perfectly delicate, poliſhed, and refined, his voice ſeemed, at firſt, to diſappoint every hearer. Thoſe who remembered it when he was in England before, found it comparatively thin and feeble. For he had now changed it to a ſoprano, and extended its compaſs from ſix or ſeven notes, to fourteen or fifteen. And let a fluid of ſix feet in depth be ſpread over more than double its uſual ſurface, and it will neceſſarily be ſhallower, though of greater extent. The muſic he ſung was the moſt ſimple imaginable; a few notes with frequent pauſes, and opportunities of being liberated from the compoſer and the band, were all he wanted. And in theſe ſeemingly extemporaneous effuſions, he proved the inherent power of melody totally divorced from harmony, and unaſſiſted even by uniſonous accompaniment. Surpriſed at ſuch great effects from cauſes apparently ſmall, we frequently tried to analyze the pleaſure he communicated to the audience, and found it chiefly aroſe from his artful manner of diminiſhing the tones of his voice, like the dying notes of the Æolian harp. Moſt other ſingers captivate by a ſwell, or *meſſa di voce*; but Guadagni, after beginning a note or paſſage with all the force he could ſafely exert, fined it off to a thread, and gave it all the effect of extreme diſtance. And though neither his voice nor execution contributed much to charm or excite admiration, he had a ſtrong party in England of enthuſiaſtic friends and adherents, of whom, by perſonal quarrels and native caprice, he contrived to diminiſh the number very conſiderably before his departure. He had ſtrong reſentments, and high notions of his own importance and profeſſion, which revolted many of his warmeſt friends, and augmented the malice of his enemies.

The ſerious operas in which he performed during the ſeaſon of 1769 and 1770, were Olimpiade, a paſticcio, but chiefly by Piccini, though the favourite ſong was "Quel labbro addorato," by Bach; Ezio by Guglielmi; and Orfeo, by Gluck. In this laſt drama his attitudes, action, and impaſſioned and exquiſite manner of ſinging the ſimple and ballad-like air, "Che farò," acquired him very great and juſt applauſe; but in the midſt of the utmoſt public favour, his private difference with the Hon. Mr. Hobart, the patentee at that time, concerning an imagined affront put upon his ſiſter in favour of Zamparini, together with his determined ſpirit of ſupporting the dignity and propriety of his dramatic character, by not bowing acknowledgment, when applauded, or deſtroying all theatrical illuſion, by returning to repeat an air, if encored at the termination of an intereſting ſcene, he ſo much offended individuals, and the opera audience in general, that, at length, he never appeared without being hiſſed. His enemies, knowing him to be *paſſion's ſlave*, frequently began an encore, with which they knew he would not comply, on purpoſe to enrage the audience. Guadagni was allowed to be the fineſt billiard player in Europe; but his antagoniſt, diſcovering his irritability, uſed, when he was playing for large ſums, to diſpute, as unfair, ſomething that was clearly otherwiſe, by which he was ſo agitated, as not to be a match for a child. He quitted England for the laſt time in the ſummer of 1771; in 1772 he performed at Verona, and afterwards accompanied the late electreſs dowager of Saxony, a dilettante of the firſt order in abilities as well as rank, to Munich, where he continued till 1776, when he appeared on the ſtage, for the laſt time, at Venice. After which he ſettled at Padua in the ſervice of Sant' Antonio, where he loſt his ſight in 1786, by a paralytic ſtroke, and ſoon after his life.

The declenſion of a great ſinger, who has not had prudence to realize an independence during proſperity, ſeems the moſt humiliating that a fallen favourite can feel. And the proud and lofty minded Guadagni, bereaved of his talents and public favour, by age, infirmities, and caprice, ſpent the laſt ten years of his life in indigence and mortification!

GUADAGNI, LA SIGNORA, ſiſter of Guadagni, a moſt pleaſing ſinger and elegant actreſs, was the original Cuchina in Italy, as well as England, in Piccini's celebrated "Buona Figliuola." She was married to Aleſſandri, a young Roman compoſer, who ſet two comic operas for our ſtage, "La Moglie Fidele," and "Il Re alla Caccia;" which are not devoid of merit; but there were ſo many maſters here at this time, whoſe fame was already eſtabliſhed, that a young compoſer, who had his reputation to make, had little chance of being much noticed. He has, however, diſtinguiſhed himſelf, ſince he left England, by writing for ſome of the firſt ſingers in the principal theatres of Italy. He ſtaid here but one ſeaſon, his wife, Signora Guadagni, having been ſuperſeded by Zamparini, a pretty woman, but an affected ſinger, which pleaſed the votaries of beauty, more than the *conoſcenti* in good ſinging.

GUADAGNOLI, PHILIP, a learned Orientaliſt, who flouriſhed in the 17th century, was born at Magliano about the year 1596. At the age of ſixteen he entered among the regular clerks minors; and made his profeſſion at Rome in 1612. He devoted himſelf moſt aſſiduouſly to the ſtudy of the Oriental languages, and he ſpent a great part of his life in tranſlating works from the Arabic. He was choſen profeſſor of the Arabic and Chaldee in the College of Wiſdom; and in 1656 he pronounced an oration in the former language before queen Chriſtina of Sweden. He afterwards was employed with others in furniſhing a correct Arabic verſion of the whole bible; this grand deſign almoſt wholly employed him twenty-ſeven years. It was completed in 1649, but was not publiſhed till ſome years after the author's death, *viz.* in 1671. In anſwer to ſome objections of a learned Perſian, to Chriſtianity, he publiſhed "Apologia pro Religione Chriſtiana." This work he undertook by the expreſs orders of pope Urban VIII., and he performed the taſk ſo much to the ſatisfaction of the Perſian, to whom it was ſent, that he immediately renounced the Mahometan faith, and became a zealous advocate for the Chriſtian religion, which he had formerly oppoſed. This work was publiſhed in Arabic in 1637, and the author next wrote a piece entitled "Conſiderations againſt the Mahometan Religion," which was printed at Rome in 1649, and which is intended to ſhew that the Koran is a mere rhapſody of impoſtures and falſehoods. He was author likewiſe of an Arabic grammar, entitled "Breves Inſtitutiones Linguæ Arabicæ," folio; and of a dictionary of the ſame language. He died at Rome in the year 1656.

GUADALAJARA, or GUADALAXARA, in *Geography*, an ancient town of Spain, ſituated on a plain near the eaſtern bank of the Henarez, and the chief town of the beautiful canton of Alcarria in New Caſtile. It was formerly inhabited by the Romans, who named it, according to ſome, Arriaca and Carraca, and, according to others, Turria. From the Romans it paſſed under the dominion of the Goths, and was conquered by the Moors in 714, who called it Guidalhichara or Guidalarrica, whence it derived its preſent name. It was retaken by Alvar Fanez, couſin of the Cid, for king Alphonſo the Firſt of Caſtile, and VIth of Leon. It is large, but ill-built; it was formerly ſurrounded by ſtrong walls, of which ſome ruins remain; and it received, in 1464, from Henry IV. of Caſtile, the title of city, and the right of ſending deputies to the ſtates-general of the kingdom. Its population, according to Mr. Townſend, conſiſts of 16,000 perſons; it is divided into 10 pariſhes, and contains ſix monaſteries, ſeven convents, two hoſpitals, and eight hermitages, chapels or private oratories. The monaſtery of the order of St. Anthony was ſuppreſſed in 1791. It is the chief place under the controul of an intendant and corrigidor, and the place of reſidence of both, as well as of an alcade mayor. The palace of the family of Infantado is of conſiderable extent, conſtructed without much taſte, but within richly ornamented and furniſhed. It is rendered famous by the royal manufactory of broad cloth, which is of different qualities, and particularly of that ſpecies of cloth, which is made of Vigogna or Vigonia wool, obtained from Buenos-Ayres and Peru. In this manufactory the king has been accuſtomed to employ about 4000 people, to whom he pays every month 600,000 reals, or 6000*l.*, beſides about 40,000 ſpinners ſcattered in the ſurrounding villages. This manufacture was firſt projected by the baron de Riperda, A.D. 1720; but it was carried on for ſome years without much ſucceſs. Another ſimilar manufacture at St. Fernando was united to this, A.D. 1755, and transferred by government to the Gremias; but after a few years, A.D. 1768, the king once more undertook to manage both on his own account; but they have not proſpered; 22 miles N.E. of Madrid. N. lat. 40° 35'. W. long 3° 32'.—Alſo, a river of Spain, which runs into the ſea, between Gibraltar and Marbella.

GUADALAJARA, or *Guadalaxara*, an audience of Mexico or New Spain, which extends over all the northern provinces, and comprehends Guadalaxara proper, Xaliſco or New Gallicia, Zacatecas, New Biſcay, Cinaloa, and Culiacan.

GUADALAJARA, or *Guadalaxara*, a city of Mexico, the capital of Guadalaxara proper, the ſee of a biſhop, and the ſeat of the royal audience, eſtabliſhed in 1548. This city is more extenſive than populous, containing from eight to nine thouſand families of Spaniards, Meſtizos, and Mulattoes; for the Indians, who live in farms and villages, cannot be included. It has eight ſquares, many convents, and two colleges for education. It is ſituated on the river Barnaja, or Eſquitlan, which flows from the lake of Mechoacan, and runs rapidly to the N.W., there being a cataract at the diſtance of four leagues. The plain on which it ſtands is watered by many rivulets, and ſurrounded with hills, overſhadowed by pines and oaks. This city boaſts of ſkilful artiſans, and the people are generally fair and well-formed, and celebrated for induſtry and honeſty. Here is a handſome aqueduct, and to the city belong numerous gardens, abounding with excellent fruits. The ſtreets are unpaved, and the carriages are drawn by unſhod mules, which are fed with maize at the price of four reals per buſhel. It is ſubject to frequent tempeſts, but it has never any ſnow. In this town there is eſtabliſhed a manufacture of cigars, the ſale of which contributes to the revenue. It is alſo famous for its earthen jars, which are of a ſweet ſcent, and are conveyed as far as Spain, where, it is ſaid, they are eaten by ſome capricious females. Near Guadalaxara is the celebrated eſtate of the marquis of Altamira, about 40 leagues in extent, which ſends annually to Mexico between three and four thouſand beeves. It is alſo very productive of wheat, pimento, &c. with numerous flocks of ſheep and ſwine; but markets are wanting. According to Eſtalla, cited by Pinkerton,

kerton, the eſtate might yield 40,000 peſos a year. The biſhoprie of Guadalaxara yields, in tithes, 2,579,108 peſos annually. N. lat 1° 20'. W. long. 104° 16'.

GUADALAJARA *de Buga*, a town of South America, in the province of Popayan; 36 miles N.W. of Popayan.

GUADALAVIAS, a river of Spain, which runs into the ſea near Valentia. N. lat. 39° 25'.

GUADAL-CANAL, one of the iſlands of Solomon, in the ſouthern Pacific ocean.—Alſo, a little walled town of Spain, in the province of Andaluſia, environed by a branch of the Sierra Morena, formerly noted for mines of quickſilver, which have been long neglected, and lately in vain explored: about a mile to the N.E. of it are ſilver mines, which are ſaid by De Laborde to yield a conſiderable revenue. This ſmall town contains about 1000 inhabitants, two pariſhes, and four convents; 19 leagues N. of Seville.

GUADALCAZAR, a town of Spain, in the province of Cordova; 12 miles S.W. of Cordova.—Alſo, a town of Mexico; 50 miles N.E. of St. Luis de Potoſi.

GUADAL-MEDINA, a river of Spain, which runs into the ſea near Malaga, and which is ſubject to inundations that incommode and injure thoſe parts of the town that are neareſt to it.

GUADALOUPE, one of the largeſt of the Caribbee or Leeward iſlands in the Weſt Indies, which, including "Grand Terre" and "Baſſe-Terre," is about 60 Britiſh miles in length, and 25 in breadth. Its form is ſomewhat ſingular, as it is divided into the two parts above-named by a narrow channel, which is navigable only by boats. This channel, which is an arm of the ſea, runs N. and S.; the portion on the N.E. of it is called "La Grande Terre," and the other on the S.W. the "Baſſe-Terre," but more generally Guadaloupe. This channel communicates with the ſea at both extremities, that on the N. being denominated "Grand Cul-de-Sac;" and that on the S. "Petit Cul-de-Sac." The part called "Grande-Terre" is about 57 miles from Antigua point on the N.W. to the point of Guadaloupe on the S.E., and 29 miles in the middle, where it is broadeſt, about 120 miles in circumference; and the other part is ſubdivided by a ridge of mountains into "Capes-Terre" on the W., and "Baſſe-Terre" on the E. This part is 36 miles from N. to S., and 23 in its greateſt breadth; and about 120 in circuit. The limb of the ſea, which ſeparates the portion called "Grande-Terre" from Guadaloupe proper is, according to Labat, about 50 fathoms wide at its northern mouth, but in ſome parts it is not above 15 fathoms. The depth is ſuch in ſome parts as to admit a ſhip of 500 tons, while in others a bark of 50 tons could not paſs at low water. The breadth is often confined by mangrove trees; but the navigation is pleaſant, the water being generally calm and clear like a mirror; and the length is about two leagues. The French were, in 1696, obliged to abandon Grande-Terre on account of the frequent incurſions and depredations committed there by the Engliſh from Antigua and Montſerrat; and, beſides, this part is deſtitute of freſh water. The air in the part of the iſland called Guadaloupe is clear and ſalubrious, and leſs incommoded with heat than that of Martinico. It alſo abounds with good water; the ſoil is rich, and well cultivated, and produces, like that of Martinico, ſugar, cotton, indigo, coffee, ginger, and various fruits. Among the vegetable productions are the tree, which yields the copaiba-balſam; the milk ſhrub yielding a liquor like milk; the moubane-tree, furniſhing a kind of plum, which is uſed for fattening hogs; the corbary tree, which yields a gum ſimilar to amber; a kind of cinnamon-tree, aloes, and ſandal-wood. The birds are parrots, partridges, turtle-doves, herons, and falcons, and an extraordinary bird, called "devil-bird," which is a fiſhing bird of paſſage, about the ſize of a young pullet, with jet-black plumage. The bees are black, ſmall, and without ſting; and the honey produced by them retains the conſiſtence of oil. A ſtinking inſect, called ravet, is ſaid to be very troubleſome in this iſland, gnawing paper, books, and furniture, but it is deſtroyed by a large ſpider. On the weſtern ſhore Labat deſcribes a ſingular phenomenon; the ſea being ſo hot, at a ſmall diſtance from the ſhore, as to boil eggs; and on moving the ſand a ſtrong ſmell of ſulphur is perceived. There are alſo a boiling fountain, and a hot marſh, the latter of which is very deceitful and dangerous to ſtrangers. Labat alſo viſited and has deſcribed the "Soufriere" or Solfaterra of Guadaloupe. This eminence commands an extenſive view, but in aſcending it, burnt ſtones occur, and places covered with white aſhes, ſmelling ſtrongly of ſulphur. The ſummit is a large platform, ſurrounded with burnt ſtones, and ſmoke iſſuing from holes and crevices. The mouth of the volcano is perceived on the E.; and Labat obſerved other apertures in this volcanic mountain. The air on the ſummit is very cold; but the negroes frequently aſcend it to gather ſulphur, which they purify and ſell. There are ſeveral pools in this mountain, and ſprings which unite and form torrents.

Guadaloupe was firſt diſcovered by Columbus, who gave it this name from a fancied reſemblance to the mountain ſo called in Old Spain. His landing was oppoſed by the women of the iſland, who attacked the ſtrange viſitors with bows and arrows; but the fire-arms of the Spaniards ſoon diſperſed them, and they obtained a very eaſy poſſeſſion of the iſland. Few of the original inhabitants, or Charaibes, now remain. This iſland was firſt ſettled by 550 French, under the conduct of Loline and Dupleſſis in 1635; but ſo ſlow was their progreſs, that, in 1700, there were only 3825 white inhabitants, 325 free people of colour, and 6725 ſlaves, of whom a conſiderable portion conſiſted of Charaibes. There were only 60 ſmall manufactories of ſugar, and 66 of indigo, with ſome cotton, and a little cacao. The horſes, mules, and aſſes were 1620; and the beeves 3699. In 1755, the colony was peopled by 9643 whites, and 41,140 ſlaves. There were 334 ſugar houſes; and the cotton, coffee, cacao had increaſed in a like proportion, while tobacco and indigo were added to the produce. The banana trees, for the food of the ſlaves, were computed at 2,028,520; with 32,577,950 ditches of manioc. The horſes amounted to 4946, mules 2924, aſſes 125; with 13,916 beeves, 11,162 ſheep and goats, and 2444 ſwine. In the month of April 1759 it was conquered by the Engliſh, who farther contributed to its proſperity. In 1763 it was reſtored to France. In 1767 the valuation exceeded that of 1755. France at that time received from Guadaloupe 140,418 quintals of fine ſugar; 23,603 of raw ſugar; 34,205 of coffee; 11,955 of cotton; 456 quintals of cacao; 1884 of ginger; 2529 of campeachy-wood; with 24 boxes of confections, 165 boxes of liqueurs, 34 caſks of rataſia, and 1202 ſkins. Theſe articles were ſold in the colony for 7,103,838 livres; while the merchandiſe received from France only coſt 4,523,884 livres. It was ſuſpected that much of the produce was ſmuggled, as it was well known to exceed that of Martinico. Pinkerton's Geography, vol. iii. In April 1794 Guadaloupe was taken by the Britiſh troops, but evacuated in February 1795. It was taken again in February, 1810. N. lat. 15° 5' to 16 37'. W. long. 61° to 72 15'.

GUADALOUPE, an iſland in the N. Pacific ocean, compoſed of high, naked, rocky mountains; about 13 miles long, nearly in a north and ſouth direction, with two rocky iſlets, one lying W.S.W. half a league, the other two miles

S. from its S. point. N. lat. 29°. E. long. 241° 38′.—Alſo, one of the Solomon iſlands in the Pacific ocean. S. lat. 9° 30′.

GUADALQUIVIR, the ancient *Bætis* or *Tarteſſus*, a river of Spain, which originates at the foot of mount Segura, and after purſuing a ſluggiſh courſe of about 340 miles through New Caſtile, diſcharges itſelf into the ſea, about 18 miles N.W. of Cadiz; N. lat. 36° 46′. W. long. 6° 26′.

GUADALQUIVIREJO, a river of Spain, which runs into the ſea, about five miles S.S.W. of Malaga; N. lat. 36° 40′. W. long. 4° 35′.

GUADALUPA, a ſmall tolerably built town, in a valley watered by a ſtream of the ſame name, and abounding with vines, orange-trees, fig-trees, and other fruits; 25 leagues W.S.W. of Toledo.

GUADALUPE, a town of Mexico, in New Biſcay; 70 miles N. of Parral.—Alſo, a town of New Mexico, in the province of Mayo; 100 miles E. of Santa Cruz.—Alſo, a town of New Mexico; 15 miles W. of Sumas—Alſo, a river called alſo *Magdalena*, ſituated between the Rio Bravo and the Miſſiſippi, that runs into a bay of the gulf of Mexico.

GUADARRAMA, a mountain of Spain, which ſeparates the two Caſtiles, over which is formed a road by order of Ferdinand VI. commencing at the village of Eſpinar, which renders the aſcent eaſy and pleaſant. The ſummit, on which is a marble monument to the memory of this prince, commands an extenſive view of the whole range of country included in the two provinces of Old and New Caſtile.—Alſo, a river of New Caſtile, which riſes near a village of the ſame name, famous for its cheeſe, and runs into the Tagus, about nine miles below Toledo.

GUADEL, a ſea-port town of Perſia, in the province of Mecran, on the coaſt of the Arabian ſea, ſituated in a bay, and near a cape, to both of which it gives name. The inhabitants are chiefly weavers; but the trade has declined. N. lat. 25° 16′. E long. 62°.

GUADEN, or HADEN, a town of Africa, in the deſert of Zanhaga. N. lat. 21° 40′. W. long. 13°.

GUADIANA, a town of Mexico, in the province of Biſcay, ſituated on a river of the ſame name; 40 miles N. of Durango. N. lat. 24° 50′. W. long. 104° 56′.—Alſo, a navigable river of Spain, anciently called *Anas*, which takes its riſe in ſome lakes or marſhes N.W. of Alcaraz in New Caſtile; it ſoon afterwards loſes itſelf in the earth, and ſprings up again through various apertures called the "eyes of the Guadiana;" then flowing weſterly, it enters the confines of Portugal, near Badajoz, and ſuddenly again changing its direction, it purſues a ſoutherly courſe to the ocean, between Ayamonte and Caſtel Marin; N. lat. 37° 10′. W. long. 7° 26.

GUADIX, a town of Spain, in the province of Granada, which is the ſee of a biſhop, ſuffragan of Seville. This town was taken from the Moors by Alphonſo in 1252, and again loſt to them; from whom it was taken by Ferdinand the Catholic. It contains five pariſhes, ſeven convents, and 8000 inhabitants, and is ſituated on a declivity eight leagues E. of Granada, in a valley encompaſſed on all ſides by high, bleak, and irregular clay hills, waſhed into broken maſſes reſembling ſpires, towers, and mis-ſhapen rocks. Whole villages are dug in theſe hills: but the adjacent diſtrict is little cultivated; however, it produces grain, wine, and good paſtures, but no oranges nor olives. Guadix is noted for the manufacture of pocket knives. N. lat. 37° 24′. W. long. 3° 9′.

GUADUM, in *Natural Hiſtory*, an herb by the ancient Romans called *glaſtum* and *vitrum*; by the Greeks *iſatis*; by the Britons *gundum*; and by us *woad*. See GLASS.

GUAFFO, in *Geography*. See COMMENDO.

GUAGAMOW, a town of Hindooſtan, in Oude; 37 miles N.N.W. of Manichpour.

GUAGE-PADDLES, or *Guage-weirs*, are contrivances for letting off a certain limited quantity of water per day or hour, from a canal or reſervoir, &c. See GAUGE.

GUAGING-MASTER, the officer appointed to guage or aſcertain the tonnage or lading which boats carry at different depths of lading.

GUAGIROS, in *Geography*. See GOAHIROS.

GUAGNINI, ALEXANDER, in *Biography*, born at Verona in 1538, was author of "Sarmatiæ Europæ Deſcriptio," a rare and highly eſteemed work. He publiſhed "Rerum Polonicarum Scriptores," in three volumes, of which the firſt volume is a compendium of the chronicles of Poland. He died at Cracow in 1614.

GUAGUAS, a tribe of ſavage Indians, in S. America, in the lately explored territory of the PAMPAS *del Sacramento*, who inhabit the banks of the Yupura, which joins the Maranon from the north. Theſe ſavages are Anthropophagi; and return from war with the hearts of their enemies faſtened round their necks. They even ſalt human fleſh, and regard it as a moſt ſavoury regale. They run like hares; and by compreſſure from their infancy, reduce their bellies to an inconceivably ſmall ſize.

GUAIACANA, in *Botany*. See DIOSPYROS.

GUAIACANÆ, the 49th natural order of plants in Juſſieu's ſyſtem, and the firſt of his 9th claſs, ſo named from the firſt genus in it, *Guaïacana* of Tournefort, *Dioſpyros* of Linnæus, Juſſieu, and others. The character of the claſs is to have two cotyledons, a monopetalous corolla, inſerted into the calyx, and ſtamens inſerted either into the one or the other. The order of *Guaïacanæ* is thus defined. *Calyx* of one leaf, divided at the ſummit. *Corolla* inſerted either into the bottom or top of the calyx, lobed more or leſs deeply. *Stamens* inſerted into the corolla, either definite in number, when they are equal to, or double, the number of its ſegments; or numerous and indefinite, in which caſe their filaments are often united at the baſe into one or ſeveral ſets. *Germen* in moſt caſes ſuperior, in a few inferior, or half-inferior; ſtyle one; ſtigma either ſimple or divided. *Fruit* ſuperior, or ſometimes inferior, either capſular, or more frequently pulpy, of many cells, with one ſeed in each. *Corculum* of the ſeed flat, in a fleſhy *albumen*. *Stem* ſhrubby or arboreſcent. *Leaves* alternate. *Flowers* axillary.

The firſt ſection, with a definite number of ſtamens, contains *Dioſpyros*, (ſee that article, and EMBRYOPTERIS,) *Royena*, *Labatia* of Schreber, which is *Pouteria* of Aublet, *Styrax* and *Haleſia*. The ſecond ſection, with indefinite ſtamens, contains *Alſtonia*, *Symplocos*, *Ciponima* of Aublet, *Paralea* of the ſame, and *Hopea* of Garden and Linnæus. All theſe ſuppoſed genera were conſidered as one by L'Heritier, and called *Symplocos*, that being the oldeſt name among the whole.

GUAIACUM, a barbarous name, derived from the Spaniſh one *Guaiac* or *Guayacan*, which itſelf originated from *Hoaxacan*, the Mexican appellation of the ſame plant. Plum. Nov. Gen. 39. t. 17. Linn. Gen. 208. Schreb. 287. Willd. Sp. Pl. v. 2. 538. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 56. Juſſ. 296. Lamarck. Illuſtr. t. 342. Gærtn. t. 113.—Claſs and order, *Decandria Monogynia*. Nat. Ord. *Gruinales*, Linn. *Rutaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of five ovate-oblong, obtuſe, concave, ſpreading, deciduous leaves; the two outer ones rather the ſmalleſt. *Cor.* Petals five, roundiſh-obovate, obtuſe, concave, ſpreading, longer than the calyx, with ſhort linear claws, inſerted into the receptacle. *Stam.* Filaments, ten, awl-ſhaped, erect, ſmooth, ſhorter than the corolla, inſerted into the receptacle; anthers incumbent, oblong, cloven at each end, at length recurved. *Piſt.* Germen on a ſhort ſtalk, turbinate, lobed, angular; ſtyle ſhort, awl-ſhaped; ſtigma ſimple, acute. *Peric.* Capſule ſomewhat turbinate, ſtalked, with from two to five rounded, ſlightly bordered, angles, and as many cells, burſting at the angles, the partitions from the centre of each valve, the other coat rather pulpy. *Seeds* ſolitary, pendulous, ovate, convex on one ſide, angular at the other.

Eſſ. Ch. Calyx of five unequal leaves. Petals five. Stamens ſimple. Stigma acute. Capſule ſtalked, of five cells and five valves, with contrary partitions. Seeds ſolitary, pendulous.

Obſ. The natural number of cells and valves of the fruit is five, but there are moſtly but two or three, not perhaps from abortion, except in the very earlieſt ſtate of the germen long before fecundation can take place, becauſe that part is, even at that early age, frequently found to conſiſt of only two lobes, reſembling the pouch of cruciform ſiliculoſe plants.

1. G. *officinale.* Linn. Sp. Pl. 546. Woodv. Med. Bot. t. 16. (G. jamaicenſe; Pluk. Phyt. t. 35. f. 3, 4. Lignum vitæ; Sloane Jam. v. 2. 134. t. 222. f. 3—6)—Leaves of two pair of elliptical obtuſe leaflets.—Native of Jamaica, Hiſpaniola, &c. A *tree* 30 feet high, and near a foot in the diameter of its trunk, the branches numerous, divaricated, knotty, leafy at the ends; the bark very ſmooth, variegated with green and white; the wood hard and ponderous, dark olive-brown within, whitiſh towards the bark, having a peculiar acid aromatic ſcent, and well known in England by the name of Braſil wood, or *Lignum vitæ.* The *leaves* are oppoſite, abruptly pinnate, conſiſting of only two pair of obovate or roundiſh, obtuſe, entire, ſmooth, pale, rigid, leaflets, various in ſize, with ſeveral radiating veins. *Flowers* pale blue, on ſimple, axillary, cluſtered ſtalks, ſhorter than the leaves. The wood and bark were celebrated remedies for venereal complaints, before mercury came into uſe, as the gum or reſin ſtill is for rheumatic diſorders.

2. G. *ſanctum.* Linn. Sp. Pl. 547. (G. americanum, lentiſci folio; Comm. Hort. Amſt. v. 1. 171. t. 88. Hoaxacan, five Lignum ſanctum; Hernand. Mex. 63. Jaſminum vulgò Americanum; Pluk. Phyt. t. 94. f. 4.)—Leaves of many pair of ſquariſh oblique leaflets.—Native of various hot parts of South America. A middle-ſized knotty *tree*, whoſe wood, according to Hernandez, is internally blue. The *leaflets* are about ſeven or eight pair, ſmaller than in the former, and oblique or unequal-ſided, obtuſe, veiny, ſometimes ſpeckled with black. *Flowers* rather corymboſe, pale yellow. The wood of this ſpecies was firſt introduced as a cure for the venereal diſeaſe by the Spaniards, and being carried to the Eaſt Indies, fetched there an extravagant price, till it became more plentiful.

3. G. *dubium.* Forſt. Prod. 32.—Leaves conjugate, oblong, lanceolate, obtuſe.—Gathered by Forſter in the iſland of Tongatabu.—Of this we know nothing more.

4. G. *afrum.* Linn. Sp. Pl. 547, is the beautiful *Schotia ſpecioſa* of Jacquin, Ic. Rar. t. 75. See Schotia.

The common *lignum vitæ*, or *guaiacum*, which is uſed in medicine, grows naturally in moſt of the iſlands of the Weſt Indies, and the warm parts of America, where it becomes a very large tree, having a browniſh, hard, brittle bark, not very thick; the wood is ſolid and ponderous, very reſinous, of a blackiſh yellow in the middle, and of a hot aromatic taſte; the ſmaller branches have an aſh-coloured bark, and are garniſhed with leaves divided by pairs; each pair having two pair of ſmall oval blunt pinnæ, of a ſtiff conſiſtence, and a lucid green; the flowers are produced in cluſters at the ends of the branches, compoſed of five oval concave petals, of a fine blue colour; in the centre of theſe is fixed a ſtyle with an oval germen, crowned by a ſlender ſtigma; and round this is ſituated a great number of ſtamina, which are as long as the ſtyle, is terminated by ſickle-ſhaped ſummits. The wood of this tree is ſo hard as to break the tools in felling them, ſo that it is ſeldom cut down for fire-wood, being difficult to burn · but is of great uſe to the ſugar-planters for making wheels and cogs for ſugar mills. It is alſo frequently brought to Europe, and wrought into bows and other utenſils. Miller.

Guaiacum, in the *Materia Medica*, is a ſpecies of the tree above-deſcribed. The wood, gum, bark, fruit, and even the flowers of this tree, poſſeſs medicinal qualities. The *wood* is brought here principally from Jamaica, in large pieces of four or five cwt. each, and, on account of its hardneſs and beauty, is much valued for various articles of turnery ware, &c. It is very compact, and ſpecifically heavier than water; the colour of the outer part is a pale yellowiſh, that of the heart a dark blackiſh brown, with a mixture of green. Without heating or raſping it has little perceptible ſmell, but during theſe operations its odour is ſlightly aromatic; when chewed it is ſlightly acrimonious. Its pungency reſides in a reſinous matter, which is totally extracted by digeſtion in rectified ſpirit, and partially by boiling water. The ſolid extract, obtained by rectified ſpirit, amounts to about one-fourth of the weight of the wood; with water, ſcarcely one-ſixth is obtained. (Lewis's Mat. Med.) The *gum*, or rather gummy reſin, is obtained by wounding the bark in different parts of the body of the tree, or by an operation called "jagging." It exudes copiouſly, though gradually, from the wounds; and when a ſufficient quantity has been diſcharged and hardened by expoſure to the ſun, it is gathered and packed in ſmall kegs for exportation. This reſin is of a friable texture, of a deep greeniſh colour, and ſometimes of a reddiſh hue; its taſte is pungent and acrid, but unleſs heated, it has little or no ſmell. It contains more reſin than the watery extract obtained from the wood, and more gummy matter than the ſpirituous extract. The bark of the guaiacum trees yields a ſpontaneous exudation, called the native gum, which is brought to us in ſmall irregular pieces of a bright ſemi-pellucid appearance, differing from the former in its much greater purity. This is ſometimes ſophiſticated by the negroes with the gum of the manchineal tree; but the ſophiſtication may be eaſily detected by diſſolving a ſmall quantity in ſpirit of wine or rum; the true gum imparts a whitiſh or milky tinge; but the manchineal gives a greeniſh caſt. Or, a few drops of ſpirit. nitri dulc. may be added to the ſpirituous ſolution, and then diluted with water, by which the gum is precipitated in a blue powder, whereas the adulteration will appear floating in white ſtriæ, &c. The *bark* contains leſs reſinous matter than the wood, and of courſe is leſs powerful, though in a recent ſtate it is ſtrongly cathartic. The *fruit* is ſaid to be purgative, and, for medicinal uſe, to excel the bark. A decoction of it has been known to cure the venereal diſeaſe, and even the yaws in its advanced ſtage, without the uſe of mercury. The *flowers*, or bloſſoms, are laxative, and are given in Jamaica to children in the form of ſyrup. However, the wood and reſin of guaiacum are the only parts now generally uſed medicinally in Europe. Guaiacum was introduced in the Materia Medica ſoon after the diſcovery of America, and, previouſly to the uſe of mercury, it was conſidered as an antidote to the lues venerea, and ſold for ſeven gold crowns a pound; but it often failed in curing the patient, and was, therefore, ſuperſeded by mercury; though it is ſtill occaſionally uſed for correcting a vitiated habit, rather than for its effects as an anti-venereal. Nevertheleſs, ſome opinions and facts adduced by Boerhaave, Aſtruc, Plenk, De Haen, Hutten, and lately by Mr. Hunter, may be conſidered in ſome meaſure as exceptions. The general virtues of guaiacum are ſtated by Bergius to be "mundificans, ſudorifera, diuretica, ſubcalefaciens, ſtomachica," and its uſe to be in "ſyphilis, arthritis, morbi cutis, odontalgia," to which may be added chronic rheumatiſms, ſcrophula, and ſome ſchirrous diſeaſes. Dr. Cullen, conceiving guaiacum as analogous to the nature of the balſams and turpentines, ſuppoſes that, like theſe, it is very diffuſible in the ſyſtem, and has conſiderable efficacy in ſtimulating the extreme veſſels every where; and thus he accounts for its power in chronic rheumatiſms; and from its paſſing off by the pores of the ſkin, he thinks that it is a probable remedy in ſome cutaneous diſorders. This opinion correſponds with Murray's. According to Lewis, where the excretory glands are obſtructed, the veſſels lax and flaccid, and the habit replete with ſerous humours, it has good effects; but in thin emaciated habits, and an acrimonious ſtate of the fluids, it often does harm. Dr. Woodville ſays, that he has frequently conjoined it with mercury and ſoap, and in ſome caſes with bark and ſteel, and found it eminently uſeful as an alterative. In the pharmacopœias it is directed in the form of tincture and elixir; the latter is ordered by the Edinburgh College to be prepared two ways, *viz.* with rectified ſpirit, and the vinous ſpirit of ſal ammoniac. Of theſe compounds the doſe may be from two ſcruples to two drams: the powder is generally given from ſix grains to twenty, or even more, for a doſe, either by itſelf, or in a fluid form, by means of mucilage or the yolk of egg. The "decoctum lignorum," (Pharm. Ed.) of which guaiacum is the chief ingredient, is commonly taken in the quantity of a pint a day. The "mixture of guaiacum" of the London pharmacopœia, or "lac guiaci" of P. L. 1787, is prepared of guaiacum gum-reſin, 1½ dram; refined ſugar, two drams; mucilage of acacia gum, two fluidrams; and cinnamon-water, eight fluid-ounces. The guaiacum is rubbed with the ſugar, then with the mucilage, and when they are mixed the cinnamon-water is poured on gradually. The doſe for adults from ℥ss to ℥ii. The "tincture" is formed by macerating for 14 days half a pound of the gum-reſin powdered in two pints of rectified ſpirit, and then ſtraining. The doſe is ʒi to ʒii. The "ammoniated tincture" is made by macerating for 14 days four ounces of the gum-reſin powdered in a pint and a half of compound ſpirit of ammonia, and then ſtraining. The doſe as before. Dr. Cullen, in imitation of Berger of Copenhagen, avoids the ſpirituous tincture of guaiacum, which has been ſometimes injurious, and employs the following preparation. Having firſt with an equal part of hard ſugar reduced the guaiacum to a fine powder, he applies ſome portion of the yolk of an egg, or of a mucilage of gum-arabic, and rubbing theſe together very carefully, he forms an emulſion with water or watery liquors. This preparation he gives over night in ſuch a quantity as may open the body once next day, which, he ſays, will happen to different perſons from doſes containing 15 to 20 grains of the guaiacum. Berger's formula is the following: ℞ G. guaiaci ℥ſs G. arabici ʒii: bene trita ſolv. in aquæ hyſſopi vel alius diſtillo, ℥ ix. Add ſacchar. ℥ſs. m. d. s. ſolutio, cujus duo cochlearia majora mane et veſperi capiantur, ſuperbibito libra una decocti hordei vel avenæ. Theden recommends the guaiacum made into pills with ſoap of almonds. Woodville Mat. Med.

The guaiac wood is diſtilled by putting thin ſhavings of it into a ſtone-ware retort, to which is to be fitted a large glaſs receiver, with a ſmall hole pierced in its ſide: and the diſtillation is to be promoted by a gradual fire. A liquor, like water, is obtained firſt, and then an acid, reddiſh, empyreumatic liquor, with a little reddiſh oil. In this proceſs a conſiderable quantity of air is diſcharged; which proves that this element is combined in certain bodies, and particularly in this.

GUAIAVA, in *Botany*, Tourn. t. 443. Gærtn. t. 38. See Psidium.

GUAIBI Coara, in *Ichthyology*, the name of an American fiſh, called by the Portugueſe *burace de velha*. It is flat bodied, with a riſing back, and is uſually caught between five and eight inches long, and of about a third part of its length in breadth. It is caught among the rocks and about the ſhores, and it is eaten in conſiderable plenty in the Braſils, both by the natives and Portugueſe. Marcgrave's Hiſt. Braſil.

GUAINUMBI, in *Ornithology*. See Trochilus.

GUAIUCACHI, in *Geography*, a town of Peru, in the dioceſe of Guamanca; 45 miles N. of Guanca-Velica.

GUAKI, a town of Peru, in the audience of La Paz; 5 miles N.W. of La Paz.

GUALACLING, in *Ornithology*, the name given by the people of the Philippine iſlands to a ſpecies of bird of the ſtarling kind. It is of the bigneſs of the turtle; it feeds on fruits, and is a very briſk and lively bird. It appears to be of a plain black colour, except when viewed in the ſun, and then is ſeen to be of a vaſt variety of bright colours.

GUALAGA, in *Geography*, a river of South America, which riſes in S. lat. 10° 57′, under the name of the Guanuco, from the lake Chiquiacoba, in the plains of Bombon, whence it paſſes to the N. receiving ſeveral rivers, and reaches the vicinity of the town of Leon de Guanuco, 10° 3′. After a precipitous courſe it receives the river Monzon, from the W. at N. lat. 9° 22′, when, becoming more tranquil, it forms ſeveral iſlets, and in the province of Lamas acquires the name of the Gualaga. At 7° 10′ it receives from the W. the river Moyobamba. After this, there are four dangerous rapids, before it reaches Ponguillo, at the extremity of the mountains. The breadth of the Gualaga is now 1200 feet; and paſſing through the province of Maynas, at 5° 4′ S. lat. it joins the falſe Maranon, being 450 yards wide and 34 deep, according to Sobreviela (cited by Pinkerton). At the confluence the Gualaga is divided into two branches, and a lake is formed about half a league in breadth, and 70 fathoms deep. During the courſe of a league, the force of each river ſeems equal; but at length the Tunguragua or Jeſuitic Maranon overcomes the Gualaga. The banks of the Gualaga are cloathed with beautiful trees, enlivened with a great variety of birds, and one ſhrub produces a kind of native wax or tallow.

GUALATA, a country of Africa, about 350 miles from the Atlantic. N. lat. 23° 30′, to 25° 30′. W. long. 5 to 8°.

GUALCAS, a town of Peru, in the dioceſe of Truxillo; 80 miles E. of Piura.

GUALDO-PRIORATO, Galeazzo, in *Biography*, was born of a noble family at Vicenza, in 1606. Little is known of him in early life, but he became hiſtoriographer to the emperor, and was author of the "Hiſtory of the Wars of Ferdinand II. and III." "The Troubles of France from 1648 to 1654, with the continuation of the War between the two Crowns;" that "Of the Miniſtry of cardinal Mazarin," three volumes. "The Hiſtory of the emperor Leopold,"

Leopold,'' and other works. He died in 1678. His works, which are in the Italian language, are all written in an agreeable ſtyle.

GUALIBI, in *Geography*, a town of Africa; 30 miles W. of Fez.

GUALIOR. See Gwalior.

GUALLARIPA, a town of Peru, in the dioceſe of Guamanga; 120 miles S. of Guamanga.

GUALRAICO, a town of the iſland of Cuba; 55 miles W.N.W. of Villa-del-Principe.

GUALTEIRI, or Gualtero, a town of Italy, in the department of the Croſtolo; 13 miles N. of Reggio.

GUALTERUS, Rodolphus, in *Biography*, was born at Zurich in the year 1519, and became, at an early age, eminent for his acquaintance with the learned languages, the belles-lettres, and theology; to the illuſtration of the latter, his other acquirements were made ſubſervient. He officiated as paſtor at Zurich from the year 1542 to 1575, and then, on the death of Bullinger, he was choſen principal miniſter of the Proteſtant church in that city and diſtrict. He died in 1586, leaving behind him many theological works, which were highly eſteemed at that time. He was author likewiſe of different treatiſes in grammar, the belles-lettres, and hiſtory, and the tranſlator of ſome ſermons, homilies, &c.

GUAM, in *Geography*, one of the Marian, or Ladrone, iſlands, in the Eaſt Indian ſea, about nine miles in circumference. This is the only one of the Marian iſlands in which the Spaniards have a ſettlement. The principal town, which is the reſidence of the governor, and of the greateſt number of the inhabitants, is at the diſtance of four leagues in the country, ſituated on the N.W. of the iſland, on the border of a conſiderable river, at the mouth of which ſhips may anchor, though the road is not one of the beſt; but it is ſafe during the ſummer months. There is a fort about three leagues from the town. The ſoil is extremely fertile, producing rice, Indian corn, and vegetables in abundance. There are ſome cows, plenty of poultry, and many different kinds of fruit. The bread-tree, the cocoa, and fig-banian, are common in the woods of Guam, and the face of the country preſents numberleſs beautifully diverſified landſcapes, conſiſting of lawns, high woody hills, and vallies in excellent cultivation. The natives are tall and well-made, and, judging from the expreſſion of the countenance, of an open and generous character. They are accuſtomed to chew the betel; and they have an excellent kind of brandy manufactured from the fermented juice of the cocoa-tree.

The natives of the Philippine iſles pretend, that the inhabitants of Guam, and the other Marian iſlands, are originally deſcended in colonies from them. The Indians on this iſland may be computed at about 10,000, and they are diſtributed into ſeven or eight villages. The natives, it is ſaid, go naked, and never bury their dead, but leave them expoſed to the air. N. lat. 13° 25'. E. long. 155° 10'. De Pages' Travels, vol. i.

GUAMA, a river of Brazil, which runs into the Para, at the town of Para.

GUAMAJACU Ape, in *Ichthyology*, a name by which Marcgrave and ſome others have called the *piſcis triangularis*, a ſpecies of *oſtracion*; which ſee.

Guamajacu *Atinga*. See Diodon *Atinga*.

Guamajacu *Guara*. See Diodon *Hyſtrix*.

GUAMALIA, in *Geography*, a diſtrict of Peru, in the archbiſhopric of Lima, ſituated in the centre of the Cordilleras. This juriſdiction commences at the diſtance of 240 miles N.E. from Lima, and being rather cold, few parts of it are fertile through its whole extent, which is above 120 miles. The Indian inhabitants of the towns apply to weaving, and manufacture a great variety of baizes, ſerges, and other ſtuffs, with which they carry on a conſiderable trade with the other provinces.—Alſo, a town of Peru, and capital of the above diſtrict; 150 miles E. of Truxillo.

GUAMANGA, an intendancy or juriſdiction of Peru, in a biſhopric of the ſame name; the ſoil of which is fertile in grain and fruit. The chief articles of commerce are cattle, hides, and ſweet-meats, beſides the produce of ſeveral mines, &c. In this intendancy, with its dependency of Lucanos, 60 mines of gold, 102 of ſilver, and one of quickſilver, were wrought in 1791. Of the firſt of theſe metals, three mines have been abandoned, and of the ſecond 63.—Alſo, a town of Peru, the ſee of a biſhop, ſuffragan to the archbiſhop of Lima. It was founded by Pizarro in 1539, in a wide and beautiful plain, watered by a river, and crowned with perpetual ſprings. The buildings are of ſtone, and thought to be ſuperior to any in Peru; while the gardens, ſquares, and chearful entrances of the city, decorated with trees, recommend a reſidence at Guamanga. The chief articles of trade are leather, grain, and fruit. In the diſtrict there is a fountain, which quickly impregnates a mould with a white and tranſparent ſtone. The ſtate of the population is not preciſely aſcertained. Among the inhabitants are 20 noble families, who live in a quarter of the town ſeparated from the reſt. It has three parochial churches, one for Spaniards, and two for Indians, beſides the cathedral, and ſeveral other churches and convents. It has alſo an univerſity, with a large revenue, for the ſtudy of philoſophy, divinity, and law. S. lat. 12° 50'. W. long. 77° 56'.

GUAMANTAGUA, a town of Peru, in the audience of Lima, and juriſdiction of Canta, in which is a celebrated image of Chriſt, which the inhabitants of Lima viſit in pilgrimage at Whitſuntide; 50 miles N.E. of Lima.

GUAMANUA, a town of the iſland of Cuba; 8 miles W. of Havannah.

GUAMARA, a river of Brazil, diſcharging itſelf into the Atlantic; 42 miles N. of Fernambuco.

GUAMOCO, a town of South America, in the province of Carthagena; 35 miles N.E. of Santa Fé de Antioquia.

GUAMUBO, a town of the iſland of Cuba; 20 miles E. of Havannah.

GUAMULOS, a town of Cuba; 63 miles S.E. of Santa Clara.

GUAN, in *Ornithology*. See Penelope *criſtata*.

GUANA, in *Geography*, a ſmall iſland in the Weſt Indies, N.E. of Antigua. N. lat. 17 16'. W. long. 62'.

Guana *Point*, a cape on the W. coaſt of the iſland of St. Chriſtopher's. N. lat. 17° 21'. W. long. 62° 23'.

GUANABANUS, in *Botany*, Plum. Nov. Gen. 42, t. 10. See Annona.

GUANACACHA, in *Geography*, a lake of South America, in the province of Chiquitos; 50 miles in circuit.

GUANACAS, a town of South America, in the province of Popayan; 40 miles N.E. of Popayan.

GUANACO, in *Zoology*. See Camelus *Huanacus*.

GUANAJO, or Bonacao, in *Geography*, an iſland in the bay of Honduras, about 60 miles in circumference, diſcovered by Columbus. N. lat. 16° 30'. W. long. 86° 23'.

GUANAJUATO, a mining ſtation of New Spain, ſituated between the two towns of Guadalaxara and Quarataro. This celebrated mining ſtation is in the Sierra Madre, or chain of Topia; and the mines produce abundance of gold, ſilver, and copper, but being carried to great depth, the expence of diſcharging the waters is conſiderable. The "Real," (a general name for the royal mining ſtations) of

St. Nicholas, is three leagues to the N. while others extend four leagues to the W. Within the mountains there are alſo five mining ſtations, each having a church, and chaplain to adminiſter the ſacrament; there are alſo in the vales 43 ſmelting houſes, giving bread to a great number of workmen, who conſume annually 100,000 loads of maize, 18,000 ſheep, 5000 beeves, and 18,000 loads of meal; the villages being 16 in the townſhip of Irapuato. In the diſtrict of this ſtation, there is a great number of looms for woollens, the deareſt being nine reals a yard.

GUANAPU, a town of Peru, in the dioceſe of Truxillo, ſituated on the coaſt; 25 miles S S.E. of Truxillo.

Guanapu, a river of Brazil, which, uniting with the Tocantins, forms the Para.

GUANARA, a town of S. America, in the province of Venezuela, fonnded in 1593 on a river, whence it has its name, which furniſhes the inhabitants with excellent water, floods their lands, and waters their cattle. On the weſtern part it has very fertile lands, and on the ſouthern and eaſtern immenſe plains, the paſtures of which are admirably adapted for the multiplication of cattle. The chief wealth of the inhabitants conſiſts in cattle, of which they poſſeſs very numerous herds. They ſupply the province with vaſt numbers of oxen, and alſo of mules; and export the ſurplus by Coro, Porto-Cavello, or Guiana. The population of this town conſiſts of 12,300 perſons: the ſtreets are ſtraight and wide, and the houſes, though not ſumptuous, tolerably well built. Here is a hoſpital with moderate revenue; and the church is large, handſome, and much adorned. Depons aſcribes its ſplendour to its being in poſſeſſion of our lady of Camoroto, whoſe virtues and miracles attract a great concourſe of viſitors from all the neighbouring provinces; 93 leagues S.W. from Caraccas, and 24 leagues S.E. from Truxillo. N. lat. 8° 14′. W. long. from Paris 72° 15′. Dupons' Travels, vol. ii.

GUANATAN, a town of S. America, in the audience of Quito; 35 miles N. of Loxa.

GUANBACHO, a town of Peru, in the dioceſe of Truxillo, on the coaſt. S. lat. 9° 22′.

GUANCA-BAMBA, a town of Peru, in the dioceſe of Truxillo; 70 miles E. of Piura.

GUANCANA, a town of Peru, in the dioceſe of La Paz, on the lake Titicaca.

GUANCA-VELICA, a town of Peru, in the dioceſe of Guamanga, and capital of a juriſdiction of the ſame name; 30 miles N.W. of Guamanga. This town was founded in 1572, by the viceroy, Don Franciſco de Toledo; it ſtands in a break of the Andes, and is one of the largeſt and richeſt cities of the viceroyalty. The temperature is very cold, and the climate changeable, as it ſometimes rains and freezes on the ſame day with tempeſts of thunder, lightning, and hail. The buildings are moſtly conſtructed of a kind of tufa, found near a warm ſpring in the vicinity. There is a dangerous torrent, which is paſſed by ſeveral bridges. The grand mine of quickſilver, in the vicinity, was diſcovered in 1563; it was managed by a company of forty, who delivered the quickſilver to the king at a certain price; but a fire in 1760 deſtroyed many of the works, and the mine has been ſince in conſiderable decay. S. lat. 12° 45′. W. long. 74° 46′.

Guanca-velica, or *Huanca-Velica*, a juriſdiction of S. America, in the biſhopric of Guamanga, or one of the provinces of the viceroyalty of Peru. The town, whence it derives its name, was founded on account of the rich quickſilver mines, from the working of which the inhabitants derive their whole ſubſiſtence. The cold temperature checking the growth of grain and fruits, they are ſupplied by their neighbours.

In this intendancy, with its dependencies of Caſtrovireyna and Lircay, 1 mine of gold, 80 of ſilver, 2 of quickſilver, and 10 of lead, were wrought in 1791; two of gold and 215 of ſilver were in an abandoned ſtate. The quickſilver mine was formerly much celebrated; but it appears to be nearly exhauſted, after having, in the courſe of two centuries, produced mercury to the value of more than 67,000,000 dollars. We learn from Helms, that at Guancavelica, a vein of cinnabar, 80 yards thick, is accompanied with galena, manganeſe, and arſenic. Behind Guancavelica, the argillite graduates into calcareous ſand-ſtone, as this does into ſimple limeſtone; all equally rich in gold, ſilver, and mercury.

GUANCHACO, a ſea-port of Peru, near Truxillo, of which it is the harbour.

GUANCHES, a river of Cuba, which runs into the Spaniſh Main, N. lat. 20° 4′. W. long. 75° 51′.

GUANDAGNANO, a town of Italy, in Friuli; 29 miles N.W. of Friuli.

GUANGON, a town on the N. coaſt of the iſland of Luçon. N. lat. 18° 24′. E. long. 121° 58′.

GUANJAYA, a town of Peru, in the dioceſe of Guamanga; 50 miles N. of Guancavelica.

GUANJOOK, a town of Abyſſinia; 20 miles S.W. of Tcherkin.

GUANO, a town of S. America, in the province of Quito; 10 miles N.E. of Riobamba.

Guano *Key*, *Great* and *Little*, two ſmall iſlands belonging to the Bahamas; the former in N. lat. 26° 30′. W. long. 77° 30′; and the latter in N. lat. 26° 18′. W. long. 77° 5′.

Guano, in *Geology*, a yellowiſh-brown earthy ſubſtance of a peculiar kind, without taſte and of a ſmell reſembling that of caſtoreum. This ſubſtance, which for centuries has been uſed by the Peruvians as a manure, is the production of ſome neighbouring rocky iſlands in the South ſea, from whence large quantities are annually brought to the continent of America. Indeed, Peru, without this ſubſtance, would be nothing but a barren deſart.

The guano has been mentioned by ſeveral early travellers in South America, and it has even been conjectured to be the dung of birds; but ever ſince the time of Ulloa it has fallen into oblivion, from which it was reſcued by Mr. Von Humboldt, who has given an intereſting account of it, which is rendered ſtill more valuable by the chemical analyſis made of this ſubſtance by Fourcroy, Vauquelin, and Klaproth, to whom that celebrated traveller had communicated ſpecimens of it. The following contribution towards the hiſtory of the guano is taken from a letter written to Mr. Klaproth by Mr. Von Humboldt.

The word *huana* (the European always confound the ſyllable *hua* with that of *gua*, and *u* with *o*) ſignifies, in the language of the Incas, *dung* for manuring: the verb *to manure* being *huanunchani*. All the Aborigines of Peru were of opinion that this ſubſtance is birds'-dung; which was, however, doubted by many of the Spaniards.

It is worth remarking that all the Guano-iſlands and rocks are ſituated between the 13th and 21ſt degree of S. lat.; and yet the number of cormorants, flamingos, and cranes appears to be equally conſiderable in the iſlands ſituated farther towards the north or ſouth. Near the town of Arica, the ſmall iſland called Iſla di Guano, emits ſuch an intolerable ſtench, that (as has been already obſerved by father Feuillée) ſhips are often prevented from approaching it. In

Arica large magazines are erected alongſide the ſhore for the reception of the guano. If we conſider that, ever ſince the twelfth, or at leaſt the thirteenth century, it has been cuſtomary in Peru to manure with this ſubſtance; that many millions of cubic feet have been ſtrewed over the ſandy parts of Peru (and indeed the poſſibility of practiſing agriculture along the ſea-coaſt depends entirely on this precious material); and farther, that the guano ſtill continues to be furniſhed in large quantities, and that the experience of the preſent generation appears to prove that thoſe birds, on one of the iſlands, will ſcarcely produce a ſhip-load of dung in a great number of years; if we conſider all this, we cannot refrain from being aſtoniſhed at the long ſeries of centuries, or the vaſt number of birds, that muſt have been required to accumulate thoſe immenſe ſtrata of guano.

The freſh birds' dung ſeen on the rocks about Huaura, and in other parts of the American coaſt in the South ſea, forms a thin whitiſh cruſt, perfectly different in appearance from the browniſh-yellow guano.

Though we can no longer heſitate to conſider alſo the guano as dung of birds, yet it may be aſked, has it originated on the ſame iſlands where it is now found, or has it been accumulated there by ſome revolution of the earth? Does it point back to an era when the deluged globe was provided with a greater number of aquatic birds than at the preſent time, in the ſame manner as the coal-formation refers us back to a vaſtly luxuriant vegetation? Or was the guano formed under circumſtances perfectly ſimilar to thoſe now exiſting, and was nothing required to produce ſuch immenſe ſtratification but a long ſucceſſion of ages? A long reſidence on the rocks and iſlands of the Peruvian coaſt, and attentive obſervation of the quantity of dung depoſited at preſent by many thouſand cormorants and flamingos in the ſpace of one year, are the means which may, perhaps, at a future period, enable us to anſwer theſe queſtions. But it may be aſked, what is to become of Peruvian agriculture, and what of the population of the coaſt, when the exhauſted Guano iſland ſhall no longer yield this manure?

Though the offenſive effluvia of the guano produce nauſea and ſternutation in thoſe who paſs a *guanero* (a veſſel loaded with this ſubſtance) on the ſea, it is nevertheleſs true that the health of the crew of thoſe veſſels is not in the leaſt affected by it. Humboldt obſerved in moſt of theſe people a healthy blooming complexion; but he adds, that ten or twelve years practice in this uncleanly but profitable trade, had done much to inure them to the otherwiſe deleterious effects of thoſe fœtid exhalations. Notwithſtanding this, the inhabitants of Arica impute the frequent intermittent fevers of that part of the coaſt to the ſtench produced by the guano.

Ulloa (in his Relacion del Viage a la Amer. Merid. iii. p. 127.) ſays, that when the depth is conſidered in which the guano is dug, it appears probable that it is an earth, although the ſmell might be conſidered as againſt this opinion; and he is inclined to ſuppoſe that a conſiderable portion of earth is mixed with the birds' dung. Frezier, who examined the Peruvian coaſt in 1712 and 1714, alſo viſited the harbour of Arica, and the iſland Iquique, to the ſouth of it On the latter iſland the guano was dug up by negroes. Frezier confeſſes that he is at a loſs to explain how ſuch immenſe maſſes can have been produced by birds, but affirms, that feathers of birds have been found at a conſiderable depth. (Frezier Voy. dans la Mer de Sud. p. 133.)

In the neighbourhood of Arica, where the crop of pepper (Capſicum baccatum) is valued at from 3 to 400,000 dollars a year, each plant is manured three times every ſeaſon with guano, *viz.* at the periods of taking root, flowering, and producing the fruit.

Under the government of the Incas, the guano was conſidered as an important object of political economy. It was prohibited, under pain of death, to deſtroy any of the birds on the Guano iſlands, each of which had its inſpectors, and was divided into departments. From Arica to Chancay, a tract of 200 leagues in length, no other manure was made uſe of than guano (Garcilaſſo, Hiſt. de las Yncas, i. p. 184.) This great care accounts in ſome meaſure for the vaſt increaſe of the guano. But thoſe wiſe regulations have long been aboliſhed: at preſent the guano is dug for without regularity and at all ſeaſons.

In an account of the guano, given by the ſame celebrated naturaliſt to Meſſrs. Fourcroy and Vauquelin, mention is made of a few other circumſtances relative to that ſubſtance, that ſhould not be omitted in this place. The guano, ſays Mr. Humboldt, is found not only in the Chinche iſlands, near Piſco, but it exiſts alſo on the parts of the coaſt and its iſles ſituated more to the ſouth, at Ilo, Iza, and Arica. The inhabitants of Chancay, who trade in this article, go to the Chinche iſlands, and return in twenty days. Each boat takes a cargo of from 1500 to 2000 cubic feet of the guano. A vanega is worth four livres at Chancay, and fifteen livres at Arica.

The ſtrata in which the guano is diſpoſed are from fifty to ſixty feet in thickneſs, and they are worked in the ſame manner as the iron ochre mines. It is an excellent manure for the Indian corn or maize; but if too much of it be applied, the root is burnt and deſtroyed by it.

When expoſed to the fire the browniſh yellow colour of the guano is converted into black; it gives out white fumes, and the ſmell of empyreumatic ammonia. Water diſſolves part of it, becomes thereby of a reddiſh colour, and adopts an acid taſte. Potaſſa diſſolves much more of it than water; the ſolution is of a deep brown colour, and is produced under an abundant developement of ammonia. The reſult of the chemical analyſis, made by Fourcroy and Vauquelin, is that the principal conſtituent part is concrete *uric acid.*

Klaproth has ſince obtained nearly the ſame reſults as the French chemiſts; his experiments prove that the eſſential component parts of the guano, excluſive of the admixed ſand, are ammoniacal uric acid, phoſphate of lime, oxalate of lime, and a reſiduum of animal colla, or ſimilar animal inflammable component part. The oxalic acid, however, Klaproth ſuppoſes not to be an original conſtituent part of the guano, but the product of a long-continued action of the atmoſpheric oxygen of the uric acid; an opinion founded on his own experience reſpecting the eaſy converſion of uric into oxalic acid, by the application of nitric and oxygenated muriatic acid. The proportion of the conſtituent parts is as follows.

Ammoniacal uric acid	16
Phoſphate of lime	10
Oxalate of lime	12.75
Silica	4
Muriate of ſoda	0.50
Sandy admixture	28
	71.25
Water, inflammable animal remains, and loſs	28.75
	100 Klapr. Beitr. vol. iv.

GUANOBUCOA, in *Geography*, a town of the iſland of Cuba; 8 miles S. of the Havannah.

GUANTA, a town of Peru, in the biſhopric of Guamanga, capital of a juriſdiction of the ſame name; 20 miles N. of Guamanga. N. lat. 12° 30'. W. long. 74° 16'.

GUANTAJAYA, a town of Peru, in the province of Arica. In this intendancy, with its dependancy of Tacna, one mine of gold and twenty of ſilver were wrought in 1791. At the ſame time no leſs a number than nineteen of the former metal had been abandoned. This was alſo the caſe with 30 mines of ſilver. The celebrated mine of Guantajaya, or Huantajaya, in the neighbourhood of Tacna, is a recent diſcovery. It is ſingularly ſituated in a ſandy plain, at a conſiderable diſtance from the mountains; and ſome of the veins are ſaid to be ſo rich, that they are cut with a chiſſel. S lat. 20° 45'. W. long. 70° 10'.

GUANTANAMO Bay, a bay on the S. coaſt of the iſland of Cuba. N. lat. 20° 12'. W. long. 74°47'.

GUANVACANA, a town of Peru, in the dioceſe of Guamanga; 80 miles E.S.E. of Guamanga.

GUANUCO, or Huanuco, a town of Peru, and capital of a juriſdiction which commences about 120 miles N.E. of Lima. This town was founded in 1539, under the name of Leon de Guanuco; the firſt inhabitants being thoſe, who, in the broils of the Pizarros and Amagros, followed the royal party. It was formerly a conſiderable city, but is now, according to Alcedo, a mean village on the royal road of the Incas, with ruins of a royal palace and temple of the ſun. The climate is for the moſt part pure and mild, the ſoil fertile, the fruits excellent, and the conſerves much eſteemed at Lima. The church, three convents, and the deſcendants of the conquerors are ſunk into great poverty; 120 miles N.E. of Lima. S. lat. 9° 59'. W. long. 75° 56'.

Guanuco *River*. See Gualaga.

GUANUCOS, a river of Mexico, which runs into the Golfo Dolce at its mouth.

GUAPERVA, in *Ichthyology*. See Chætodon *Arcuatus*, and *Lanceolatus*. See alſo Lophius *Hiſtrio*.

Guaperva is alſo the name of ſeveral ſpecies of *Baliſtes*: thus, the guaperva hiſtrix of Willughby is the baliſtes aculeatus; the guaperva peixe-porco of Marcgrave, &c. or guaperva maxima caudata of Willughby and Ray, is the baliſtes vetula; the guaperva lata ad caudam ſtriata Liſteri is the baliſtes ringens; and the guaperva lata, cauda forcipata, &c. of Willughby is the baliſtes forcipatus.

GUAPURIUM, in *Botany*, from its Peruvian name *Guapuru*, a word too barbarous to be received into a regular ſyſtem of botany, and therefore, no doubt, one of thoſe which Juſſieu himſelf tells us in his introduction, p. 24, note *c*, he adopts only for a time, till the genera to which they belong are finally aſcertained. Juſſ. 324. Claſs and order, *Icoſandria Monogynia*. Nat. Ord. *Myrti*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, four-cleft. *Cor.* Petals four. *Stam.* Filaments numerous; anthers roundiſh. *Piſt.* . . . . *Peric.* Berry globular, umbilicated, crowned with the calyx, pulpy within. *Seeds* from two to four.

A *ſhrub*; the *leaves* of its principal branches deciduous, of the ultimate ones oppoſite, ſimple, from three to ſix pair, as if abruptly pinnate, ſprinkled with pellucid dots. *Flowers* in tufts from the cracked bark of the leafleſs branches. The habit is that of a *Plinia*, but the germen is not ſuperior.—Such is the account given by Juſſieu, from his uncle's manuſcripts, and the inſpection of a dried ſpecimen. The original *Plinia* itſelf is ſo obſcure, and there is ſo much reaſon to ſuſpect a miſtake in Plumier's repreſentation of the ſituation of the germen, that it is impoſſible to ſay whether this plant be of the ſame genus or not.

GUARA, in *Ornithology*, the name of a Braſilian bird, called by Cluſius *numenius Indicus*, or the *Indian curlew*. See Tantalus *Ruber*.

Guara, in *Ichthyology*. See Scomber *Cordyla*.

GUARACAPEMA, a name uſed by ſome for the fiſh more uſually called the *dorado*. See Coryphæna *Equiſelis*.

GUARACAYO, in *Geography*, a town of S. America, in the province of Quito; 6 miles N.N.E. of Jaén.

GUARACHIRI, a town of Peru, and capital of a juriſdiction in the audience of Lima, commencing at the mountains, about ſix leagues E. of Lima. The vallies and lower grounds are the only inhabited parts, and theſe, being very fertile, produce wheat, barley, maize, and other grain in great abundance. Its mountains have ſilver mines, but few of them are wrought; 50 miles E. of Lima. S. lat. 11° 55'. W. long. 76° 18'.

GUARANIA, a province of the viceroyalty of Buenos Ayres, ſo called from the Guaranis, a tribe of Indian inhabitants, who occupy about 30 villages, from the river Tabiquari, in Paraguay, to the frontiers of Buenos Ayres, being moſtly to the E. of the river Parana: the eaſtern borders of the Guaranis extend along Brazil, and on the W. they border on Paraguay, Corrientes, and Santa Fé. As ſoon as a Guarano Indian dies, his companions take up the corpſe, and throw it into the Oronoko, tied to a cord which they faſten to a tree. On the following day they drag out the corpſe, when it is found to be a ſkeleton, perfectly clean and white, ſtripped of the fleſh which has been devoured by fiſh. They then disjoint the bones, and lay them up curiouſly in a baſket, which they hang from the roof of the houſe.

GUARANTEE, or Warrantee, in *Law*, a term relative to *warrant*, or *warranter*; properly ſignifying him whom the warranter undertakes to indemnify or ſecure from damage.

Guarantee, is more frequently uſed for a warranter, or a perſon who undertakes and obliges himſelf to ſee a ſecond perſon perform what he has ſtipulated to the third. See Warranty.

GUARANTHARA, in *Geography*, a river of the Brazil, which runs into the Atlantic, S. lat. 7° 20'. W. long. 34° 25'.

GUARANTY, in *Politics*, an engagement of mediatorial or neutral ſtates, whereby they pledge their faith, that the articles of a particular treaty ſhall be inviolably obſerved on both ſides.

This engagement implies, that the guarantees are obliged to aſſiſt the party invaded contrary to the treaty, againſt the injurious aggreſſor; but not if the war is occaſioned by any other cauſes than the violation of the articles of peace. Puffendorf, Law of Nature and Nations, book viii. ch. 8. § 7.

The ancient lords were obliged to guaranty the lands of their vaſſals, *i.e.* to defend them againſt their enemies; otherwiſe they loſt their fee, and their vaſſals were no longer bound to do them homage and ſervice. Kings alone did not forfeit their fiefs by not guarantying them; and yet we read, that Borel, count of Barcelona, threatened the king of France, Hugh Capet, to ſwear fealty to the Saracens, in caſe he did not guaranty him; and under Lewis the Young, the count of Champagne did homage to the emperor, on the like account.

To guaranty a fee, had likewiſe another meaning; being uſed to denote that where a fee was divided between the eldeſt ſon and the younger, the eldeſt did homage to the lord, both for himſelf and all the reſt; and by that homage guarantied the whole.

GUARAPIRANGA, in *Geography*, a town of Brazil, in the government of Minas Geraes; 40 miles S.E. of Villarica.

GUARAPO, an intoxicating liquor made from the fermentation of coarſe ſugar and water. It is in general uſe throughout Terra Firma. The Indians and negroes prefer it to the beſt wine. Thoſe who ſell it muſt have a licence from the farmer of the tax, for which they pay. The proceeds from farming the guarapos, and cock-fights, are appropriated to the maintenance of the hoſpital of St. Lazarus, at Caraccas.

GUARAPUCU, in *Ichthyology*. See SCOMBER *Thynnus*.

GUARAQUAÇU, in *Geography*, a river of the Brazil, which runs into the Atlantic, S. lat. 9 36′. W. long. 35° 16′.

GUARA-TEREBA, in *Ichthyology*. See SCOMBER *Cordyla*.

GUARATIBA, in *Geography*, a river of Brazil, which runs into the Atlantic, S. lat. 7 20′.

GUARAUNA, in *Ornithology*. See SCOLOPAX *Guarauna*.

GUARD, or GARD, in its general ſenſe, implies defence, cuſtody, or conſervation, of any thing; the act of obſerving what paſſes, to prevent ſurprize; or the care and precaution taken to hinder any thing's being done contrary to the intention and deſire of another.

The word is formed of the French *garde*, and that of the corrupt Latin *warda*, and that of the German *wahren*, *to keep, to defend*.

GUARD is alſo uſed in a figurative ſenſe, for the act or ſervice of guarding, and the perſons appointed for that purpoſe.

Thus we ſay, to be upon guard, to ſet the guard, mount the guard, to diſmount the guard, to relieve the guard, to change the guard, the officer or ſerjeant of the guard; alſo, a ſtrong guard, an attempt on the guard, &c.

So, again, thoſe to whom the king commits the ſafety of his perſon, are called his *guard*, *life-guard*, *body-guard*. And ſo thoſe who have had the education and guardianſhip of infants, or idiots, are called their *guards* or *wards*.

GUARD, or *Gard*, is alſo applied to a writ relating to the office of ward; whereof there are three kinds; one called *droit de garde;* the ſecond, *ejectment de garde;* the third, *raviſhment de garde*. See GUARDIAN.

GUARD, in the *Military Senſe*, is properly the duty or ſervice done by the ſoldiers, to ſecure the army, or place, from the attempts and ſurpriſes of an enemy. In garriſon the guards are relieved every day; ſo that every ſoldier mounts guard once every three or four days in times of peace, and much oftener in time of war. Of this there are divers kinds: as,

GUARD, *Advanced*, a party of horſe or foot, which marches before a corps, to give notice of approaching danger. See ADVANCE *guard*.

GUARD, *Artillery*, is a detachment from the army to ſecure the artillery when in the field. Their "corps de garde" is in the front of the ARTILLERY *park* (which ſee), and their ſentries diſperſed round it. This is generally a 48 hours' guard; and upon a march this guard marches in the front and rear of the artillery, and have it in charge to leave nothing behind. If a gun or waggon breaks down, the officer that commands the guard is to leave a ſufficient number of men to aſſiſt the gunners and matroſſes in getting it up again.

GUARD, *Artillery quarter*, is frequently a non-commiſſioned officer's guard from the royal regiment of artillery, whoſe *corps de garde* is always in the front of their encampment.

GUARD, *Artillery rear*, conſiſts of a corporal and ſix men, poſted in the rear of the park. See ARTILLERY *park*.

GUARD, *Baggage*, is always an officer's guard, who has the care of the baggage on a march.

GUARD-*boat*, in *Sea Language*, a boat appointed to row the rounds among the ſhips of war which are laid up in any harbour, &c. to obſerve that their officers keep a good look-out, calling to the guard-boat as ſhe paſſes, and not ſuffering her crew to come aboard, without having previouſly communicated the watch-word of the night.

GUARDS, *Camp*, are of two ſorts; the one ſerve to maintain good order within the camp, (ſee CAMP,) and the other, which are ſtationed without the camp, ſerve to cover and ſecure it againſt the enemy. They are formed both of infantry and cavalry; and ſhould conſiſt, as the occaſion requires, of the eighth part, or third part, or even of half the army, when an attack is apprehended. The cavalry guards are removed farther from the main army than the infantry; but not ſo far as to endanger their being cut off. Theſe guards have generally a day poſt and a night poſt; the latter of which is ſeldom more than four or five hundred paces from the camp: the guards of infantry are generally fixed, except thoſe that are to ſupport and protect the cavalry guards, and to cover the forage grounds.

GUARD, or GARDE, *Corps de*. See CORPS.

GUARD, *Counter*, in *Fortification*. See COUNTER-*guard*.

GUARD, *Forrage*. See FORRAGE.

GUARD, *Grand*, conſiſts of three or four ſquadrons of horſe commanded by a field officer, and poſted before the camp on the right and left wing towards the enemy, for the ſecurity of the camp.

GUARD-*irons*, in a *Ship*, are certain curved or arched bars of iron, placed over the ornamental figures on a ſhip's head or quarter, to defend them from the impreſſion of ſome other ſhip, when they lie cloſe to or rub againſt each other.

GUARD, *Main*, is that from which all the other guards are detached. Thoſe who are to mount the main guard, meet at the reſpective private parades, and from thence they go to the general parade; where, after the whole guard is drawn up, the ſmall guards are detached to their reſpective poſts; and then the ſubaltern officers draw lots for their guards, who are all commanded by the captain of the main guard. This guard mounts in garriſon at different hours, according to the pleaſure of the governor.

GUARDS, *Ordinary*, are ſuch as are fixed during the campaign, or in garriſon towns, and which are relieved daily; whereas *extraordinary* guards, or detachments, are ſuch as are only commanded on particular occaſions; either for the further ſecurity of the camp, to cover the foragers, or for convoys, eſcorts, or expeditions.

GUARDS, *Mounting*. All guards are to parade with ſhouldered arms, and unfixed bayonets, without any intervals between them, the ranks open, and the ſerjeants with pikes carried. The officers with their ſwords drawn, and non-commiſſioned officers commanding guards, to be formed about 40 paces in front of the centre, in two ranks, facing the line, where they are to receive the old parole and ſuch orders as may be given them.

The major or commanding officer will give the word of command—

"Officers and non-commiſſioned officers, outward face!—Take poſt in front of your reſpective guards!—Quick, March!"

As ſoon as they have taken poſt, fronting their reſpective guards, the word of command will be given—

“ Officers and non-commiſſioned officers—to your guards —March!—Halt!—Front!”

“ Officers and non-commiſſioned officers, inſpect your guards!”

The ſeveral officers and non-commiſſioned officers will then inſpect their guards, as quick as poſſible. When there is a captain's guard, each officer is to take a rank, the ſerjeants accompanying them.

As ſoon as the inſpection is over, the adjutant will go down the line and receive the report of each guard; the officers return to their poſts; and the major, or commanding officer, will then—

“ Order arms!—Fix bayonets!—and Shoulder!”

When the colours are brought on the parade, the troop is beat; and the drummer's call on the right.

The captain will face inwards, and the lieutenant and enſign will face to the right, and march, *quick time*, to the head of the grenadiers. The captain goes to the head of the right of his remaining men. The field officer then orders the grenadiers to cloſe their ranks, and to march off in *quick time*, the lieutenant being three paces advanced in front of his men, and the enſign one. The colours will be received as uſual. And the grenadiers, on their arrival on the left flank of the guards, will file at the *ordinary time*, through the ranks; the lieutenant, and the colours, in front of the front rank. The guards are to march off at the *ordinary time*, and by diviſions, taking care, that when they open their ranks, the front rank of each keeps its exact diſtance from the front rank preceding it. When there are more officers than one belonging to the ſame guard, the ſecond in rank is to take poſt, and to march paſt the commanding officer on the parade, at the head of the laſt diviſion, inſtead of being in the rear of it. When there is an officer, ſenior to the field officer of the day, on the parade, the guards are to march by and ſalute him: the field officer of the day, in that caſe, marching at their head.

GUARDS, *Out*, may lead us to conſider *out-poſts*, *advanced picquets*, and *detachments*, The duty of out-poſts, &c. as ſtated by the laſt printed regulations, is chiefly confined to light troops, who are occaſionally aſſiſted and relieved by the line. In that caſe, they are always under the direction of ſome general. But when it becomes neceſſary to perform this duty from the line, the out-poſts fall under the command of the general officers of the day, unleſs ſome particular officer be put in orders for that ſpecific command. All outguards march off without trumpets ſounding, or drums beating. They pay no compliments of any kind; neither do their ſentries take any complimentary notice of officers paſſing near their poſts. No guards are to preſume to ſtop any perſons coming to camp with proviſions (unleſs they be particularly ordered ſo to do), and are on no account to exact or receive any thing for their free paſſage.

Any officer, trumpeter, or other perſon, who comes from the enemy's camp, is to be ſecured by the firſt guard he arrives at, till the commander in chief's, or the general's pleaſure is known. When a deſerter comes in from the enemy, the officer commanding the poſt, or guard, at which he arrives, is immediately to ſend him under a proper eſcort, (without permitting him to be delayed or examined, or any queſtions aſked him) to the officer commanding the outpoſts, who, after enquiring whether he brings any intelligence immediately relating to his own poſt, will forward him to head-quarters.

The ſentries on the outpoſts are always to be double. No officers, ſoldiers, or followers of the camp, are on any account to be ſuffered to paſs the outpoſts, unleſs they are on duty, or preſent a regular paſs from head-quarters.

The men on advanced picquets are to carry their proviſions with them, ready cooked, when circumſtances will permit. The cavalry to carry ſufficient forage for the time they are to be out.

It is the duty of officers on all guards to inſpect every relief of ſentries, both when they go on, and come off their poſts; to call the rolls frequently, and by every means in their power to keep the men under their command in the moſt perfect ſtate of vigilance and preparation.

Officers commanding outpoſts are to ſend guides, or orderly men, to the major of brigade of the day, or to the brigade-major of their own brigades, as circumſtances require, in order to conduct the new guards, and to carry ſuch orders as may be neceſſary.

When the army is on a march, the officers muſt apprize the brigade-majors of the ſituation of their poſts, as ſoon as they arrive at them. All detachments of brigades, which are ordered to march *immediately*, are to be taken from the picquets, and replaced directly from the line.

Whenever detachments exceed 200 men, or upwards, a ſurgeon or ſurgeon's mate is to be ſent from the corps of the officer who commands. On particular duties, the attendance of a ſurgeon or mate may be requiſite with ſmaller detachments. Detachments of cavalry, of 50 or upwards, will be attended by a farrier.

As ſoon as an officer commanding an outpoſt, or advanced picquet, (whether of cavalry or infantry,) arrives on his ground, he muſt endeavour to make himſelf maſter of his ſituation, by carefully examining, not only the ſpace he actually occupies, but the heights within muſket-ſhot; the roads and paths leading to or near his poſt, aſcertaining their breadth and practicability for cavalry and cannon. He ſhould examine the hollow ways that cover the approach of an enemy; and, in ſhort, conſider all the points from which he is moſt likely to be attacked, either by cavalry or infantry. He will, by theſe means, be enabled to take meaſures to prevent the poſſibility of being ſurprized; and ſhould he be attacked during the night, from the previous knowledge he has obtained of the ground, he will at once form a juſt eſtimate of the nature of the attack, and make his arrangements for defence with promptitude and deciſion. In order to convey the ſame alacrity to his men, and to prepare the moſt unexperienced for ſudden and unexpected attacks, an officer upon an outpoſt will do well to put them upon the alert, by ſkilfully occaſioning falſe alarms. But theſe muſt not be often repeated, nor when practiſed be made known to his men as having proceeded from himſelf; ſince ſupineneſs and inactivity might by degrees be the conſequences of ſuch a diſcovery.

An intelligent officer upon an outpoſt, even unprovided with entrenching tools, will materially ſtrengthen his poſt, when the unobſerver would remain inactive. A tree felled with judgment; bruſhwood cut to a certain diſtance; pointed ſtakes, about breaſt high, placed on the points moſt aſſailable by an enemy, may be attended with the greateſt advantages, and can be effected with the common hatchets, which the men carry to cut fire-wood. In ſhort, every impediment which an officer, acting on the defenſive, can throw in an enemy's way, ought to be ſcrupulouſly attended to. Independently, therefore, of the means which he adopts for the immediate protection of his poſts, he muſt look beyond that point; and as nothing checks the ardour of troops more than an unexpected obſtacle, within an hundred yards, more or leſs, of the place attacked, he muſt, on his arrival at the outpoſt, throw up ſome temporary impediment at that diſtance. See General Regulations 34 to 37.

GUARD, *Picquet*, is a number of horſe and foot, who keep themſelves always in readineſs in caſe of an alarm; the horſes being generally ſaddled, and the riders booted. The foot draw up at the head of the battalion at the beating of the tattoo, but afterwards return to their tents, where they remain in readineſs to march on any ſudden alarm.

This guard is to make reſiſtance in caſe of an attack, till the army can get ready.

GUARD, *Port*, a guard detached from the main guard. All officers on port, or detached guards, are to ſend a report, night and morning, to the captain of the main guard, and at all other times, when any thing extraordinary occurs. Thoſe who command at the ports are to draw up the bridges, on the approach of any body of armed men, of which they are to give notice to the officer of the main guard, and not to ſuffer any of them to come into the garriſon, without leave from the governor or commander.

GUARD, *Provoſt*, is always an officer's guard that attends the provoſt in his rounds, to prevent deſertion, marauding, rioting, &c.

GUARD, *Quarter*, is a ſmall guard commanded by a ſubaltern officer, poſted in the front of each battalion, about two hundred and twenty-two feet before the front of the regiment.

GUARD-*Rails*, are ſtrong rails of wood bolted on to piles, juſt above the level of the water, at the head and tail of the locks on canals, and projecting before the wing-walls, for guiding the boats into the locks, and prevent their ſtriking the walls.

GUARD, *Rear*, is that part of the army which brings up the rear on a march: the rear guard of a party is frequently eight or ten horſe, about five hundred paces behind the party. Hence the advance guard going out on a party, forms the rear guard in their retreat.

Rear Guard is alſo a corporal's guard placed in the rear of a regiment to keep order in that part of the camp.

GUARD, *To Relieve*. See RELIEVE.

GUARD *Rooms* of cavalry and infantry are allowed a water-bucket, candleſtick, tin can for beer, and drinking horns: they are alſo allowed fire-irons and coal-tray, from Sept. 1 to May 1, when they are to be taken into ſtore. The rooms of the quarter-maſters and ſerjeants of cavalry, and the ſerjeant-major and quarter-maſter ſerjeant of infantry, are to be furniſhed with the neceſſary bedding and utenſils in the ſame manner as is allowed to the ſoldiers' rooms.

GUARD, *Safe*. See SAFE *Guard*.

GUARD-*Ship*. See *Guard*-SHIP.

GUARD, *Standard*, is a ſmall guard under a corporal, out of each regiment of horſe, who mount on foot in the front of each regiment, at the diſtance of twenty feet from the ſtreets, oppoſite to the main ſtreet.

GUARD, *Trench*, conſiſts of three, four, or ſix battalions, according to the occaſion, which mount in the time of a ſiege, in order to oppoſe the beſieged when they ſally out, protect the workmen, &c.

GUARD, *Turn out the*, is a phraſe uſed when it is neceſſary for the guard to form for the purpoſe of receiving a general or commanding officer; on the approach of an armed party; on the beat of drum, or ſound of trumpet, or any alarm.

GUARD, *Van*, is the ſame with the front of an army. See ADVANCE *Guard*, and *Advance* GUARD, above.

GUARD is more particularly underſtood of a ſoldier, as a muſqueteer, archer, or the like, detached from a company, or corps, to protect, detain, or ſecure, any perſon, or to ſurvey his actions.

GUARDS is alſo underſtood of the troops, or companies, kept to guard the king; called alſo *royal guards*, *life guards*, *gardes du corps*, &c.

There are alſo uſually bodies of guards to wait on the princes of the blood, in the ſame capacity.

The guards are diſtinguiſhed into *horſe*, *foot*, *grenadiers*, and *yeomen*.

GUARDS, *Horſe-Grenadier*, were divided into two troops, called the 1ſt and 2d troops of horſe-grenadier guards. The firſt troop was raiſed in the year 1693, and the command given to lieutenant-general Cholmondeley; the 2d in 1702, and the command given to lord Forbes. Each troop has a colonel, lieutenant-colonel, one guidon, or major, three exempts and captains, three lieutenants, one adjutant, three cornets, and ſixty private men.

GUARDS, *Life*. In conſequence of the reduction of the horſe-grenadier guards, two regiments have been raiſed for the expreſs purpoſe of guarding the metropolis, and of eſcorting his majeſty. They are generally called the 1ſt and 2d life-guards. Each regiment conſiſts of ſix troops of 53, and one kettle-drum.

GUARDS, *Royal Regiment of Horſe*, is commonly called the "Oxford Blues," from having been originally raiſed by the earl of Oxford, and conſiſts of nine troops. The quarter-maſter belonging to this corps is an exception to the general regulations that affect the quarter-maſters of all cavalry regiments. The latter hold their commiſſions by warrants, but the former has the ſign-manual to his appointment.

GUARDS, *Yeomen of the*, firſt raiſed by king Henry VII. in the year 1485, are a kind of foot guards to the king's perſon, and are generally called by a nick-name beef-eaters. They were anciently 250 men of the firſt rank under gentry, and of a larger ſtature than ordinary, each being required to be ſix feet high. At preſent there are but 100 on conſtant duty, and 70 more not on duty; and when any one of the 100 dies, his place is ſupplied out of the 70. They are dreſſed after the faſhion of king Henry VIII.'s time. Their firſt commander, or captain, was the earl of Oxford, and their pay is 2*s*. 6*d*. *per* day.

GUARDS, *The Foot*, are appointed for the guard of his majeſty and his palace, and for general ſervice: they are diſtinguiſhed by regiments: of which there are three, called the 1ſt, &c. regiment of foot guards. They were raiſed in the year 1660: the firſt regiment is commanded by one colonel, one lieutenant-colonel, three majors, twenty-ſeven captains, one captain-lieutenant, ſixty-two lieutenants, twenty-four enſigns, and three adjutants; and it conſiſts of three battalions. The 2d regiment, or Cold-ſtream, has one colonel, one lieutenant-colonel, two majors, ſixteen captains, one captain-lieutenant, forty-two lieutenants, fourteen enſigns, and two adjutants; and conſiſts of two battalions. The third regiment is the ſame as the ſecond.

Guards, no doubt, are as ancient as monarchy: the remoteſt antiquity affords inſtances of them.

The Roman emperors had for their guard the prætorian cohorts, eſtabliſhed by Auguſtus, as Dion and Suetonius relate: thoſe of the emperors of Conſtantinople were called *buccellarii*.

Captain, colonel, brigadier, exempt of the guards, &c. See CAPTAIN, COLONEL, BRIGADIER, YEOMAN, &c.

The *Scotch guard* was firſt eſtabliſhed in France by Charles VII. who choſe himſelf a guard out of ſuch Scots as were ſent by the earls of Buchan, Douglas, and other Scotch lords, to drive out the Engliſh.

GUARDS, *Prætorian*. See PRÆTORIAN.

GUARDS, *White*. See SCHOLARES.

GUARD, in *Fencing*, an action or poſture, proper to defend or ſcreen the body from the efforts or attacks of an enemy's ſword, or to execute any offenſive movements againſt him.

Some have reckoned four, and others five or ſix general guards of the ſword; to conceive which, it has been uſeful to imagine a circle drawn on an upright wall, and divided into four cardinal points, *viz.* top, bottom, right, and left.

Now, when the point of the ſword is directed to the bottom point of the circle, and conſequently, the head of the ſword tilted up to the top point, with the body inclining forwards, this is called *prime*, or the *firſt guard*. The *ſecond guard*, which ſome improperly call the *third*, is when the point of the ſword is directed to the right or ſecond part of the ſame circle, a quadrant diſtant from the firſt, with the fort of the ſword turned to the right, and the body raiſed proportionably. *Tierce*, or the *third guard*, is performed by directing the ſword's point to the uppermoſt point of the ſame circle diametrically oppoſite to that of prime; in which caſe the body, arm, and ſword, are in their natural diſpoſition, being the mean between the extremes of their motion. *Quart*, *Carte*, or the *fourth guard*, is when the point of the ſword is directed to the fourth point of the circle, deſcending to the right as far as one fourth of tierce, with the external ſide of the arm and the flat of the ſword turned towards the ground and the body out of the line to the right, and the fort of the ſword towards the line to the left. There is alſo a *quint*, or a kind of *fifth guard*, being the return of the point of the ſword on the right, after traverſing the circle to the point of the prime whence it had departed; and yet with a different diſpoſition of the body, arm, and ſword.

Theſe guards are alſo called, by the maſters, *figures* and *poſtures*; and the common centre of all their motions is to be in the ſhoulder.

In all theſe kinds of guards, there are high *advanced*, high *retired*, and high *intermediate guards*, when diſpoſed before the upper part of the body, either with the arm quite extended, quite withdrawn, or in a mean ſtate. *Mean advanced guard*, or ſimply *mean guard*, is when the ſword is diſpoſed before the middle part of the body. *Low advanced, retired*, or *intermediate guards*, are thoſe where the arm and ſword are advanced, withdrawn, or between the two extremes, before the lower part of the body.

Some will have prime the principal guard; others, quint; others, with better reaſon, tierce; becauſe it conſiſts of right lines, which are more eaſily defended than oblique ones, ſuch as thoſe of prime, ſecond, quart, and quint. By modern practice, only two guards are uſed in ſmall ſword play, *viz.* the guard of carte, and the guard of tierce, called the inſide and outſide guards. The one covers your body from a ſtraight inſide thruſt, by croſſing blades on that ſide, and the other covers you from a ſtraight outſide thruſt, by oppoſing the blade outwards. Guards are ſynonymous with engagements.

Mr. M'Arthur, having reduced the guard-poſtures to the two above-mentioned, gives the neceſſary inſtructions, in a conciſe but very perſpicuous and intelligible manner, for forming theſe two poſitions. His inſtructions are exemplified by appropriate figures, which cannot fail to aſſiſt the learner in apprehending them, and alſo in reducing them to practice. We profeſs neither to be teachers nor practitioners in the art of fencing; and we conceive, that little can be done by any ſyſtem of rules, however excellent, without correſponding exerciſe under the direction of a maſter. The reader, whom it may concern, will, we imagine, be induced by the following extract to recur to this ingenious author's "New and Compleat Treatiſe on the Theory and Practice of Fencing, &c." of which a new and reviſed edition was publiſhed in 1784; or to ſome other ſimilar treatiſe on the ſubject. The author begins with inſtructing the learner how to hold his ſword or foil well. For this purpoſe the hilt muſt be flat in the hand, ſo that the two edges may be nearly horizontal when the learner throws himſelf upon guard; the thumb being ſtretched along upon the upper flat part of the hilt, within half an inch of the ſhell or guard, and the pummel reſting under the wriſt. The ſword or foil being held in this manner, and the learner ſtanding upon his firſt poſition, ſimilar to what is called the third poſition in dancing; that is, with the right foot before the left, and the heel advanced near the buckle, is directed to throw himſelf upon the common guard of carte, by advancing his right foot about the diſtance of $1\frac{1}{2}$ foot in meaſure from the left, or at the diſtance of two lengths of his own foot from the heel of the other. The two heels ſhould be in the ſame ſtraight line. "Turn your wriſt," ſays the author, "in ſuch manner, that the nails may appear upwards. Your hand ſhould be on a line with the lower part of your breaſt; the arm not ſtretched, but a little bent and flexible, and the elbow inclined a little to the outſide. The point of your ſword or foil ſhould be about 15 degrees elevated, and nearly fixed on a line with the upper part of your adverſary's breaſt. The left arm, which is neceſſary to balance the body in its different movements, muſt be raiſed in a ſemi-circular manner, on a line with the forehead, the hand kept open in an eaſy manner, the thumb and firſt finger nearly meeting. Your body ſhould be totally ſideways, and your head turned towards the right, ſo as to keep ſight of your point: for it is evident, the leſs you expoſe the breadth of your body, by keeping it in a direct ſide poſture, the more difficulty there will be to touch you in aſſaults: your body, feet, arms, and ſhoulders ſhould be in the ſame ſtraight line: let the balance of your body reſt upon the left leg, by keeping the left knee bent and flexible, ſo as you may incline a little backwards. The right leg ſhould be kept eaſy on the ground, the knee alſo a little bent, and perpendicular to the point where your right heel reſts." The next point is to acquire the mode of advancing and retreating upon the carte guard, without varying the above-deſcribed poſition; "In order to advance with regularity, move the right foot with eaſe forward to the diſtance of more than a foot, making the left foot inſtantly follow to the ſame diſtance: theſe two movements muſt ſeem as one, by being comprehended in the ſame moment of time. Keep your body firm and ſteady upon guard while advancing. Let there be a pauſe of time, as long as a perſon might count over three, between every advance, always obſerving, after making five or ſix advances, that the diſtance and poſition of your guard is exactly the ſame with your primitive diſtance and poſition. The retreat on this guard is performed in the ſame manner as the advance thereon, only your left foot makes the firſt movement backwards, and your right follows in a line of direction at the ſame moment." "This is the firſt guard naturally taken by beginners, when entering upon aſſaults, and from it in general all the various thruſts and parades are thrown." The ſecond, or tierce-guard, is uſually practiſed in aſſaults by experienced fencers; and its poſition is the ſame with that of carte. "The hand only muſt be a little reverſed, ſo as that the nails, which were upwards in carte, muſt be half turned downwards, when in tierce-guard. The arm ſhould be a little ſtretched outwards in order to cover or ſecure the outſide. The point ſhould be in the ſame direction, as if on the other guard of carte; that is, fixed ſteadily, that your eye may perceive it oppoſite to the upper part of your adverſary's breaſt.

Advance and retreat on this guard with the ſame caſe and regularity as is done in carte, agreeably to the inſtructions given in the firſt leſſon."

Guards, in *Aſtronomy*, is a name ſometimes applied to the two ſtars neareſt the pole; being in the hind-part of the chariot, at the tail of the Little Bear. See Ursa *minor*.

Guards, in *Engineery*, are upright pieces of wood nailed on to the lock-gates of a canal, to keep the barges from ſtriking the planks on the gates.

GUARDA, or **Guardia**, in *Geography*, a ſtrong town of Portugal, in the province of Beira, and the ſee of a biſhop, ſuffragan of Liſbon; ſituated on Monte Eſtrella, near the ſource of the Mondego, containing a cathedral, four churches, two convents, an hoſpital, and about 2300 inhabitants; 67 miles E. of Coimbra. N. lat. 40° 21′. W. long. 6° 55′.

Guarda, or *Guarda, La*, a town of Spain, on the W. coaſt of Gallicia; 14 miles W. S. W. of Tuy.

Guarda, a town of the iſland of Cuba; 155 miles W. S. W. of Havanna.

GUARDAMAR, an inconſiderable ſea-port town of Spain, in the province of Valencia, ſituated at the mouth of the Segura, with a good harbour, and principally trading in the exportation of ſalt; 17 miles S. S. W. of Alicant. N. lat. 38° 7′. W. long. 0° 45′.

GUARDANT, or **Gardant**, in *Heraldry*, a term applied to a beaſt when borne in a coat of arms, full faced, or with his face turned towards the ſpectator, and thus appearing in a poſture of guard or defence.

Heralds ſay, a lion is never ſo repreſented; but a leopard always.

GUARDIA, in *Geography*, the name of ſeveral towns of Naples, in the provinces of Calabria Citra, Baſilicata, and Principato Ultra.

Guardia, *La*, a town of Spain, in New Caſtile, ſituated in an elevated and ſalubrious tract, and containing about 3000 inhabitants, formerly ſtrong, but now decaying, and noted only for a manufacture of ſalt-petre; 22 miles E. S. E. of Toledo.

Guardia *Alferes*, a town of Naples, in the province of Moliſe, the ſee of a biſhop, ſuffragan of Benevento; 21 miles E. of Moliſe. N. lat. 41° 50′. E. long. 14° 50′.

GUARDIAN, or **Gardian**, is he to whom the charge, or cuſtody, of any perſon, or thing, is committed.

The notion of guardian angels is very ancient in the Eaſt. See Angel.

In the convents of Franciſcans, the officer is called *guardian*, who in the others is called *ſuperior*.

In the order of the Garter, the officer, who in other military orders is called *grand maſter*, is called the *ſovereign-guardian* of the order.

Guardian, *Gardeyn*, in *Law*, is a perſon intruſted with the education, tuition, &c. of ſuch as are not of ſufficient diſcretion to guide themſelves, and their own affairs; as children and idiots.

The word *guardian*, with us, includes the offices both of the tutor and curator of the civilians: the tutor, for inſtance, had the government of a youth till he arrived at fourteen years of age; and the curator had the diſpoſition and ordering of his effects thenceforward till twenty-five years of age; or the charge of a lunatic, during his lunacy; all which purpoſes our guardian alone anſwers; though with regard to lunatics and idiots, theſe officers are commonly kept diſtinct. In other words, the tutor had the charge of the maintenance and education of the minor, and the curator, the care of his fortune; or, according to the language of the court of chancery, the former was the committee of the perſon, and the latter the committee of the eſtate.

There are ſeveral ſorts of guardians. The firſt are guardians by *nature, viz.* the father, and, in ſome caſes, the mother of the child: for if an eſtate be left to an infant, the father is, by common law, the guardian, and muſt account to his child for the profits (Co. Litt. 88.): and, with regard to daughters, it ſeems by conſtruction of 4 and 5 Ph. & Mar. cap. 8. that the father might by deed or will aſſign a guardian to any woman-child, under the age of ſixteen; and if none be aſſigned, the mother ſhall in this caſe be guardian. (3 Rep. 39.) The ſecond ſort are guardians for *nurture* (Co. Litt. 88.), which are, of courſe, the father and mother, till the infant attains the age of fourteen years (Moor. 738. 3 Rep. 38.); and in default of father or mother, the ordinary uſually aſſigns ſome diſcreet perſon to take care of the infant's perſonal eſtate, and to provide for his maintenance and education. (2 Jones. 90. 2 Lev. 163.) There are alſo guardians in *ſocage*, who are alſo called guardians by the *common law*: theſe take place only when the minor is entitled to ſome eſtate in lands, and then, by the common law, the guardianſhip devolves upon the next of kin, to whom the inheritance cannot poſſibly deſcend. (Litt. § 123.) Theſe guardians continue only till the minor is fourteen years of age; when he is preſumed to have diſcretion ſo far as to chooſe his own guardian.

But the ancient law relating to guardians is much altered by ſtat. 12 Car. II. cap. 24, which ordains, that "where any perſon has a child under the age of twenty-one years and unmarried at the time of his death, it ſhall be lawful for the father of the child, whether born at the time of his deceaſe, or yet in ventre de ſa mere, either by deed, or will, to diſpoſe of the cuſtody and tuition of ſuch child while under age, or for any leſſer time, to any perſon, popiſh recuſants excepted; which diſpoſition ſhall be good againſt all perſons claiming ſuch child as guardian in ſocage, or otherwiſe." Theſe are called guardians by *ſtatute*, or *teſtamentary* guardians. "And in caſe the father appoint no guardian, the ordinary may appoint one to look to his goods and chattels till the age of fourteen; at which time the child may chooſe a guardian himſelf; and for his lands, the next of kin on that ſide by which the lands deſcend may be guardian, as heretofore in caſe of a tenure in ſocage." There are alſo ſpecial guardians by *cuſtom* of London, and other places.

The guardian, when his ward comes of age, is bound to give him an account of all which he has tranſacted on his behalf, and muſt anſwer for all loſſes incurred by his wilful default or negligence. To prevent conteſts, the guardians of large eſtates apply to and act under the direction of the court of chancery, accounting annually before the officers of that court: for the lord chancellor, by right derived from the crown, is the general and ſupreme guardian of all infants, as well as idiots and lunatics. The court of chancery may, and ſometimes does remove a guardian who abuſes his truſt, and appoints another in his room. 1 Sid. 424. 1 P. Will. 703.

Guardian, in *Chivalry*, was an office which formerly belonged to the feodal lord, in virtue of his wardſhip of an heir-male, under the age of twenty-one, and of a female under fourteen. This wardſhip conſiſted in having the cuſtody of the body and lands of ſuch heir, without any account of the profits till the age of twenty-one in males, and ſixteen in females. Theſe profits were claimed in lieu of knight-ſervice, which the male was ſuppoſed capable of rendering at twenty-one, and the female by her huſband at fourteen. However, if the female was under fourteen, when the lord's wardſhip commenced, he might keep her under ward till ſixteen, by ſtat. Weſt. 1. 3 Edw. I. cap. 22. This wardſhip was taken from the lord by the charter of Henry I. and transferred to the widow or next of kin. But this noble immunity did not continue long. When the male heir arrived to the age of twenty-one, and the heir-female to that of ſixteen, they might ſue out their livery or *ouſter le main*, *i. e.* the delivery of their lands out of their guardian's hands; but for this they were obliged to pay a fine, *viz.* half a year's profit of the land.

Theſe guardians had alſo another kind of power over their infant wards, which was that of diſpoſing of them in matrimony: and if the infants refuſed a ſuitable match, they forfeited the value of the marriage to their guardian; but if they married without his conſent, they forfeited double the value. (Litt. § 110.) This right of ſelling the ward in marriage was expreſsly declared by the ſtatute of Merton, 20 Hen. III. cap. 6. Theſe grievances, and others of a ſimilar nature, were firſt aboliſhed by the lords and commons in parliament, in 1645; and this ordinance was confirmed by the protector and his parliament in 1656; and they were finally aboliſhed by the ſtatute 12 Car. II. cap. 24, and by 20 Geo. II. cap. 43. and cap. 50. The ſame are alſo aboliſhed in Scotland. (See Knight's *ſervice.*) Upon the abolition of the Court *of wards*, the care which the crown was bound to take, as guardian of its infant tenants, was totally extinguiſhed in every feodal view; but reſulted to the king in his court of chancery, together with the general protection of all other infants in the kingdom. (F. N. B. 27.) When therefore a fatherleſs child has no other guardian, the court of chancery hath a right to appoint one; and from all proceedings relative to it, an appeal lies to the houſe of lords. The court of exchequer can only appoint a guardian *ad litem*, to manage the defence of the infant if a ſuit be commenced againſt him: a power which is incident to the juriſdiction of every court of juſtice (Cro. Jac. 641. 2 Lev. 163. T. Jones 90.); but when the intereſt of a minor comes before the court judicially, in the progreſs of a cauſe, or upon a bill for that purpoſe filed, either tribunal indiſcriminately will take care of the property of the infant.

Guardian *in ſocage*. See GUARDIAN above, and Socage.

Guardian *of the ſpiritualities*, is the perſon to whom the ſpiritual juriſdiction of a dioceſe is committed, during the time of the vacancy of the ſee.

This guardian may be either ſuch in law, *i. e. jure magiſtratus*, as the archbiſhop is of any dioceſe within his province; or by delegation, as he whom the archbiſhop, or vicar-general, does for the time depute.

The dean and chapter of Canterbury are guardians both for the dioceſe and the whole province during a vacancy of the archbiſhopric; ever ſince the office of prior of Canterbury was aboliſhed at the reformation. 2 Roll. Abr. 22.

Guardian *of the Church*. See Church-*warden*.

Guardian, or *Warden*, of the Cinqueports, is an officer who has the juriſdiction of the Cinqueports, with all the power that the admiral of England has in other places.

Camden relates, that the Romans, after they had ſettled themſelves and their empire in our iſland, appointed a magiſtrate, or governor, over the eaſt parts, where the Cinqueports lie, with the title of *comes litoris Saxonici per Britanniam*; having another, who bore the like title, on the oppoſite ſide of the ſea. Their buſineſs was to ſtrengthen the ſea-coaſt with munition againſt the outrages and robberies of the barbarians. And that antiquary takes our warden of the Cinqueports to have been erected in imitation hereof. See Cinque-ports.

Guardian *of the Peace*. See Conservator *of the peace*.

GUARDIANI, in *Geography*, a ſmall iſland in the Grecian Archipelago, near the S. coaſt of Cephalonia.

GUARDO, or Govardo, a town of Italy, in the department of the Mela, on the Chieſa; 10 miles N.E. of Breſcia. N. lat. 45° 38′. E. long. 10° 26′.

GUARDUCCI, Tommaso, in *Biography*, a native of Florence, and ſcholar of Bernacchi, arrived in England in the autumn of 1767, at the beginning of the opera regency of Meſſrs. Gordon and Vincent. He was tall and aukward in figure, inanimate as an actor, and in countenance ill-favoured and morbid; yet, with all theſe diſadvantages, he was one of the moſt correct ſingers we ever heard; and a man of great probity and worth in his private character. He was unfortunate in arriving here ſoon after Manzoli, the impreſſions of whoſe great voice and majeſtic manner of ſinging had not been effaced by his immediate ſucceſſor, Eliſi. Guarducci's voice, though of much leſs volume than Manzoli's, was clear, ſweet, and flexible. His ſhake and intonations were perfect, and by long ſtudy and practice he had vanquiſhed all the difficulties of his art, and poſſeſſed himſelf of every refinement of his particular ſchool, as well as of the general vocal embelliſhments of Italy at this period.

Though prejudice ran high againſt him on his firſt arrival in London, his merit at length made its way, and his highly poliſhed manner of ſinging was very much approved and felt by the principal profeſſors and perſons of taſte and diſcernment who heard him. He ſoon diſcovered that a ſinger could not captivate the Engliſh by tricks or inſtrumental execution, and told the author of this article, ſome years after, at Montefiaſcone in Italy, that the gravity of our taſte had been of great uſe to him. "The Engliſh (ſaid he) are ſuch friends to the compoſer and to ſimplicity, that they like to hear a melody in its primitive ſtate, undiſguiſed by change or embelliſhment. Or if, when repeated, *riſſioramenti* are neceſſary, the notes muſt be few and well ſelected, to be honoured with approbation."

Indeed, Guarducci was the plaineſt and moſt ſimple ſinger, of the firſt claſs, whom we ever heard. All his effects were produced by expreſſion and high finiſhing, nor did he ever aim at execution. He ſung in the Engliſh oratorios upon ſhort notice, with very little knowledge of our language, and ſtill leſs practice in pronouncing it. However, he was well received and well paid, for he had 600*l.* for twelve oratorios, a larger ſum than was ever given on a like occaſion, till the time of Miſs Linley.

In October, the King's theatre was opened, with a new ſerious opera, by different authors, entitled "Tigrane," in which the admirable cantabile air, "Care luci," compoſed by Sacchini, was ſung in an exquiſite manner by Guarducci. This air, the firſt that was ever performed on our ſtage of Sacchini's compoſition, was printed without his name.

In December, another paſticcio opera, called "Sifare," was performed, in which Guarducci gained great applauſe by his poliſhed manner of ſinging a ſimple and elegant air by Galuppi, "Quel labro addorato," which was conſtantly encored during the run of the opera. Abel compoſed an air for him in this drama, "Frena le belle legrime," with an accompaniment for the *viol da gamba*, which he played himſelf; but it was laboured, and had not the effect that might be expected from the united powers of two ſuch complete muſicians.

Guarducci, inſtead of an opera, had for his benefit, in the ſpring of 1764, the oratorio of "Betulia liberata," written by Metaſtaſio, and ſet by Jomelli, in which, among many other admirable compoſitions, Guarducci had an air of ſupplication, through which were heard the cries of the people for peace and bread, in a diſtant chorus, ſung extremely ſoft; this was juſtly admired for its new and fine effect.

Soon after he had quitted this country, when we called upon him in 1770, at Monteſiaſcone in the way to Rome, he had built himſelf a very good houſe, fitted it up in the Engliſh manner, with good taſte. He had previouſly purchaſed a winter houſe in Florence, and built this at Monteſiaſcone, the place of his birth, to retire to in ſummer, and to receive his mother, and his brothers and ſiſters; it is charmingly ſituated, commanding, on one ſide, a fine proſpect of the country, as far as Aquapendente, and a great part of the lake Bolſena; and on the other, the hills of Viterbo, and the country leading to it.

He ſaid, that he had totally quitted the ſtage, and intended ſinging no more in public; this would have been a loſs to his country; as we found that he was then allowed by the Italians the firſt place among all the ſingers of that period; and at Rome, they continued to ſpeak of his performance in Piccini's "Didone Abbandonata" with rapture.

But alas! this ſingularly regular, prudent, and worthy man, after he had retreated from the ſtage, and imagined himſelf ſafely landed, and out of the reach of public caprice, and frowns of fortune, was obliged, ten years after, when his youth was gone, and his powers of pleaſing rapidly on the decline, again to mount the ſtage for a ſubſiſtence, by having been perſuaded by his friends to truſt his whole property, for the ſake of high intereſt, to a merchant at Leghorn, who, becoming a bankrupt, left him without a ducat to carry on his eſtabliſhment for his family or his own ſupport! We relate this melancholy ſtory as another beacon to future great theatrical performers, who by toil, labour, and economy, have acquired and accumulated a proviſion for age, change of faſhion, and infirmities, not to be tempted to truſt their property without ſafe and ſolid ſecurity to merchants; the riſk being always proportioned to the promiſed premium, which, when inordinate, even men intentionally honeſt are unable to pay.

GUAREA, in *Botany*, a barbarous word, from *Guara*, the name given to this tree by the inhabitants of Cuba.—Allamand in Linn. Mant. 150. Schreb. 254. Willd. Sp. Pl. v. 2. 332. Cavan. Diſſ. 366. Mart. Mill. Dict. v. 2. Juſſ. 265. Lamarck. Illuſtr. t. 301.—Claſs and order, *Octandria Monogynia*. Nat. Ord. *Trihilatæ*, Linn. *Meliæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in four deep, ſhort, flattiſh, obtuſe, equal ſegments. *Cor.* Petals four, erect, linear, acute. Nectary tubular, ſomewhat cylindrical, entire, the length of the corolla. *Stam.* Filaments none; anthers eight, attached to the inner margin of the nectary. *Piſt.* Germen globoſe, ſtanding on a cylindrical receptacle, crowned with a glandular border; ſtyle thread-ſhaped, prominent; ſtigma capitate, depreſſed, undivided. *Peric.* Capſule globoſe, umbilicated, with four furrows from the centre, of four cells, and four thick hard valves. *Seeds* ſolitary, oblong, clothed with a ſcarlet arillus.

Eſſ. Ch. Calyx four-cleft. Petals four. Nectary cylindrical, bearing the anthers on its edge. Capſule with four cells and four valves. Seeds ſolitary, with an arillus.

Obſ. Very near *Trichilia*, from which it was ſeparated by Linnæus, at the ſuggeſtion of F. Allemand, a ſurgeon who travelled in South America and the Weſt Indies, and ſent him many deſcriptions, with ſome ſpecimens, of plants. This gentleman was nephew to the late profeſſor Allemand of Leyden. See ALLAMANDA.

1. *G. trichilioides.* Linn. Mant. 228. Cavan. Diſſ. 366. t. 210. Swartz. Obſ. 146. (Trichilia Guara; Linn. Sp. Pl. 551, excluding Browne's ſynonym. Melia Guara; Jacq. Amer. 126. t. 176. f. 37. Eleutheria arborea; Browne Jam. 369. Lauro affinis arbor, &c. Alleygator or Muſk-wood; Sloane Jam. v. 2. 24. t. 170. f. 1. Guidonia nucis juglandis foliis major; Plum. Ic. 139, excluding the ſynonyms, t. 147. f. 2. Jito; Piſ. Braſ. 79. t. 70.)

This, the only known ſpecies, is a tree of moderate ſize, growing in Brazil, Jamaica, and other parts of the Weſt Indies. The bark and wood, as well as all parts of the plant, are ſaid to ſmell ſtrongly of muſk, and the wood abounds with a bitter reſin, which, as well as its muſky flavour, renders it totally unfit for making rum caſks. The *leaves* are large and handſome, abruptly pinnate, compoſed of three or four pair of elliptical, pointed, entire, ſmooth leaflets. *Flowers* whitiſh, in axillary branched cluſters, often a foot long. *Capſule* nearly globular, bigger than a hazel nut.

Piſo ſays the bark of the root is an active and dangerous purge, and Browne, that the powder of the bark in general is uſed by the negroes of Jamaica as an emetic.

GUARGA, in *Geography*, a river of Africa, in the kingdom of Fez, which runs into the Seba; 30 miles E.N.E. of Mahmora.

GUARIBA, in *Zoology*. See SIMIA *Beelzebul*.

GUARICO, otherwiſe called *Cape* FRANCOIS, in *Geography*, a town that lies on the N. W. ſide of the iſland of St. Domingo, in N. lat. 19° 45′ 48″, and 73° 0′ 45″ W. of the meridian of Paris, according to the obſervation of Don George Juan, taken on the ſpot. The town is about one-third of a league in length, and contains between 13 and 15 hundred inhabitants, who are a mixture of Europeans, white creoles, negroes, mulattoes and caſts; the latter being the moſt numerous. Since a dreadful fire, which deſtroyed the town, the houſes, which were conſtructed of wood, are now built of ſtone, and in general they have only a ground floor. The town contains, beſides a pariſh church, a college of Jeſuits, a nunnery of Urſulines, a convent, and a ſpacious hoſpital. The adjacent country is well cultivated, and laid out in plantations of ſugar, indigo, tobacco, and coffee. The trade carried on from this port was formerly very great, as no leſs than 160 veſſels, from 150 to 4 or 500 tons, annually reſorted to it from France. The climate is extremely hot, and ſubjects the inhabitants to malignant fevers and dyſenteries. The harbour, though open to the E. and N. is very ſecure, being incloſed by a ridge of rocks, which fence it againſt the impetuoſity of the ſea.

GUARIN, PETER, in *Biography*, was born at Rouen in the year 1678. When he was about eighteen years of age he joined the order of Benedictine monks, and ſoon became ſuch a proficient in the Greek and Hebrew languages, that he was appointed profeſſor of them. He was author of "A Hebrew Grammar," in two vols. 4to. and employed much of his time and labour on the compoſition of "A Hebrew Lexicon," which was publiſhed, after his death, in two vols. 4to. It was entitled "Lexicon Hebraicum et Chaldæo-biblicum," &c. Guarin completed that part of it only which reaches to the end of the letter *mem*: the remainder was executed by Le Tournois and others belonging to the congregation of St. Maur.

GUARIN, in *Geography*, a town of Peru, in the dioceſe of La Paz; 60 miles N. N. W. of La Paz.

GUARINI, BATISTA, in *Biography*, was born at Ferrara in 1587. He was educated at Piſa, Padua, and in his native city, in the univerſity of which he was for ſome years the profeſſor of belles lettres. At the age of thirty he entered into the ſervice of Alfonſo II. duke of Ferrara, who created him a cavalier, and employed him in various embaſſies. In reward for his ſervices the duke nominated him his ſecretary; but, through ſome diſguſt, he reſigned his employment in leſs than two years. The anger of his maſter obliged him to quit the courts of Mantua and Savoy, to which he had ſucceſſively reſorted. After many years he returned to Ferrara, whence he was delegated, in 1605, to compliment pope Paul V. on his acceſſion. He died at Venice in 1612. He was author of various works, conſiſting of Latin orations; letters; poems, &c. alſo of "Il Secretario," or the art of letter writing; a comedy entitled "Idropico." His fame as a poet reſts entirely upon his famous dramatic paſtoral, the "Paſtor Fido." It has gone through a multitude of editions, and is regarded as one of the ſtandard productions of Italian poetry, which place it deſerves on account of the variety and intereſt of its action, and the warmth and beauty of its language.

GUARINO, ſurnamed *Veroneſe*, was born at Verona about the year 1370. He was the pupil of John of Ravenna; but not ſatisfied with the degree of knowledge which he obtained under him, he ſailed to Conſtantinople about his twentieth year, in order to learn Greek of Manuel Chryſoloras. On his return to Italy he began to keep an open ſchool, and he paſſed, ſucceſſively, to Florence, Bologna, Padua, Trent, Verona, Venice, and Ferrara. He had many ſcholars, who ſhewed themſelves worthy of their maſter, to whom is, in great part, owing the reſtoration of ancient elegance in the Greek and Latin languages, which took place in the 15th century. At Ferrara he was invited to undertake the education of Leonello d'Eſte, ſon of the marquis, Nicholas III. in 1429, and here he was appointed to the profeſſorſhip of the learned languages. He founded a family in that city, where he died in 1460, at the age of 90. He was engaged, as a writer, in the uſeful taſk of tranſlating the ancient Greek authors into Latin. He gave verſions of many lives of Plutarch, and of other pieces by that author. At the command of pope Nicholas V. he tranſlated the firſt ten books of Strabo's Geography, which were printed, with the verſion of the other ſeven, by Gregory Tiferno: theſe were afterwards tranſlated by Guarino. He was author, likewiſe, of ſome grammatical treatiſes on the Greek and Latin languages; of commentaries upon ancient authors; of orations on various occaſions; and of ſome Latin poems.

Guarino, Batista, a ſon of the preceding, was born at Verona. He opened a ſchool for the learned languages at Ferrara in 1461, and became one of the moſt celebrated profeſſors of his time. He had among others, for his ſcholars, Giraldi and Aldo Manuzio, of whom the latter dedicated to him his edition of Theocritus in 1495. He was ſelected by Borſo, duke of Ferrara, as ambaſſador for the court of France; and he was honoured with the title of ſenator by the king of Naples. As an author, he is known by his poems in four books, which were printed at Modena in 1496; and by letters and orations on various ſubjects. He wrote comments upon Lucan, Catullus, and Cicero's epiſtles, and tranſlated ſome of the orations of Demoſthenes, Dio Chryſoſtom, and St. Gregory Nazianzen.

GUARINONE, Chriſtopher, a native of Verona, who acquired conſiderable reputation, as a phyſician, about the end of the 16th century. He graduated at Padua; and, on his return to Verona, taught philoſophy privately, and at the ſame time practiſed his profeſſion with ſo much diſtinction, as to be appointed firſt phyſician to the duke of Urbino, and afterwards to be invited to the court of Prague, by the emperor Rodolf II. Guarinone eſtabliſhed a medical academy or ſociety, which met weekly in his own houſe. He died at Prague, in 1602, at a very advanced age. He was author of the following publications:—1. "Commentaria in primum Librum Ariſtotelis de Hiſtoria Animalium." Francfort, 1601.—2. "Tractatus de Methodo doctrinarum;" ibid. 1601.—3. "De generatione viventium, etiam naſcentium ex putredine;" ibid. 1601.—4. "De principio venarum;" ibid. 1601.—5. "De natura humana ſermones quatuor," 1601.—6. "Conſilia Medicinalia, in quibus univerſa praxis medica exactè pertractatur," Venet. 1610. Eloy. Dict.

GUAROMINI, in *Geography*, a bay on the coaſt of Brazil. S. lat. 23° 30′.

GUAROUBA, in *Ornithology*, a ſpecies of *Pſittacus*; which ſee.

GUARUGUARU, in *Ichthyology*, the name of a ſmall American freſh-water fiſh, ſeldom exceeding an inch and half in length, and of a very ſlender body. It is eaten, though very ſmall, being very well taſted. It is caught in abundance in lakes and ponds.

GUASABAS, in *Geography*, a town of New Navarre; 220 miles S.S.E. of Caſa Grande.

GUASAI, or Kua-Say, a town of Tonquin, on a river which runs into the Chineſe ſea. N. lat. 17° 36′. E. long. 105° 40′.

GUASAIBON, a town of the iſland of Cuba; 25 miles W. of Havanna.

GUASCO, a town of Chili, at the mouth of the river Guaſco, which runs into the Pacific ocean. S. lat. 27° 20′.

GUASTALLA, a town of Italy, in the department of the Mincio, near the Po, at the union of the rivers Croſtollo and Tagliata, with a ſmall territory, to which is annexed the title of duchy, ceded by the treaty of Aix-la-Chapelle, in 1748, to the duke of Parma. In 1806, the principality was given to the prince of Borgheſe, who married the princeſs Paulina; 21 miles N.W. of Parma. N. lat. 44° 56′. E. long. 10° 39′.

GUASTECA of *D'Anville*, or Panuco, a province of the domain of Mexico, bounded on the N. by the new kingdom of Leon, on which quarter it is rather barren; and on the S. bordering on Mexico proper, where it is not only fertile, but has mines of gold and one real of ſilver, dependent on Zucatecas, whence it is diſtant three leagues. In Arrowſmith's map, and in that of Alzate, this province is ſupplanted by that of Santander; Panuco, the capital, being placed in the province of Mexico. This, however, is a very ſmall diſtrict.

GUATIMALA, one of the ſeven grand territories or domains, often called kingdoms by the Spaniſh authors, into which the dominions of Spain in North America are diſtributed. This territory contains the following provinces, *viz.* Veragua, Coſta Rica, Nicaragua, Honduras, Xeſes, or Choletuca, Tigueſgalpa, St. Miguel, St. Salvador, Sonſonate, Suchitepec, Soconuſco, (of which the ſeven diſtricts laſt enumerated form what is called Guatimala in the maps,) Icalcos, Vera-Paz, Chiapa, and Yucatan. The large domain of Guatimala is ruled by a preſident, who is alſo captain-general, or commander of the troops, but ſubordinate to the viceroy of Mexico. This is one of the three royal audiences, and it contains 25 bailiwicks. The royal audience, or high court of juſtice, was eſtabliſhed in 1544. The ſoil of this province is fertile, and the country abounds in corn, cattle, cochineal, honey, wax, ſugar, cotton, and indigo; it is mountainous, with numerous volcanos, and ſubject to earthquakes. See the deſcription of each province reſpectively.

Guatimala, the capital of the above-mentioned domain, the ſeat of a royal audience, and the ſee of an archbiſhop, eſtabliſhed in 1742, was founded by the name of St. Jago, at the ſide of a volcano, in a valley about three miles wide, opening gradually towards the South ſea, between two mountains, and containing 7000 families. It was deſtroyed by an earthquake in 1751, and, after being rebuilt, was again deſtroyed by the ſame calamity in 1775; but it was again rebuilt at the diſtance of about 25 geographical miles farther to the ſouth, on the river Vaccas, near the Barra de Iſtapa of D'Anville, now called the harbour of Guatimala. It has churches and convents, though their number is not preciſely ſpecified, and an univerſity, which begins to adopt uſeful plans of education. The inhabitants are celebrated for perſonal beauty and ſweetneſs of diſpoſition; the women being reputed the handſomeſt in Spaniſh America, which ſome have aſcribed to the moiſture of the climate. The number of inhabitants has not been aſcertained, nor even mentioned by any writer, but is probably equal, if not ſuperior, to that of Guadalaxara. N. lat. 14° 28′. W. long. 92° 40′.

GUATIMAPE, a town of Mexico, in New Biſcay; 105 miles N.N.W. of Durango.

GUATIMAR, a town of the iſland of Cuba; 50 miles N.N.E. of St. Jago.

GUATIMOZIN, in *Biography*, laſt king of Mexico, was nephew of Montezuma, and ſucceeded to the throne on the death of Quetlevaca, in 1520. He was raiſed to this high diſtinction ſolely by his talents and prowefs, which pointed him out as a proper perſon to defend the rights of his country againſt the Spaniards. A new invaſion of Mexico by thoſe mercileſs plunderers ſoon called forth his energies into action. He ſhewed himſelf worthy the choice of his friends, exerted all his powers in the defence of his capital, and repulſed an attempt by Cortes to take it by ſtorm. In the progreſs of the ſiege he preſerved an unſubdued ſpirit, and rejected all the propoſals of the enemy, though they were almoſt daily gaining ground. At length he was perſuaded to attempt a retreat acroſs the lake, but was intercepted and made priſoner. Finding reſiſtance in vain, he ſurrendered with a dignified compoſure, requeſting only that no inſult might be offered to the empreſs and his children. When brought into the preſence of Cortes, he appeared with neither the fierceneſs of a barbarian, nor the dejection of a ſupplicant. "I have done," ſaid he, "what became a monarch. I have defended my people to the laſt extremity. Nothing now remains but to die. Take this dagger," laying his hand on one which Cortes wore, "plant it in my breaſt, and thus put an end to a life which can no longer be of uſe." The Spaniſh commander, whoſe name muſt be for ever tranſmitted to poſterity with the infamy which it deſerves, irritated by the ſmallneſs of the treaſures found in the captured city, ordered the hero to be put to the torture, in order to force a diſcovery of more. The unfortunate prince, together with his chief, was ſtretched on burning coals. Guatimozin endured the torments with the utmoſt patience and reſignation, but his fellow-ſufferer, overcome by the violence of the anguiſh, turned a dejected eye to his maſter, which ſeemed to implore his permiſſion to reveal the ſecret. But the high ſpirited prince, darting on him a look of authority mingled with ſcorn, checked his weakneſs by aſking, "Am I now repoſing on a bed of roſes?" Overawed by the reproach, he perſevered in dutiful ſilence, and ſhortly after expired. Cortes, the ſavage Cortes, aſhamed of the horrid ſcene, reſcued the royal victim from the hands of his torturers, and prolonged a life reſerved for new indignities and ſufferings; and upon an inſurrection of the Mexicans, in which he could have had no ſhare, the Spaniſh commander cauſed him to be hanged without even a hearing. This ſoul deed was perpetrated in 1522.

GUATO, in *Geography*, an iſland in the S. Pacific ocean, near the coaſt of Chili; 20 miles long and five broad. S. lat. 44° 40′.

GUATUCUPA, in *Ichthyology*. See LABRUS *Cromis*.

GUAVA, in *Botany*. See GUAIAVA.

GUAURA, in *Geography*, a town of Peru, in the audience of Lima; 70 miles N.N.W. of Lima. S. lat. 11°. W. long. 7° 26′.

GUAXACA, now called *Oaxaca*, the capital of a province of the ſame name in the domain of Mexico. It is much celebrated for its abundant harveſts of cochineal. It is ſituated at the opening of three large plains, one of which extends to the town of Guatimala, at a great diſtance. It is watered by a beautiful river, and is amply ſupplied with pure waters from the mountains on the N.E. by ſeveral aqueducts. The air is clear and healthy, being refreſhed in the morning by the eaſt wind, and by the weſt in the evening; and the climate preſents perpetual ſprings. Thiery, who viſited this city in 1777, adds in his deſcription of it, that it is diſtinguiſhed by magnificence of ſituation, artificial beauty, excellence of ſoil, temperature of climate, and abundance of fruits of Europe and America in conſtant ſucceſſion. Nothing is wanting, he ſays, to render Oaxaca an enchanting city but ſuperior induſtry. Its numerous ſpires and houſes give it a majeſtic appearance. The form is an oblong ſquare, about two miles by 1½, including the ſuburbs, which are full of gardens, and of plantations of nopal, a kind of cactus, which feeds the cochineal inſect. The ſtreets are wide and ſtraight, and well paved; and the houſes, of two floors, are built of ſtone. The town-houſe in the great ſquare, recently erected, is built with ſtone of a ſea-green colour. The biſhop's houſe and the cathedral form two other ſides of the ſame ſquare, ſurrounded with arcades, as a fence from the rain and ſun. The other churches and monaſteries, which are numerous, are ſolidly built and richly decorated. Here are a biſhop and provincial governor, ſubordinate to the governor of Guatimala, to which audience the province belongs. The population, compriſing Indians, mulattoes, and negroes, amounts to about 24,000 perſons. The province of Oaxaca is eſteemed the moſt fertile of the whole kingdom of Guatimala; and, beſides cochineal, produces abundance of excellent chocolate. It has manufactures of black wax; and the kernels of a fruit are ingeniouſly painted with miniatures. Eſtella reckons among the productions of this province, ſugar, cotton, rice, chocolate, plantains, cochineal, and caſſia. It has alſo mines of gold, ſilver, lead, and cryſtal; and moſt of the rivers roll particles of gold. The inhabitants, however, want induſtry. In this province there are only two manufactures of indigo, and 507 looms employed in weaving cotton. This celebrated city is ſubject to earthquakes, and was a conſiderable ſufferer from the laſt that happened in New Spain. N. lat. 17° 30′. W. long. 108° 36′.

GUAXACATLAN, a town of Mexico in the province of Guadalaxara; 60 miles N.W. of Guadalaxara.

GUAYAQUA, a town of S. America, in the government of Tucuman; 125 miles N. of St. Salvador de Jugui.

GUAYAQUIL, a celebrated commercial province of New Granada, near the Pacific ocean. This province, during the winter months, from December to May or June, is much incommoded by the elements, inſects, and vermin. It is ſubject to an extraordinary inundation, reaching as far as the Andes, whither the inhabitants then retire with their herds. The inceſſant rains are alſo accompanied with frequent and dreadful tempeſts of lightning and thunder. During the rainy ſeaſon Reaumur's thermometer is generally between 24° and 28°. In this ſeaſon fevers, diarrhœas, dyſenteries, vomiting, and ſpaſms, are diſeaſes that prevail, and are frequently fatal. The "boba," or ſerpent, of prodigious ſize, is found here, and there is alſo a ſerpent about a palm in length, and of a bright ſilver colour, whoſe bite is mortal in 24 hours. Innumerable ſwarms of inſects and vermin infeſt both the air and ground. The ſnakes, poiſonous vipers, ſcorpions, and ſcolopendræ, find their way into the houſes to the great moleſtation and even deſtruction of many of the inhabitants. Some of theſe animals have found their way into the beds: and the inhabitants, in order to ſecure themſelves from danger, are under a neceſſity of carefully examining their houſes and their beds, and for preventing the acceſs of the moſquitoes and other inſects, all perſons, even the negro ſlaves and Indians, have canopies over their beds. In ſummer the number and activity of theſe vermin are diminiſhed. During the inundation the caymans, ſome of which are of the enormous length of nine yards, ſpread over the country; but in the dry ſeaſon, from June to December, they are leſs troubleſome. This ſeaſon, which, within the tropics, is the coldeſt, in ſome degree invigorates the inhabitants, who are enervated and rendered indolent and liſtleſs by the climate. At Babahoyo there is an annual fair, where the people of Guayaquil meet thoſe of Quito and the adjacent towns. But in the rainy ſeaſon Babahoyo is inacceſſible, the inundation forming an oval lake about 20 miles in length, while the villages on the heights can be approached by boats. The churches, on account of the inundation, are always on the ſummits: when the overflowing waters have ſubſided, the beauty of the meadows and woods ſurpaſſes all deſcription. The products of this juriſdiction are tobacco, not much eſteemed, wax, cotton, and principally large trees, fit for building and repairing ſhips.

The juriſdiction of Guayaquil begins at Cape Paſſado, ſo called from its lying 21′ S. of the equinoctial, and about half a degree N. of the bay of Manta. From this cape it continues along the coaſt, including the iſle of Puna, to the town of Machala, on the coaſt of Tumbez, where it is terminated by the juriſdiction of Piura. From thence it runs away eaſtward, and is bounded by that of Cuença; and then turning northward along the weſtern ſkirts of the Andes, it terminates on thoſe of Bamba and Chimbo. Its length from N. to S. is about 60 leagues, and its breadth from E. to W. 40 or 45, reckoning from the point of Santa Elena to the parts called Ojibar. The whole country, like that in the neighbourhood of the city, is a continued plain, and in winter univerſally overflowed. It is divided into ſeven lieutenancies or departments, for each of which the corregidor appoints a lieutenant or deputy, who is confirmed by the audience of Quito. Theſe departments are Puerto Viejo, Punta de Santa Elena, Puna, Yaguache, Babahoyo, Baba, and Daule. The firſt has a capital of the ſame name, and includes the towns of Monte Chriſto, Picoaſa, Charapoto, and Xipijapa. The ſecond comprehends the towns of Punta, Chongon, Morro, Colonche, and Chandui. The third department, or that of Puna, is an iſland at the mouth of the Guayaquil river, extending N.E. and S.W., between ſix and ſeven leagues, and is of a quadrilateral figure. Formerly it is ſaid to have contained between 12 and 14 thouſand inhabitants; but it has now only one ſmall town, ſituated at the head of its harbour in the N.E. part. To this lieutenancy has been annexed the town of Machala, on the coaſt of Tumbez, together with that of Naranjal, the landing place of a river of the ſame name, called alſo the Suya. The juriſdictions of Machala and Manaranjol produce great quantities of cacao, and that of the former is eſteemed the beſt in the whole province of Guayaquil. The lieutenancy of Yaguache is at the mouth of a river of the ſame name, which falls into the Guayaquil on the S. ſide, and riſes from the ſkirts of the Cordilleras, S. of the river Bamba. Its juriſdiction contains three towns. Its chief product is wood and a little cacao: but cattle and cotton are the principal objects of attention to its inhabitants. For an account of Babahoyo and Baba, ſee theſe articles. The lieutenancy of Daule includes a town of the ſame name, and is waſhed by a river, to which it owes its appellation. It contains many ſpacious houſes belonging to the inhabitants of Guayaquil. Here are numerous plantations of tobacco, of excellent quality, ſugar-canes, cacao, and cotton; together with large orchards of fruit-trees and extenſive corn fields. The river Daule diſcharges itſelf into the Guayaquil: it is very large, and on both a great trade is carried on with that city. The buſineſs of grazing is followed in all theſe lieutenancies, more or leſs; in proportion to their extent, the nature of the ſoil, and the convenience of driving the cattle to the mountains, beyond the reach of the inundations. Juan and Ulloa's Voyage to South America, vol. i.

Guayaquil, a city, the capital of the above province, ſituated in the ſouthern part of the vice-royalty of Granada, on a river near the Pacific ocean. It was founded about the year 1534 or 1535; but after being deſtroyed by the Indians, it was re-built in 1537, at ſome diſtance from its firſt ſituation, on the declivity of a mountain: and in 1693, conſiderable additions were made to it, at the diſtance of five or ſix hundred toiſes, communicating with the old part by a long bridge. The city extends along the bank of the river from the lower part of the old town to the upper part of the new, near half a league, but the breadth is not proportional to the length. The houſes of both towns are chiefly conſtructed of wood; but ſince the year 1767, they have begun to uſe whitened earth, as being leſs ſubject to accidents from fire. After the almoſt general conflagration in 1764, it was prohibited by the audience of Quito, and by the ſuperior government of Santa Fé, to thatch the houſes with ſtraw, or to encompaſs them with boards or canes. The city had been before nearly ruined by 11 different conflagrations; but by reaſon of its advantageous ſituation for commerce, it has always reſumed its primary ſtation. The ſtreets of the new town are ſtraight, and ſufficiently wide, but having no declivity, the rain-water ſtagnates and occaſions diſorders; and the filth is increaſed by theſe pools being made the receptacles of ordures. Guayaquil is now become one of the handſomeſt towns of Spaniſh America; the ſtreets having been paved, and an arcade running before all the houſes, ſo that walkers are protected from the ſun and rain. The houſes are alſo improved, and covered with tiles. Nevertheleſs, the marſhes in its vicinity, which infect it with peſtilential vapours, and the water, tainted with ſtreams from theſe marſhes, and from the filth of the town, render it inſalubrious and ſubject to diſeaſe. The city has a parochial church, two convents, a college of Jeſuits, and an hoſpital. Both the city and its juriſdiction are under a corregidor, nominated by the king, and he holds his office five years; for the police and civil government Guayaquil has ordinary alcaldes, and regidores. The revenue is managed by a treaſurer and an accomptant, who receive the tributes of the Indians, the duties on imports and exports, and the taxes on commodities, which are either conſumed in the city, or carried through it. The eccleſiaſtical government is lodged in the biſhop of Quito's vicar, who is generally alſo the prieſt of the town. The city is defended by three forts, two on the river near the city, and the third behind it, guarding the entrance of a ravine. The number of inhabitants may now be eſtimated at about 10,000; though it is ſaid to have been formerly much more conſiderable, owing to the influx and temporary abode of ſtrangers, drawn thither by commerce. Many of its eminent families are Europeans, who have married there; beſides theſe, and ſubſtantial creoles, the other inhabitants are of different caſts, as in other cities of this part of America. In ſpite of all the local diſadvantages of this town, with reſpect to ſalubrity, it is ſuppoſed to be now increaſing, the trade offering many benefits to ſettlers, who are often fixed in marriage by the charms of the women; for an ugly woman in Guayaquil is mentioned as a proverbial rarity. The freedom of commerce, eſtabliſhed in 1778, has improved the advantages of this city, ſo conveniently ſituated for trade with both North and South America. In 1794, there was built on the little iſle of Puna, near the mouth of the Guayaquil river, at the royal expence, a wooden fortreſs, with a battery to defend the harbour. This is the reſidence of the officers who viſit the ſhips that enter and depart. On the ſouth of the iſland are ſalt-works. Many Spaniſh ſhips which uſed to ſtop in the bay of Callao, proceed directly to Guayaquil; and the balance of the trade with Lima is in its favour. Guayaquil is indeed now in ſuch a ſtate of progreſſive improvement, that thoſe who knew it formerly would ſuppoſe it quite another city. Poſſeſſed of almoſt the only grand and genuine haven on the weſtern coaſt of South America, this city may well avail itſelf of its advantages. Acceſſible by a broad and majeſtic river, leading to the port of Puna, at the diſtance of eight leagues, though large ſhips might proceed, it is uſual to transfer the cargoes to balzas, a kind of navigable rafts, formed of large beams, of a wood nearly as light as cork. Upon theſe rafts the maſters ſometimes even form their habitations, adorned with little beautiful gardens, ſo that when the ſhips arrive, the whole river preſents, as it were, a floating city. (See Boat.) One great advantage belonging to Guayaquil is, that its ſituation renders it a proper arſenal for the conſtruction of ſhips; having abundance of ſuitable timber in its vicinity, and proviſions being very cheap. It was accordingly named for that purpoſe in a royal ordinance of 1767. The timber is not only abundant and excellent, but may be eaſily conveyed thither by numerous rivers. The balſam tree, the cinnamon tree, the pechiche, the guachapeli, whoſe roots yield ſtrong curves; all theſe, and many others, are celebrated for their duration, and for their reſiſtance to worms, and other accidents of the ſea. The government of Guayaquil is chiefly military, there being two companies of infantry, who form the garriſon alternately, with two others at Quito. S. lat. 2 12'. W. long. 79° 6'.

Guayaquil, a river of South America, which riſes in the Cordilleras, and purſues a ſerpentine courſe, ſubject to great ſwellings from the torrents that are precipitated from theſe mountains, to Iſla Verde, in the bay of Puna. The diſtance of the navigable part of this river from the city of Guayaquil to the cuſtom-houſe at Babahoyo, where the goods are landed, is 24½ leagues; and to Caracol, the landing place in winter, 28½ leagues. The diſtance from Guayaquil to Iſla Verde is computed at about ſix leagues, and from Iſla Verde to Puna three leagues: ſo that the whole diſtance from Caracol, the moſt inland part up the river, to that of Puna, is 37½ leagues. The mouth of the river at Iſla Verde is about a league in breadth, and ſomewhat broader at Guayaquil, above which it contracts itſelf as it advances nearer the mountains, and forms various creeks. In ſummer the tides reach as far as the cuſtom-houſe; but in winter the current is ſo ſtrong and rapid, that three or four times in the year the tides are imperceptible. The floods, to which this river is ſubject, ſhift the banks of ſand that lie between the city and Iſla Verde, ſo that no ſhips of any conſiderable burden can go up with ſafety, unleſs great caution and frequent ſoundings are practiſed. The borders of this river, like thoſe of Yaguache, Baba, and Daule, as well as thoſe of the creeks and canals, are decorated with country ſeats, and cottages of poor people, of all caſts, for the convenience both of fiſhing and agriculture. The port of Guayaquil, at the mouth of this river, is the place where the goods from the provinces of Peru, Terra Firma, and Guatimala, conſigned to the cuſtoms, are landed; and, on the other hand, thoſe from the mountains, deſigned for the above mentioned provinces, are brought hither and ſhipped for their reſpective ports. The products of this country that are exported, are cacao and timber, cotton, rice, and fiſh, both ſalted and dried: horned cattle, mules, and colts; tobacco, guinea pepper, drugs, and ceibo wool, produced by a high and tufted tree of that name. The goods imported are wine, brandy, oil, and dried fruits from Peru; bays, flour, papas, bacon, hams, cheeſe, and other goods of the ſame kind from Quito; and from Panama, European goods purchaſed at the fairs. From New Spain it receives naphtha, tar, and cordage for the uſe of ſhipping. The tranſitory commerce conſiſts of the reciprocal exchange between the large kingdoms of Quito and Lima: the latter ſends the products of its vineyards and oliveyards, and the former furniſhes cloth, bays, ſerges, hats, ſtockings, and other woollen goods. Indigo is imported from New Spain by the merchants of Guayaquil, and ſent to the manufacturers of Quito.

GUAYAVAL, an iſland in the S. Pacific ocean, near the coaſt of Mexico. N. lat. 24° 20'.

GUAYCAMO, a town of S. America, in the province of Tucuman; 25 miles S.E. from St. Fernando.

GUAYCHA, a town of Peru, in the dioceſe of La Paz, on lake Titicaca; 80 miles N.N.W. of La Paz.

GUAYLAS, a juriſdiction of S. America, in the archbiſhopric of Lima, beginning 50 leagues from Lima, and extending N.N.E. along the centre of the Cordilleras. This juriſdiction is large, and has different temperatures of air. The low parts produce grain and fruits, the upper abound in cattle and ſheep, which form the greateſt branch of their trade.

GUAYMARAL, a town of S. America, in the province of St. Martha, on the Magdalena; 22 miles S. of Teneriffe.

GUAYNAMOTA, a town of Mexico, in the province of Guadaxara; 70 miles N.W. of Guadalaxara.

GUAYNI, a river of Guinea, which runs into the Atlantic. N. lat. 7 50'. W. long. 59 40'.

GUAYRA, La, a ſea-port town of S. America, in the government of the Caraccas, and the harbour of Leon de Caraccas. This town is placed among very lofty mountains, and during nine months in the year experiences great heats. Putrid and malignant fevers, frequently fatal, occur in the months of July, Auguſt, and September. The ſtreets are narrow and badly paved: and the houſes meanly built. It is defended by regular batteries, and the ordinary garriſon of the place is a company detached from the regiment of Caraccas. In time of war it is reinforced by other troops of the line, and the militia of Caraccas. The government have propoſed to make it merely a military poſt, and its commerce only a ſhipping place for the capital. Few merchants reſide here, the whole buſineſs being done at Caraccas. The commodities bought or ſold at Caraccas are ſent to Guayra only to be embarked. The population of

Guayra conſiſts of 6000 perſons, of whom 3000 are in the gun-boats, 711 form the garriſon, or are in the guarda-coſtas or gallies. The almoner diſcharges, with reſpect to them, all clerical functions. The town has only one parochial church.

In conſequence of the ordinance for free commerce, iſſued October the 12th, 1778, Guayra is become a port of conſiderable trade. This port, and Porto-Cavallo, are regulated by an ordinance of 1798. In 1796 there arrived at Guayra forty-three veſſels of various ſizes, which imported more than to the value of three millions of dollars, the cuſtoms exceeding two hundred and eighty thouſand.

GUAY-TROUIN, René du, in *Biography*, a French naval officer, was born at St. Malo in 1673. His father united the profeſſion of a merchant to that of an adventurous ſeaman, and the ſon, willing to diſtinguiſh himſelf, went on board a privateer, and performed a number of heroic actions. In 1691, when he was only in his eighteenth year, he had the command of an armed ſloop, carrying fourteen guns, with which he obtained much ſucceſs on the coaſt of Ireland. Three years after he entered the river of Limerick, and carried off ſeveral veſſels; but falling in with four Engliſh ſhips, he was obliged to yield, and was taken a priſoner into Plymouth. In confinement he won the affections of a female who enabled him to make his eſcape, and in a ſhort time he appeared again on the coaſt of England, where he captured ſome prizes. In the year 1695 he took three rich veſſels on the Iriſh coaſt, and two Dutch ſhips on the coaſt of Spain: theſe ſucceſſes were followed by others ſtill more important. In 1696 he fell in with baron de Waſſenaer, who with three ſhips was eſcorting a fleet of merchant men, and took the baron with a part of his convoy. He preſented, in perſon, his priſoner to the king, and thereupon was removed to the royal navy, and appointed to the command of a frigate. In a few years afterwards he was made captain of a fifty-four gun ſhip, with which, it is ſaid, he took an Engliſh man-of-war of ſeventy-two guns. So brilliant was his career of ſucceſs, that in 1709 he was rewarded with letters of nobleſſe, the preamble to which records his having captured more than 300 merchant ſhips, and 20 ſhips of war. The moſt important of all his exploits was the taking of Rio Janeiro in 1711, which occaſioned a loſs to the Portugueſe of at leaſt a million ſterling. A penſion was now forced on him, he having in 1707 refuſed one that was then offered, requeſting that it might be granted to his ſecond captain, whoſe thigh had been ſhot off. "I," ſaid the gallant officer, "am ſufficiently rewarded, if I obtain the advancement of my friends." He did other important ſervices for his country, and died at Paris in 1736. His "Memoirs," partly written by his own hand, and partly by a nephew, were printed in one vol. 4to. 1740.

GUAZA, in *Ichthyology*, a ſpecies of *Labrus*; which ſee.

GUAZACOALCO, in *Geography*, a river of Mexico, which runs into the gulf of Mexico. N. lat. 18° 10'. W. long. 95° 26'.

GUAZACOCO, a town of New Mexico, in the province of Cinaloa; 28 miles S.W. of Cinaloa.

GUAZUMA, in *Botany*, Plum. Gen. 36. t. 18, the American name of a plant of the natural order of *Malvaceæ*, referred by Linnæus to the ſame genus as the chocolate-tree, *Theobroma*, but which is now, with great propriety, made a genus by itſelf. See Bubroma.

GUBA, in *Ancient Geography*, a town of Aſia, in Comagena, ſeated on the Euphrates, near a mountain, in which this river had a cataract, N.W. of Barſalſum.

Guba, in *Geography*, a town of Aſiatic Turkey, in the province of Aladulia; 24 miles N.E. of Semiſat.

GUBBIO, or Eugubio, a town of Italy, in the duchy of Urbino, the ſee of a biſhop, held under the pope. It has ſeven churches and 21 convents; 33 miles S. of Urbino. N. lat. 43° 17'. E. long. 12° 35'.

GUBEL, a town of Bohemia, in the circle of Chrudim; 15 miles N.E. of Leutmiſchl.

GUBEN, a town of Luſatia, capital of a circle to which it gives name, ſeated on the Lubbe, near its junction with the Neiſſe; ſurrounded with walls in 1331. It contains three churches and an hoſpital: good wine is made here, and it has a manufacture of cloth; 22 miles S. of Francfort on the Oder. N. lat. 51° 57'. E. long. 14° 45'.

GUBER, a country in the interior of Africa, ſubject to Aſben. N. lat. 18° 15'. E. long. 8° 30'.

GUBERGRO, or St. Francisco, a river of Africa, which waters Benguela, and runs into the Atlantic; S. lat. 13° 30'.

GUBINAGUR, a town of Bengal; 28 miles N. of Dinagepour.

GUBINAPOUR, a town of Bengal; 15 miles N. of Mauldah.

GUDCARA, a town of Hindooſtan, in Bahar; 45 miles S.S.W. of Arrah.

GUDEGOW, a town of Hindooſtan, in Rohilcund; 7 miles W. of Biſſowlah.

GUDEMEL, a ſmall iſland on the W. coaſt of Scotland, E. of Oronſay. N. lat. 55° 59'. W. long 6° 17'.

GUDENAH, a town of Hindooſtan, in Bahar; 40 miles W.N.W. of Chuprah.

GUDENFELD, a town of Pruſſia, in Natangen; 25 miles S of Brandenburg.

GUDENSBERG, a town of Germany, in the principality of Heſſe-Caſſel; 8 miles S. of Caſſel. N. lat. 51° 12'. E. long. 9° 22'.

GUDGEON, in *Ichthyology*, the Engliſh name of the fiſh called by authors the *gobio*, and *gobius fluviatilis*. There are two ſpecies of the gudgeon. The firſt is our common river gudgeon, the Cyprinus *gobio* of Linnæus; which ſee. The ſecond is the leſſer river gudgeon, differing from the former not only in ſize but in being of a more tapering ſhape, growing very ſmall towards the tail, and being of a whiter colour and leſs ſpotted. The firſt is common in our rivers (ſee *Gudgeon* Fishing); the ſecond in thoſe of Germany, where it is commonly called a *wapper*.

Gudgeon, *Sea*. See Goget.

Gudgeons, in a *Ship*, are uſed for the eyes driven into the ſtern poſt, into which the pintles of the rudder go, to hang it on.

GUDGOW, in *Geography*, a town of Hindooſtan, in Baglana; 60 miles N.E. of Chandor.

GUDJARA, a town of Hindooſtan, in the circar of Gohud; 10 miles N.E. of Gohud.

GUDMUNDEN, a town of Sweden, in Angermannland; 18 miles N. of Hernoſand.

GUDRAJEGUNGE, a town of Hindooſtan, in Bahar; 3 miles W. of Arrah.

GUEBUCU, in *Ichthyology*, the name given by Marcgrave to the Xiphias *Gladius*; which ſee.

GUEBWELLER, in *Geography*, a town of France, in the department of the Upper Rhine, and chief place of a canton, in the diſtrict of Colmar; 10 miles S.S.W. of Colmar. The place contains 2552, and the canton 8615 inhabitants, on a territory of 90 kiliometres, in 11 communes. A canal was made from this town to New Briſac on the Rhine, by order of Lewis XIV.

GUEDRIER, de St. Aubin, Henry-Michael, in *Biography*, was born in the dioceſe of Rouen in the year 1695. He purſued his maturer ſtudies at Paris, and was admitted a member of the Sorbonne in the year 1723. In 1736 he was choſen librarian, and obtained afterwards other preferment. He was very learned in the modern and ancient languages, and was deeply ſkilled in theology and morals. He was held in high eſteem, and for many years was conſulted as a reſolver of difficult caſes of conſcience. He died in 1742, leaving behind, as a memorial of his profound talents, "The Sacred Hiſtory of the Two Covenants," which had been publiſhed the year before his death, in ſeven volumes, 12mo. This work is ſaid to be a good exhibition of the harmony of the Old and New Teſtament hiſtories, interſperſed with diſſertations, criticiſms, and reflections.

GUEGUETENANGO, in *Geography*, a town of Mexico, in the province of Chiapa; 120 miles S.E. of Chiapa. N. lat. 16° 20′. W. long. 93° 16′.—Alſo, a river that runs into the Pacific ocean, N. lat. 15° 25′. W. long. 94° 37′.

GUEGETLAN, a town of Mexico, the capital of Soconuſco.

GUELDERLAND, Duchy *of*, formerly a province of the Netherlands, bounded on the N. by Overyſſel, and the Zuyder ſea, on the E by the biſhopric of Munſter and the duchy of Cleves, on the S. by the duchy of Juliers and Brabant, and on the W. by the ſtates of Utrecht and Holland. By the peace of Luneville, the Pruſſian and Auſtrian parts of Guelderland were ceded to France; and they form a portion of the department of Roer.

GUELDRES, a town of France, in the department of the Roer, and chief place of a canton in the diſtrict of Cleves. It is advantageouſly ſituated amidſt marſhes on the river Niers, whoſe waters fill the ditches; and it was formerly ſo ſtrongly fortified as hardly to be taken, except by famine. In the year 1794 it was taken by the French, and at the peace of Luneville ceded to that country; 72 miles S.E. of Amſterdam. The place contains 1556, and the canton 11,554 inhabitants, in 14 communes. N. lat. 51° 31′. E. long. 6° 10′.

GUELPHS, or Guelfs, a celebrated faction in Italy, antagoniſts of the Gibelins.

The Guelphs and Gibelins kept Germany and Italy in perpetual agitation during three centuries. The former ſupported the pretenſions of the popes, and the latter defended the rights of the emperor. Their riſe is referred by ſome to the time of Conrad III., in the twelfth century; by others, to that of Frederic I. and by others, to that of his ſucceſſor, Frederic II. in the thirteenth century, and by others again to the conteſt between Gregory VII. and Henry IV. about the cloſe of the 12th century.

The name *Guelph* is commonly ſaid to have been formed from *Welfe*, *Welfo*, on the following occaſion; the emperor Conrad III. having taken the duchy of Bavaria from Welfe VI. brother to Henry duke of Bavaria; Welfe, aſſiſted by the forces of Roger king of Sicily, made war on Conrad, and thus gave birth to the faction of the Guelphs.

Others derive the name Guelphs from the German *Wolff*, on account of the grievous evils committed by that cruel faction. Others deduce the denomination from that of a German called Guelfe, who lived at Piſtoye; adding, that his brother, named *Gibel*, gave his name to the *Gibelins*; under which head the reader will find a more ample account of the origin and hiſtory of thoſe celebrated factions.

GUELTAS, in *Geography*, a ſmall iſland in the Engliſh channel, near the coaſt of France. N. lat. 48° 51′. W. long. 3° 15′.

GUEMENE', a town of France, in the department of the Lower Loire, and chief place of a canton, in the diſtrict of Savenay; 9 miles N. of Blain. The place contains 3585, and the canton 7300 inhabitants, on a terrritory of 240 kiliometres, in 5 communes.—Alſo, a town of France, in the department of Morbihan, and chief place of a canton, in the diſtrict of Pontivy. The place contains 1325, and the canton 14,667 inhabitants, on a territory of 297½ kiliometres, in 9 communes.

GUEPARD, in *Zoology*, the name given by Buffon to the Felis *jubata*; which ſee.

GUEPIER, in *Ornithology*, the name given by Buffon to the Merops *apiaſter*; which ſee.

GUER, in *Geography*, a town of France, in the department of Morbihan, and chief place of a canton, in the diſtrict of Ploermel, and 9 miles E.S.E. of it. The place contains 4800, and the canton 10,658 inhabitants, on a territory of 160 kiliometres, in 5 communes.—Alſo, a river of France, which runs into the Engliſh channel, N. lat. 48° 45′. W. long. 3° 28′.

GUERANDE, a town of France, in the department of the Lower Loire, and chief place of a canton, in the diſtrict of Savenay; 36 miles W. of Nantes. The place contains 7222, and the canton 11,831 inhabitants, on a territory of 217½ kiliometres, in 6 communes.

GUERCHE, La, a town of France, in the department of the Cher, and chief place of a canton, in the diſtrict of St. Amand; 7 miles N. of Sancoins. The place contains 1003, and the canton 6069 inhabitants, on a territory of 235 kiliometres, in 9 communes.—Alſo, a town of France, in the department of the Ille and Vilaine, and chief place of a canton, in the diſtrict of Vitré; 9 miles S. of Vitré. The place contains 3578, and the canton 14,258 inhabitants, on a territory of 212½ kiliometres, in 11 communes. N. lat. 47° 57′. W. long. 1° 10′.

GUERCINO da Cento, in *Biography*. See Barbieri.

GUERET, Gabriel, a lawyer and man of letters, was born at Paris in 1641, and admitted an advocate in parliament before he was twenty years of age. He was diſtinguiſhed at a much earlier period by his literary publications, of which the firſt was entitled "Les Sept Sages de la Grèce." His "Entretiens ſur l'Eloquence de la Chaiſe et du Barreau," contains judicious reflections. But the works on which his literary reputation is chiefly founded, are entitled "Le Parnaſſe Reforme," and its ſequel "La Guerre des Auteurs." Theſe are both written in a ſatirical ſtyle, and have been much applauded. As a lawyer he was chiefly diſtinguiſhed for his conſultations; and for the part which he took in the compilation of "Le Journal du Palais," conſiſting of a well digeſted collection of the arrets of the French parliaments. He likewiſe publiſhed an edition of Le Prêtre's "Arrets Notables du Parlement," which he enriched with notes and additions.

Gueret, in *Geography*, a town of France, in the department of the Creuſe, and principal place of a diſtrict, ſituated near the ſource of the Gartempe, between two mountains, at ſome diſtance from the Creuſe. The place contains 3125, and the canton 12,963 inhabitants, on a territory of 247½ kiliometres, in 13 communes. N. lat. 46° 10′. E. long. 1° 57′.

GUERICKE, Otto, in *Biography*, an able experimental philoſopher, was born in the year 1602. Of his early life nothing is known, but he was counſellor to the elector of Brandenburg, and burgomaſter, or conſul of Magdeburg; he is, however, better known and more diſtinguiſhed by his philoſophical diſcoveries than by the honours to which he was advanced in the ſtate. To him we are indebted for the diſcovery of the air-pump, the honour of which has ſometimes been given to Mr. Boyle, but this excellent man readily acknowledged that he was indebted to the experiments of Guericke for being able to bring his own machine to perfection. This philoſopher invented the braſs hemiſpheres to illuſtrate the preſſure of the air, and, it is ſaid, he made a pair large enough, and ſo accurately exhauſted them, that the power of ſeveral horſes acting at the handle of each was unable to draw them aſunder. He was the inventor of an inſtrument to ſhew the variations in the ſtate of the atmoſphere, which anſwered the purpoſe of a barometer, till a more perfect inſtrument was executed. He was author of ſeveral treatiſes in experimental philoſophy, the principal of which is entitled "Experimenta Magdeburgica," 1672. He died at Hamburgh in the year 1686.

GUERITE, in *Fortification*, a centry-box; being a ſmall tower of wood or ſtone, placed uſually on the point of a baſtion, or on the angles of the ſhoulders, to hold a centinel, who is to take care of the ditch, and watch againſt a ſurpriſe.

GUERKIN, or GHERKIN, a kind of cucumbers for pickling.

GUERNADUAS, in *Geography*, a town of the iſland of Cuba; 32 miles E.S.E. of Spirito Santo.

GUERNSEY, an iſland lying within the bay of St. Malo, is about 7 leagues N.W. from Jerſey, 20 from Weymouth, 5 from Alderney, and about 7 from the French coaſt of Normandy; and, with the neighbouring iſlands, is encompaſſed by the Britiſh channel. Its greateſt length is about 13 miles, and breadth more than eight. In the Itinerary of Antonine it is named *Sarnia*, a word from which has, through the languages of Gaul, been derived *Garnſay*, *Garnezay*, and *Guernſey*. This iſland, with Alderney, Sark, Herme, and Jethou, forming one bailiwick, may be ſuppoſed to have ſhared in the circumſtances of the neighbouring continent. As part of the duchy of Normandy, they were veſted, at the conqueſt, in the crown of England, a parcel of which they have yet continued, notwithſtanding the ſeveral efforts of the French for their recovery. The lands of this iſland are, on the S. and S.W., very high, and full of abrupt precipices, interſected by ravines towards the ſea, affording extenſive proſpects of the ocean, Jerſey, and the coaſt of France, from cape La Hogue ſouthward. In many of the ravines, the views of the granite cliffs and mountainous heights are often grand and romantic, and ſometimes riſe to a degree of ſublimity little to be expected, and ſeldom met with. On the N. and E. the coaſt is low, and diverſified with a ſucceſſion of bays, ſeparated by rocky head-lands, and without, at various diſtances, the ſunken rocks and crags, by which the iſland is ſurrounded, form at once an appearance terrific and pleaſing, ſince they inſure, aided by the ſeveral currents, an almoſt certain immunity from attack. Every part of the coaſt is fortified with ſtrong batteries and breaſt-works, beſides the regular fort and citadel, with a ſuitable eſtabliſhment of regiments of the line and militia for its defence. Among the curioſities of the coaſt may be reckoned *La cave Mabie*, on a level with the ſea, at the foot of a rocky ſteep, near Prevolet point; it is above 200 feet in depth, and from an entrance of nine or ten feet, and ſix in height, it extends to 50 or 60 in height and breadth, ending in granite points. The whole foundation of the iſland is of this ſubſtance, and ſeveral of its heights conſiſt of conical aſcents of the granite ſub-ſtrata, raiſed, as it were, by a power acting vertically, not unlike a volcanic effort.

The climate, like that of the weſt of England, is ſubject to moiſt winters and ſprings, with a ſuperabundance of high winds. The ſummers are warmer than in England, and ſtrangers are, in ſome degree, ſubject to the diſeaſes of hot climates. The face of the iſland is diverſified by moderate hills and vallies, covered with numerous encloſures, and ſeparated by intricate roads, and watered with ſeveral ſtreams, which, collected, turn over-ſhot mills. Agriculture, the conſtant employment of the inhabitants of the country, is carried on with care and diligence; for, unaided by machines, every rood of ground in Guernſey may be ſaid to maintain its man. The ſeats of the gentry, and the farm houſes and cottages, (from whoſe appearances the comforts of a country may be eſtimated,) lie agreeably ſcattered among orchards and gardens, affording the traveller a variety of gratifying views: he muſt alſo find pleaſure in obſerving the cleanlineſs and induſtry of the peaſantry, and the ſatisfaction generally found in all ranks; yet, perhaps, ſhould the ſtranger expect much accommodation, or even civility, he may be diſappointed. In this, however, it is not certain that the inhabitants differ from thoſe of other remote places.

There are ten pariſhes in the iſland; thoſe of the vale are ſeparated by a ſandy flat, covered formerly, at high water, for many hours, and called the Bray, having the bay of St. Sampſon, and another, called Grand Havre, at each extremity, where enbankments have been caſt up, an undertaking of the preſent lieutenant-governor's, which promiſes to bring a conſiderable tract into cultivation. The produce of this iſland differs little from that of the weſtern parts of England. Their fruits are generally very fine. Pigs are conſtantly fed, during winter, with parſnips. Butter, pork, and veal, are in the higheſt perfection; and the ſeas produce an abundant ſupply of fiſh.

Among the marine productions is found the ſea-ear, a ſhell-fiſh, eſteemed a delicacy; the beautiful ſhells of which are frequently ſold under the name of iris-ears. The aphrodita-aculeator, or ſea-mouſe, is ſometimes caught by the fiſhermen; it has the peculiar property of paſſing the water through the whole length of its body at each reſpiration, which it projects in one or two ſtreams from the tail, and the protuberances at the ſides are furniſhed with briſtles inſtead of feet. It is extremely tenacious of life; and, on account of the changeable colours of the down with which it is covered, and its extraordinary habits, is intereſting and beautiful. There are alſo to be found, adhering to the rocks when the tide is out, various ſpecies of animal flowers, or ſea-anemonies. Theſe creatures, beſides their tentacula, ſeem little more than a caſe, or alimentary-canal, which yet perform all the offices of digeſtion; they have alſo the power of motion: and other properties deſerving inveſtigation.

The inhabitants of Guernſey were originally Norman French, and may yet be ſo eſteemed. They ſpeak a provincial dialect, in which are found many old terms. Of the ancient Gallic inhabitants of Guernſey memorials are to be found in two remaining aſſemblages of ſtones, there called Druids' altars, by us *Cromlecheu*. They are placed in open and formerly dreary parts of the coaſt, on a part of which, called la Crocq, there is a tall ſtone, whence it is ſaid the name is derived; but what may have been deſignated by *the hook* muſt be now uncertain, and the Celtic antiquary ſhould be cautious leſt the hand of the quarrier may not have recently formed the objects of his favourite ſpeculation. Of Guernſey under the Franks, or old Gothic inhabitants, ſcarcely any traces remain, unleſs in the names of certain places derived from ſituation: theſe are met with in Lihou, Hournette, Jethou, Hougathe, Hammeau, Haye, Vaude, &c. whoſe alliance with the Francic language is evident. There are to be found in Guernſey, as in moſt other places, many cuſtoms by which the inhabitants are peculiarly diſtinguiſhed. They may yet be ſaid, as it was noticed by the hiſtorian, Malmſbury of their anceſtors, to be moderate and abſtemious, yet fond of external appearance. The ſtranger is ſurpriſed at the ſize and handſome exterior of the ſeats and farm houſes, yet in the latter there is generally a want of comfortable finiſh. The Guernſey farmer, whoſe feudal character is fixed, is contented with plain walls, an earthen floor, and his almoſt every room equipped with the convenient apparatus of the kitchen. His uſually ſpacious entrance is crowded with barrels of cyder, monſtrous ſhining braſs kettles, and the furniture of his horſes. The food of the ordinary rank is a ſoup made of cabbage, greaſe, flour, and a few ſlices of green bacon: this diſh, improved with a ſmall portion of beef, is not only the holiday food, but finds its place on the retired table of the ſuperior. The eater of ſoupe à la graiſſe is always known by his bilious aſpect, the general complexion of the native inhabitants. Theſe ſeldom tranſgreſs the obſervance of an exact ſobriety, to which the greater mind attaches, ſince liquors are ſo eaſy of acceſs; and here they are in exact oppoſition to the habits of the Engliſh ſettler, who, but too frequently leaving his country to avoid the preſſure of the laws, is not often accompanied by many of its virtues. Their affection to their children, and unalterable attachment to their parents, whom they cheriſh to the lateſt period, are proofs that theſe iſlanders yet retain a portion of primæval ſimplicity. Their parſimony produces effects much to be deſired among the lower orders of this country. A cottage, a garden, a field, an orchard, appear to be in Guernſey, at leaſt, the patrimony of every family, and every one is enabled to improve his poſſeſſions. The amuſements are chiefly dancing on the holidays, at the principal annual feſtivals, riding in parties in the month of Auguſt, when the roads are crowded with cheerful cavalcades, a cuſtom ſuppoſed to be derived from the abbot of St. Michael going through the country in proceſſion, or from the proceſſion of Corpus Chriſti, which is leſs probable, as that feſtival happens uſually in June. Viſits are in the town a common amuſement. The company break up in the evening at eight, when the ſtreets are on a ſudden filled with ladies and lanthorns. Several ſuperſtitions are found to exiſt. Witchcraft is credited. A man was very lately pilloried as a witch-finder; and certain tall, meagre, old women in remote country reſidences, are treated with grave obſervance, leaſt their cattle ſhould ſuddenly die or their cyder turn ſour. And it is not long ſince a ſomething like our Cock-lane-ghoſt was played off by ſome enthuſiaſts, in which a deſcent of fire, upon the bed of a child, was a principal part of the farce, which continued for ſeveral weeks. A pretended ſpectre la bete la tua alſo infeſted the town for ſome time every winter about Chriſtmas. Theſe ſpectres are common enough in France: at Tours they have le roy Hugon, who walks in the night, as does at Paris le moine Bouru, and at Toulouſe le malo beſtio.

The *laws* are the feudal, ameliorated by time, which has worn down moſt of the oppreſſive cuſtoms of that ſyſtem. They are adminiſtered by the bailiff and jurats forming the royal court, and are chiefly Norman, to be found in the work of Terrein. In criminal caſes, it ſhould ſeem as if the ſentence was rather guided by the judgment of the aſſeſſors than by any written law; and in caſes of bankruptcy our own precedents are the uſual reſort. An Engliſh jury is not known in Guernſey; yet here is to be found a due adminiſtration of juſtice, among a numerous population fully at eaſe for the ſecurity of life and property. Advocates, and the glorious uncertainty of the law, are not ſtrangers in the iſland. It has one or two petty-foggers, ſignificantly termed chicaneurs, and ſuits can be protracted, but in general a decent riddance is made. Law is cheap, and it is not poſſible to conceive perſons more addicted to litigation than the inhabitants of Guernſey. The mode of acquiring lands by the payment annually of a ſtipulated number of quarters of wheat is remarkable; that it ſhould be commodious depends on thoſe who make the rate in lieu, which is always paid in money. The care taken of the dowries of women is highly creditable, though it proves not unfrequently prejudicial to the heirs. In caſe of ſecond marriages an intelligent abſtract of the laws and the privileges of the meetings of the bailiff and jurats, the clergy and douzainiers, or repreſentatives of the people, in the preſence of the lieutenant governor, called the States of the Iſland, may be ſeen in Dicey's Hiſtory of Guernſey.

The preſent predominating ſyſtem of religion in the iſland is that of the church of England, though not unmarked with certain traits of the diſcipline of Geneva, which was pertinaciouſly held till the reign of Charles II. The followers of the late John Weſley are very numerous and buſy, and the din of their meetings is heard throughout the country. Calviniſm, diſtinct from the Engliſh church, has at preſent but a ſlight hold in the iſland. There are a few ſectaries of other denominations, and the number of emigrants from France, and labourers from Ireland, form a congregation of Catholics, which is freely tolerated.

Society in Guernſey is conſidered as divided into three claſſes: of theſe, the firſt ſeems to claim an excluſive right to conſequence and office. Theſe are the ſeigneurs des fiefs, the merchant, ſome of the clergy and lawyers, with military and naval officers, and whatever it ſhould ſeem could in Guernſey entitle the poſſeſſor to the rank of gentleman; yet this rank is ſo capriciouſly diſtributed, that we find a moderate ſhop kept by gentlemen of the firſt claſs, with an excluſion to perſons of ſuperior merit from their routs and aſſemblies. The ſecond claſs is formed of thoſe who have thriven, yet not admitted to the ſociety of the firſt; and the third, or loweſt, includes the farmer and the peaſant, the artiſt and artificer, whoſe want of qualification no merit or property can compenſate: and thus the nobility, the title theſe petty folks aſſume, are diſtant and haughty, and the inferior rank, miſuſed and diſregarded, are pliant, ſervile, ſelfiſh, and ſubtle. Among the ſeats in the iſland that of Harpe de Puye is the moſt ancient. It is remarkable for a projecting turret at each corner, named Promp ſur le coin, a favourite old French faſhion in building. The ſituation it occupies is in a pleaſant valley, and the lands and woods about it are adorned in a ſtyle not quite modern. This old ſeat reflects more credit on the anceſtry of Guernſey than any other of the more early habitations, though ſeveral retain ſomething of the old baronial obſcurity. There are, however, many good modern ſeats, which are neither inelegant, or in taſte altogether wanting in the diſpoſal of the grounds about them.

There were anciently four caſtles in the iſland; of theſe *Caſtle Corner*, ſeated on a rock, about a quarter of a mile from the ſhore, near the town, is the ſuperior. It is ſcarcely acceſſible but on one ſide, and is formed wholly of granite. The original foundation of theſe fortreſſes is given to duke Robert of Normandy: this is noticed in the reign of Edward I. and Edward II. &c. on account of the attempts made by the French to repoſſeſs the iſland, and it has been once taken, and, for ſome time, held by them. It anciently conſiſted of a keep, now made into caſemates, an outer wall of great thickneſs, flanked by ſeveral machicolated towers. In this caſtle the lieutenant governors had their reſidence. In it are ſeveral wards, united by gloomy paſſages ; and it muſt have been a place of great ſtrength, although it did not occupy the whole defenſible parts of the rock. In the time of queen Elizabeth it was augmented with a lower line of curtain and baſtions. Barracks and accommodation have ſince been formed for a numerous garriſon, and it is well defended by a conſiderable number of heavy artillery. Here was the common priſon of the iſland both for debtors and felons, a foul hole, diſgraceful to humanity. This caſtle has loſt much of its ancient appearance ; a late engineer having ſtript ſeveral of the towers of their machicolations for making repairs. There was beſides a tower of conſiderable height in the centre of the keep, about which were ſeveral houſes, as appears by one of Groſe's views, publiſhed in 1777. Theſe were called the new buildings in 1672, when an exploſion of gunpowder took place, and conſiderably damaged this ſtrong hold. There are two other views from the ſame hand, of that year, in which the caſtle is ſeen without thoſe parts, nearly as it is at preſent. The *Caſtle in the Marſhes* bears about it an appearance of high antiquity. It is ſurrounded by a double wall of granite, roughly laid with an outer and inner ditch, and a keep in the Norman form. It is at preſent laid out in garden ground, and belongs by office to the governors. The *Vale caſtle,* placed upon a commanding eminence near St. Sampſon's harbour, is of ſome antiquity ; as it is mentioned ſo long ſince as the year 1114, when Renault Montſannape was governor. A ſtrong circumſcribing wall, with ſome flanking towers, comprize, with the portal, the whole exterior of this once reputed ſtrong fortreſs. Within are barracks for the garriſon : it has ſeveral pieces of cannon placed upon its ramparts, commanding a paſſage called the ruſſel. Near the aſcent to this caſtle is a burial ground belonging to the Ruſſians, who were in this iſland in the year 1800, which was remarkable for the number and various forms of the croſſes they had left on the graves of their deceaſed companions. There were, beſides theſe, till lately, ſome remains of a caſtle at Rocquane, ſeated on a ſmall rocky eminence at the bottom of a bay of the ſame name, on the weſtern coaſt. It was denominated a fort in the year 1114, under the government of Renault Saliſbury. It has been ſince diſmantled, and formed into a powerful battery of heavy guns. There was yet in the iſland another fortification called the caſtle du grand Geoffroy, taken down about 1203, when the church of St. Mary of the caſtle was built upon its ſite, which took beſides the title of Notre Dame, *de la delivrance* ; indicating, as it ſhould ſeem, this grand Geoffroy no very good neighbour, and with his caſtle, happily got rid of. This diſtrict was alſo in 1114 and 1203 termed La Paroiſſe du grand Sarazin. Within it we find the Rohais, an eſtate, not unlikely ſo denominated after a town in Paleſtine, which is mentioned by Reland.

The Chriſtian religion is ſaid to have been planted in this iſland by St. Sampſon and St. Magloin, Britiſh biſhops, about the year 566 ; but this diſtrict does not ſeem to have been ſeparated into parochial lots for many centuries after. The earlieſt mention of a religious fraternity is in 1111, when Claude Panton, hermit of Lerne, and his holy brethren, are noticed as applying for the conſecration of the church of St. Sampſon. Although at this time, and before, it is probable the abbey of St. Michael in the Vale had been founded, this religious houſe had its court and ſeneſchal : and the proceſſions of its abbot and monks are frequently noticed ; but of what order it was, like the form and paſt conſequence of buildings, is forgotten ; nothing more remains of it than a ſmall portion converted to a cottage on the edge of the bray. There are beſides ſome pointed arches on the ſouth wall of the cemetery of the Vale church, likely a part of its chapel, ſaid to have been on the ſouth ſide of the pariſh church, with the proceſſional way lying between. Near this is a cauſeway of large ſtones, called the *devil's bridge, viz.* Pont du Val, which paſſed acroſs the bray. The paſſage of the ſea acroſs this flat ſeems to have taken place about the year 1204, when at a court of chef plaids for the vale, held on the 14th of October that year, a remonſtrance was made on the part of the prior and his brethren, and of the pariſhioners of that pariſh, and of St. Sampſon's, that they were greatly injured by the ſea having broken in and deſtroyed the paſſage between them, ſo that they could not paſs in proceſſion, &c. and praying permiſſion to erect and ſupport a certain bridge. This record points out the date of the raiſed cauſeway named St. Sampſon's bridge, as well as the time when the bray had been ſo far formed by the encroachments of the ſea, as to become a ſerious inconvenience to the inhabitants of the vicinity.

A ſecond monaſtic inſtitution was founded about 1114, in the ſecluded iſland of Lihou, a ſpot ſeparated from the coaſt of Guernſey by a channel paſſable at low water, now the property of a Mr. Muchant, and ſerving the purpoſe of a warren for rabbits. Here are yet the remains of the priory church of our lady of the Rock, which had been dedicated the 15th of Auguſt in the above year by Cloitare de Belangere, biſhop of Coutance, at the requeſt of Machoire Lublin, then prior. They conſiſt of the longitudinal half of the ſimple ſtructure, with which thoſe monks were contented, amounting to little more than a wall broken by a few plain arches, and bearing about one-third of the highly pointed vault which had covered this building. Several foundations of the priory walls are found in the vicinity : it was ſeated near the ſouthern ſhore upon the ſea. The only building now on this iſland is a ſummer-houſe in ruins. To the weſtward of Lihou is yet a rocky and almoſt iſolated headland. Here nature puts on one of her moſt terrific appearances ; all is barren ; craggs and rocks laved perpetually by an apparently boundleſs ocean : a cauſeway, the work of thoſe poor monks, paſſes from Lihou to the oppoſite ſhore ; it is dry at ſpring ebbs, when it appears formed of pieces of red granite, united ſo firmly by the excellence of the cement, that it is yet, in many places, whole, after ages of diſuſe and neglect. It leads to the bottom of a high hill, of a conical form, named Le Ree. Of theſe eminences, ſo like volcanic productions, ſeveral could be pointed out in the iſlands of Guernſey and Alderney, as well as Jethou : the latter ſeems thus wholly formed. What further deſerves remark is, that on the coaſts from this point to the ſouthward, till the aſcent to Pleinmont, the ſea makes viſible encroachments upon the land, where the ſhore is not defended by rocks ; while from thence northerly, vaſt quantities of ballaſt are continually waſhed up, forming a bulwark againſt the ocean, and an acceſſion to the iſland.

Moſt of the eccleſiaſtical benefices in Guernſey ſeem to have been appropriated to religious houſes, and at the change of religion, the great tythes falling into the hands of the crown have conſtituted a part of the governor's ſalary. The churches to which theſe benefices were annexed yet remain, and the dates of their dedications may be ſuppoſed nearly to form thoſe of the buildings themſelves, and are given in the following order. St. Sampſon 1111 ; the Vale church 1117 ; Torteval 1130, built by Philip de Carteret in conſequence of a vow made in a violent ſtorm ; St. Sauveur's, 1154 ; the Foreſt Church, 1168 ; St. Peter au bois, 1167 ;

1167; St. Martin's, 1199; St. Mary of the Catal, 1203; St. Andrew's, 1284; St. Peter's Port, 1312. Theſe churches are of granite, and from the hardneſs of the material, what ornaments they poſſeſs, muſt have been the effect of much labour and perſeverance. They are remarkable for being covered generally with a very highly pointed and continued vault, ſtrengthened in parts by munnions, over which are laid the roof and covering. Within they have little that is intereſting; the windows having been ſtript of their munnions, beſides being unſightly, from the cuſtom of painting the joints of the maſonry, and uſing the means to give them an exterior appearance. The architecture of theſe edifices is in other reſpects Gothic, except a few inſtances. There is a circular groined vault in the chancel of the Vale church, about which are Norman zigzags. The churches of St. Peter au bois, and St. Sauveur, are ſomewhat handſome ſtructures, and do not appear in a ſtyle quite ſo early as the dates annexed to them above; and it is remarkable, that though the forms and proportions of the mouldings throughout the interior of St. Peter's are Gothic, yet it is not recollected that a pointed arch occurs through that building. The exterior of the town church is handſome; its tower is an ornament from the pier and road, and its porch remarkable for the depth and extent of its mouldings, as is the porch of St. Martin's for the ſculptured foliage with which it is decorated. In the town church are ſome good modern monuments; in the reſt but few are to be ſeen. The moſt ancient is a braſsleſs ſlab in the Vale church; yet the cemeteries are ſufficiently full. The inſcriptions on the grave-ſtones of the natives run all nearly in the ſame ſtrain, every one departs to the Lord, and unleſs a ſeigneur du fief reſts below, this ſtrain is never interrupted. St. Peter's Port, the only town in the iſland, ſeems to owe its origin to the protection afforded from the vicinity of the caſtle, and it muſt, from the ſize and handſome condition of its church, have been in a flouriſhing ſtate in the year 1312. It is of late much increaſed, having originally conſiſted of a narrow ſtreet of high houſes, but now it ſtretches acroſs a ravine, over ſeveral hills, and upon the heights by which it is ſurrounded. The ſtreets are in the lower parts irregular, narrow, and dirty, and compoſed of a mixture of good and mean houſes and ſhops, which are numerous and well-ſupplied before the ſmuggling was ſuppreſſed by a late act of parliament (which, with privateering, made the great concern of the place): the ſtreets were filled with paſſengers and carts, with all the buſtle of trade, the river with ſhipping, and the key always thronged. There are but few public buildings worth attention in this town. The new court-houſe is a neat granite ſtructure, fitted with ſuitable offices, where the records are kept, but except a few detached parchments and Elizabeth's charter, include a period of little more than two centuries, in which the contracts have been entered into books, previous to which they were kept in rolls, and ſaid to be unfortunately loſt. The fate of the eccleſiaſtical records of the iſland is remarkable; the clergy of its former religion having, as it is reported, packed them in *caſks*, with their church plate, and conveyed them to Normandy, after having lain ſome time buried in a chapel, at a diſtant part of the vale. The memorial, however, called La dedicaſe des Egliſes, has eſcaped, and contains many circumſtances of much curioſity, which could be better relied on, did it not ſeem to be either tranſlated, or probably reformed by the preſbytery, whoſe language it rather ſpeaks than that of the pontificate. But to return to the town, a new priſon has been lately erected, for which the debtors goal at Mancheſter ſeems to have ſerved as a model, and which, much to the credit of the preſent leading men, has the great advantages of air, ſpace, and convenience. The hoſpital, or work-houſe, an inſtitution of conſiderable benefit to the town, is well regulated by its own peculiar laws, and ſupported by an endowment, together with a moderate rate *per* quarter on lands and houſes. Here not only the poor are maintained, but the diſorderly confined and corrected; beſides, allowances are granted to the induſtrious while under temporary affliction or neceſſity. The general charity of the iſland is beſides extenſive, and ſeldom divulged. In paſſing through the ſtreets of the town, ſeveral ancient houſes will be perceived with their ſtories overhanging, as found in ſeveral parts of London, and like them have certain ſculptured decorations. On a corbel of one of theſe, in the high ſtreet, occurs the ſymbol I.H.S. which muſt have been fixed ſome time at leaſt before the reign of Edward VI. At the back of the ſame ſtreet are the keys and the piers, a vaſt maſs of rough maſonry, formed with large blocks of granite, and carried out into the harbour: it includes a ſpace of ſeveral acres. The walls forming this incloſure are paved, and, having the advantage of parapets, form a walk, the reſort of men of buſineſs, politicians, and loungers. Beyond is the harbour and road, which is expoſed towards the S.E., but an open ſpace or carfour at the end of the principal ſtreet, ſerving the purpoſe of an exchange, an accommodation, it is a matter of ſurprize, a trading community ſhould be ſuffered to want. In this ſtreet is kept the market for fiſh; but for meat and vegetables, a large building has been erected in an open ſquare. Commodities are here weighed at the king's ſcales, with ſtandard weights; and a ticket of the quantity is delivered to the purchaſer. There are alſo frequent viſits made by the proper officers, who ſeize for the uſe of the hoſpital whatever is defective in weight and quantity. Above the market-houſe is a large and handſome pair of rooms for the public aſſemblies and entertainments, which are held monthly during the winter ſeaſon. There is beſides a play-houſe, and once, in two or three years, it is allowed to be occupied by a company of actors for ſeveral months, who meet with good encouragement: and they are ſometimes regaled by equeſtrian feats, fire-works, and concerts. From the level of the market, one hundred ſteps leads up the ſide of the ravine to the new town, where are many good and open ſtreets, beſides George Row, conſiſting of ſeveral elegant houſes. Near this is a road called La Battaille, in memory of an engagement which took place in ſome of the French aggreſſions, who were here worſted, and afterwards driven out, and about this ſpot ſeveral French coins have been found. On the ſame level is L'Hivreure, where are ſeated the public walks, frequented by perſons of all conditions; beſides, they ſerve often the purpoſe of military parade. Proceeding thence towards the town, we come to a large houſe named the College, a foundation of queen Elizabeth, for teaching the claſſics, and which yet, in ſome meaſure, continue to be taught. Near this is the government-houſe, a handſome ſtructure; it is at preſent the habitation of ſir John Doyle, bart. whoſe good ſenſe and manly conduct, united to his amiable manners, have conciliated and made his own every rank in the iſland. By this gentleman's unremitting attention, the fortifications have been increaſed and diſpoſed with a maſterly ſolicitude: the iſland has been traverſed with new roads, and every means purſued by which the charge committed to his care could be ſtrengthened and defended.

With reſpect to the laws that govern this iſland, ſee ALDERNEY.

GUERNSEY *Lily*. See AMARYLLIS.

GUESCAR, in *Geography*. See HUESCAR.

GUESCLIN, BERTRAND DU, in *Biography*, conſtable of France, in the 14th century, was born in Brittany in

1311. He was the ſon of a noble of that province, but ſo completely neglected in his youth, that he was never able to read or write. When he arrived at manhood, he was perpetually engaged in quarrels and in combats with his cotemporaries, and he grew up very hard featured and plain, but manly and vigorous. "I am too ugly," ſaid he to one of his companions, "ever to pleaſe the ladies, but I can at leaſt make myſelf feared by the enemies of my king." He accordingly devoted himſelf to the profeſſion of arms, and followed it with great ſucceſs, obtaining many important advantages over the Engliſh in Britanny. After the battle of Poictiers, in which John, king of France, was made priſoner, Du Gueſclin flew to the ſuccour of the regent Charles, heir of the throne, and gave him very important aſſiſtance in recovering many ſtrong places in the hands of the enemy. He was raiſed to the command of the royal army by Charles V. in 1364, and performed ſuch ſervices, as were repaid with high honours by his ſovereign. He was afterwards ſent to the aſſiſtance of Charles De Blois, competitor for the duchy of Britanny againſt Montfort, when Charles, raſhly engaging againſt his advice, was killed at the battle of Auray, and Du Gueſclin, covered with wounds, was made priſoner by the Engliſh. He was ranſomed at a high price; and was again taken captive at the battle of Navarette, in 1367. The Black Prince, diſcontented with his ally Peter the Cruel, gave Du Gueſclin his liberty, who immediately entered into the ſervice of Henry de Traſtamare, and was the chief agent in fixing him on the throne, in oppoſition to his enemy Peter. He received for his reward very ſignal honours from his ſovereign, was made conſtable of Caſtile, duke of Molina, and count of Burgos. He was engaged, after this, in ſeveral expeditions, which did him honour as a warrior and hero: the laſt was in the ſouthern provinces, where the Engliſh had rallied their forces, and had laid ſiege to Chateau-neuf-de-Rendan, in Auvergne. Here he was attacked with a mortal diſeaſe, and perceiving his end to be approaching, he ſummoned his principal officers to his bed-ſide, ſtrongly recommended to them never to treat as enemies, labourers, women, children, the aged and infirm, teſtifying the moſt unfeigned regret at having himſelf not always obſerved theſe rules. He expired in the year 1380, at the age of ſixty-nine. The Engliſh garriſon, which had conditioned to ſurrender at a certain time, if not relieved, marched out the day after his death, and the commander reſpectfully laid the keys of the fortreſs on his coffin. His body was conveyed to St. Denis, and depoſited in the tomb next that of the king.

GUESDA, in *Botany*, is properly the name of woad; but it is alſo uſed by ſome for the *lutum*, or *lutea herba* of the Romans, and *cymene* of the Greeks. This is an error in too many of the old authors, though ſo palpable that one would have thought nobody could have run into it; the *lutum*, or *cymene*, having been always uſed to dye yellow, and the *glaſtum* or *gueſda*, to dye blue; and the characters of the *lutum* or *cymene*, plainly ſhewing it to be our *geniſtella tinctoria*, or dyer's weed, but not at all agreeing with the *glaſtum*, or woad.

GUEST-Rope, on *Ship-board*, is that rope by which the boat is kept from *ſheering*, or going too much in and out, as ſhe lies in the tow of a ſhip.

GUEST-TAKERS, or Gist-takers. See Agistor.

GUET. See Watch.

GUETA, or Hueta, in *Geography*, a town of Spain, in New Caſtile, ſituated on a ſmall river, and containing 10 pariſhes, 7 convents, and three hoſpitals; and ſaid to be founded 930 years B.C.; it derived its preſent name, ſignifying the moon, from the Moors, and it was taken from them by Alphonſo VI.; 43 miles E. of Madrid. N. lat. 40° 20′. W. long. 3 1′.

GUETARIA, a ſea-port town of Spain, in the province of Guipuſcoa, with a good harbour at the mouth of the Orio; 9 miles W. of St. Sebaſtian.

GUETTARD, John Stephen, in *Biography*, was born at Eſtampes on the 22d of September 1715. He was admitted a doctor of the faculty of medicine of Paris in 1742. He diſtinguiſhed himſelf in the ſtudy of botany and mineralogy, and his reputation procured for him admiſſion into the Academies of Science of Paris, Stockholm, Florence, and Rochelle, as well as the ſituations of cenſor royal, and of keeper of the cabinet of natural hiſtory belonging to the duke of Orleans. He travelled much in queſt of knowledge; and he publiſhed in the collection of the Academy of Science, and printed in two quarto volumes nearly two hundred memoirs, on different parts of natural hiſtory. He likewiſe publiſhed ſome "Obſervations on Plants," in 1747. He lived to the age of 71. Hutchinſon Biog. Med. Eloy.

GUETTARDA, in *Botany*, named by Linnæus in honour of John Stephen Guettard, M. D. member of the Academy of Sciences at Paris, author of a local French Flora, entitled "Obſervations ſur les Plantes," in two vols. 12mo. Paris, 1747, and of a great number of valuable treatiſes on Botany, as well as Entomology, publiſhed in the Memoirs of the above Academy. He died in 1786, aged 71.—Linn. Gen. 492. Schreb. 641. Willd. Sp. Pl. v. 4. 398. Mart. Mill. Dict. v. 2. Juſſ. 207. Lamarck Illuſtr. t. 154. Gærtn. t. 36. (Haleſia; Brown. Jam 205.)—Claſs and order, *Monoecia Heptandria*, Linn. *Monoecia Hexandria*, Schreber and Willdenow. *Pentandria Monogynia*, Lamarck, which laſt is perhaps moſt juſtifiable by analogy, but the different ſpecies differ, as well as vary, in number of ſtamens. Nat. Ord. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, cylindrical, ſhort, ſlightly waved or toothed, deciduous. *Cor.* of one petal, funnel-ſhaped; tube cylindrical, elongated; limb in from four to nine roundiſh, ſpreading ſegments, much ſhorter than the tube. *Stam.* Filaments very ſhort, in the mouth of the corolla, and equal in number to its ſegments; anthers linear, erect. *Piſt.* Germen roundiſh, inferior; ſtyle thread-ſhaped, rather longer than the tube; ſtigma obovate, notched. *Peric.* Drupa dry, roundiſh or ovate. *Nut* of from four to ſix cells, not burſting, with one ſeed in each.—Some flowers have only the rudiments of a germen, and others no ſtamens, in the ſame cyme, which induced Linnæus to refer the genus to *Monoecia*; but ſuch differences, not accompanied by a difference of ſtructure in the other parts, are liable to vary, nor have they been obſerved in more than the firſt ſpecies.

Eſſ. Ch. Calyx ſuperior, cylindrical, ſlightly toothed. Corolla of one petal, funnel-ſhaped. Anthers in the mouth of the tube. Drupa dry. Nut with ſeveral ſeeds.

1. G. *ſpecioſa*. Linn. Sp. Pl. 1408. Oſb. It. 275. Lamarck. Dict. v. 3. 53. Illuſtr. t. 154. f. 2. (Rava Pou; Rheede Hort. Mal. v. 4. 99. t. 47, 48. Cadamba jaſminiflora; Sonner. Voy. v. 2. 228. t. 128.)—Leaves roundiſh, acute; heart-ſhaped at the baſe; naked on both ſides. Flowers ſeven or nine-cleft.—Native of Java. Cultivated in various parts of the Eaſt Indies, for the fragrance of its flowers. A tall *tree*, with numerous purpliſh, ſlightly downy branches. *Leaves* oppoſite, on ſhort ſtalks, a ſpan long and nearly as broad, roundiſh or obovate, acute, entire, though

a little wavy; ſmooth and naked on both ſides, with one rib and many alternate ſomewhat radiating veins; paler beneath. *Flower-ſtalks* axillary, ſolitary, ſhorter than the leaves, naked, each bearing a cloſe, ſhort, downy cyme. *Flowers* ſeſſile, *Calyx* ſlightly waved rather than toothed. *Tube* of the corolla above an inch long, downy; limb in ſeven, eight, or nine obovate almoſt horizontal ſegments. *Fruit* globoſe, depreſſed, its nut curiouſly lobed and ſinuated, not burſting, containing about ſix ſeeds. The ſynonym of Rheede is very erroneouſly cited by Linnæus for his *Nyctanthes hirſuta*, *Jaſminum hirſutum*, Sm. Exot. Bot. t. 118.

2. G. *argentea*. Lamarck. Dict. v. 3. 54. Illuſtr. t. 154. f. 1. Willd. 399. (Haleſia arboreſcens; Brown. Jam. 205. t. 20. f. 1.)—Leaves roundiſh, acute; heart-ſhaped at the baſe; downy beneath. Flowers five-cleft.—Native of Jamaica; "in ſixteen-mile-walk." *Browne*. A ſmall *tree*, eight or ten feet high; the *ſtem* three or four inches in diameter. It has much the appearance of the preceding, with which Linnæus and even Swartz confounded it; but the *leaves* being downy or ſilky beneath, and the *flowers* with only five, rarely four or ſix, ſegments, and as many ſtamens, ſeems to prove it diſtinct. Lamarck in his deſcription appears to miſtake Browne's definition, "*ſuſtentaculis longis alaribus*," as meaning the ſtipulas, not the flower-ſtalks; he therefore leaves out the word *inſidentibus*, which makes the whole clear in the original, and is miſled to diſtinguiſh this ſpecies from the former by the ſtipulas, which we find exactly alike in both. Browne named this plant *Haleſia*, in honour of Dr. Hales, not knowing that Linnæus had deſtined another genus for this purpoſe.

3. G. *rugoſa*. Swartz. Ind. Occ. v. 1. 632.—"Leaves ovate, acute, rough; ſomewhat heart-ſhaped at the baſe; downy beneath. Flowers ſix-cleft."—Native of Antigua and Dominica.—A *tree*, with alternate, upright, ſubdivided, round, ſcarred branches. *Leaves* ſtalked, moſtly terminal, oblong or ovate, rather coriaceous and rigid, heart-ſhaped at the baſe, entire; rough on the upper ſide, with elevated points; hairy or downy underneath. *Flowers* white, ſilky and ſilvery at the outſide, ſmaller and with a ſhorter tube than the laſt. *Fruit* red. *Swartz*.

4. G. *elliptica*. ibid. 634.—"Leaves elliptical, downy. Flowers four-cleft."—Native of dry fields in Jamaica. A *tree*, 20 feet high, with ſmooth round branches. *Leaves* ſtalked, oppoſite, often ternate on young branches, elliptical, obtuſe, entire, rigid, ribbed, very veiny; ſmoothiſh above; hairy or downy beneath. *Tube* of the flower often an inch long, but the limb very ſmall. *Fruit* with four ſeeds. *Swartz*.

5. G. *membranacea*. ibid. 635.—"Leaves ovate, pointed, membranous, rough, with minute briſtles. Flowers four-cleft."—Native of mountainous thickets in Hiſpaniola. A *ſhrub* or ſmall tree with upright rough branches. *Leaves* ſtalked, oppoſite, ribbed and veiny, the veins briſtly, like thoſe of gooſegraſs, with minute, curved prickles. *Footſtalks* long, flaccid, rather hairy. *Flowers* whitiſh, their tube half an inch long. *Fruit* the ſize of a ſmall pea, containing four ſeeds. *Swartz*.

What Lamarck's figures 3. and 4. repreſent, we have no information, as the letter-preſs to his plates finiſhes at t. 145, nor are theſe plants deſcribed in his dictionary. His *Guettarda coccinea*, Aublet t. 123, is *Iſertia* of Schreber, to which article we refer the reader.

GUEVARA, ANTONY DE, in *Biography*, who flouriſhed in the 16th century, was born in the province of Alava, in Spain; he was brought up at court, but after the death of queen Iſabella of Caſtile, became a Franciſcan monk, and obtained ſome honourable employment in his order. His eloquence cauſed him to be appointed preacher to Charles V., and he acquired much reputation by his pulpit oratory. To Charles he was alſo hiſtoriographer, but his total diſregard to accuracy rendered his labours, in this department of knowledge, of no eſtimation whatever. His delight in fiction accompanied him into the pulpit, and he would, in his ſermons, read, as quotations from ancient authors, paſſages that exiſted only in his own manuſcript. He was nominated to two biſhoprics, and died in 1544. He was author of "The Dial of Princes, or Marcus Aurelius," pretending to be a hiſtory of that emperor and Fauſtina his wife, drawn from ancient authority, but entirely fictitious. It went through many editions in the French and Italian languages as well as in Spaniſh. He wrote "Golden Epiſtles," and ſeveral other works.

GUEVARA, *Don* JUAN NINNO DE, a Spaniſh painter of hiſtory and portraits, who was a ſcholar of D. Miguel Manrique, and after him of Cano, at Madrid; whoſe forms and ſtyle of compoſition he adopted, and executed with great force in his chiaro-ſcuro, and boldneſs of touch. In teint he endeavoured to imitate Rubens and Vandyke, and many of his portraits reſemble the works of the latter very much. His principal works are at Seville, Cordova and Malaga. At the latter place he was born in 1632, and died in 1698.

GUEVEI, *Antilope pygmæa*, in *Zoology*, a ſpecies of antelope, with very ſhort, conically pointed, twiſted horns, which are wrinkled at the baſes. It is the Guevei-major of Adanſon and Buffon, and the royal antilope of Pennant. This very elegant little animal, which inhabits Senegal, Guinea, and the hotteſt parts of Africa, is only about nine inches high, and yet is ſo very active, that it is ſaid to leap over a wall 12 feet high. Its colour is reddiſh-brown, with jet-black horns about two inches long, the female having no horns. The ears are broad, and the legs are ſcarcely bigger than gooſe-quills. It is eaſily made very tame and familiar; and it is ſo tender as not to bear being tranſported to Europe.

GUEUGNON, in *Geography*, a town of France, in the department of the Saone and Loire, and chief place of a canton, in the diſtrict of Charolles. The place contains 1257, and the canton 5949 inhabitants, on a territory of 252½ kiliometres, in 9 communes.

GUEVINA, in *Botany*, a name of whoſe origin or meaning we have no account. Molin. Chil. 198. Juſſ. 424. Brown Tr. of Linn. Soc. v. 10. 165. (Quadria; Gen. Fl. Peruv. et Chil. 16. 33. t. Gærtn. v. 3. t. 220.) Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Proteaceæ*, Brown.

Eſſ. Ch. Petals four, irregularly three of them revolute, one erect. Anthers ſunk in the hollows of their points. Two glands at the baſe of the germen in front. Germen two-ſeeded. Stigma oblique. Drupa with a ſingle ſeeded nut.

1. G. *Avellana*. (Quadria heterophylla; Fl. Peruv. et Chil. v. 1. 63. t. 99. f. b. Nebu ſubrotundo fraxini folio; Feuill. v. 3. 46. t. 33.) Native of mountains in Chili. A ſpecimen gathered by Dombey is in ſir Joſ. Banks's collection. A *tree* about 20 feet high, with a tufted top. *Leaves* alternate, pinnate, of four or five pair of ſtalked, heart-ſhaped, toothed, ſmooth, ſometimes auricled, leaflets. *Flowers* ſmall, in long axillary ſpikes, white, moſt of them abortive; they ſtand in pairs in the ſpike, with a bractea to each pair. *Petals* downy, deciduous. *Fruit* round, or ſomewhat oval, ſlightly fleſhy, yellowiſh, turning black ſoon after gathering,

very aſtringent. *Nut.* like that of the hazel, but firmer and ſweeter, eaten by the Spaniards, who call it *Avellano,* on account of its reſemblance to the *Corylus Avellana.*

GUEULE, in *Architecture.* See Gula.

GUFFER, in *Ichthyology.* See Eel-*pout.*

GUGLIELMI, Pietro, in *Biography*, a young Neapolitan opera compoſer, who arrived here in 1768, with his wife from one of the Venetian conſervatorios, as ſecond woman, who had a fine and uncommon counter-tenor voice for a female, and ſung very well.

Guglielmi had at this time ſome Neapolitan fire, and brought over the new and faſhionable muſical phraſes from Italy, but he wrote too faſt, and with little invention or ſe-ection of paſſages. Indeed he arrived here at an unfortunate eriod, when cabals in favour of Cocchi, Bach, Vento, and Giardini, as compoſers of ſerious operas, ran high; and when the comic operas of Piccini were ſo juſtly admired, that their merit was not likely to be effaced or eclipſed by a compoſer of inferior fame and intrinſic worth, when it was leſs the intereſt of rival candidates for public favour to de-ry the productions of Piccini who was abſent, than of Gug-ielmi who was preſent, and a mark for envy and detraction o ſhoot at. Guglielmi never had great ſucceſs here. Indeed, it ſeems to have been fairly proportioned to the abili-ies he manifeſted, though he has ſince compoſed much bet-er in Italy, and ſometimes with great ſucceſs. His harp-ichord pieces which he compoſed here were full of froth, and common paſſages, and had little other merit than *appearing* difficult, though of eaſy execution; and which, though pert, could never be called dull or tedious.

GUGLIELMINI, Domenico, was born at Bologna on the 27th of September, 1655. The great progreſs which he had made in mathematics, was evinced by his publications at the age of 21 years. He was admitted doctor of medicine at the age of 22; and ſoon after he was permitted to teach the mathematics, although he did not obtain the title of profeſſor until the year 1694. In 1696 he was elected a member of the principal learned ſocieties of Europe; and in 1702 the univerſity of Padua offered him the profeſſorſhip of the Theory of Medicine, an office which he accepted and fulfilled with great reputation. He ied on the 12th of July, 1710, in the 55th year of his age. His numerous publications were collected, and edited, by Morgagni, under the title of "Opera omnia Mathematica, Hydraulica, Medica, et Phyſica. Acceſſit vita auctoris J. B. Morgagni," Geneva, 1719, in two volumes 4to. Cloy. Dict.

GUGLINGEN, in *Geography*, a town of Wurtemberg, n the Zaber; 22 miles S.S.E. of Heidelberg. N. lat. 49° ′. E. long. 9° 7′.

GUGUAN, or St. Philip, one of the Mariane, or Larone iſlands. N. lat. 17° 50′. E. long. 146° 20′.

GUHRAU, a town of Sileſia, and principal place of circle, in the principality of Glogau; 17 miles E. of Gros Glogau.—Alſo, a town of Sileſia, in the principality f Neiſſe; 6 miles S.W. of Grotkau.

GUHRE, a town of Perſia, in the province of Lariſtan; 5 miles E. of Lar.

GUHUNGEKKALA, a town of Aſiatic Turkey, in e province of Adana; 25 miles N. of Adana.

GUIANA, an extenſive territory of South America, ounded on the N. by the provinces of Venezuela and Cumana, or rather by the river Orinoco or Oronoko, on the . or N. E. by the Atlantic ocean, on the S. by the river aranon, and on the W. by New Granada. Its extent from . to W. has been eſtimated at 1100 miles, and its breadth om N. to S. from 300 to 600. Several ſettlements have been formed on the ſea-coaſt by the Dutch, French, and Portugueſe; the latter having been united to the government of the Brazils, and now conſidered as part of that country.

Guiana, *Dutch*, now (1810) for the moſt part in the poſſeſſion of the Engliſh, was taken poſſeſſion of by the Dutch for the firſt time in 1663, but four years afterwards they were expelled by the Engliſh, whoſe deſcendants form part of the colony, retaken by the Dutch in 1676, and ſince ſubject to a variety of viciſſitudes. Dutch Guiana lies to the N.W. of the French ſettlement, and is bounded on the E. by the river Maravina or Maroni, and on the W. by cape Naſſau: it is often called Surinam, from a river of that name on which the capital is ſituated. Its length from S.E. to N.W. is about 350 Britiſh miles, along the ſhores of the Atlantic, but its breadth is only 60. This colony is divided into four provinces, Surinam, which is the chief ſettlement, Berbice or Berbiz, Demerara, and Eſſequibo or Eſquivo, deriving their names from different rivers. (See each reſpectively.) The chief towns are Paramaribo, New Middleburg, and Demerara. The largeſt river is the Eſquivo; and the Berbiz and Corentin are alſo conſiderable rivers. The wet and dry ſeaſons in this climate, which are ſaid to be equal to thoſe of the Weſt India iſlands, alternate each for three months. The long wet ſeaſon is from April to September. The ſhort from the middle of November till January. From the middle of January to the end of April, the air is dry and clear, and comparatively cool. The natives are of a reddiſh brown or copper colour, like the other American tribes. The Caraibs towards the coaſt are ſavages; who being engaged as auxiliaries to ſuppreſs a negro revolt, devoured the bodies of the ſlain. The cruelties of the Dutch ſettlers, and eſpecially the women towards their ſlaves, ſurpaſs all deſcription; and it appears from Stedman's account, that the phlegmatic character is capable of greater atrocity than any other. Among the vegetable productions of this colony, we may mention the ſilk-cotton tree, which is often twelve feet in circumference, and hollowed into canoes of conſiderable burden; the red mangrove tree, which ſends forth from its branch and trunk an infinite number of filaments, like a ſhip's ropes, which fall into the ground, take root, and riſe again; the palm, deſcribed by Stedman, which ſeems to be the drunken tree of Paraguay. Among the animals are the lauba, which is amphibious and of ſmall ſize, and the tiger, variegated with black longitudinal ſtripes from head to tail; and the ſnake, one of which is deſcribed as being 33 feet long, and three feet in circumference. Towards Patamaca, on the W. of the river Maroni, the mountains reach within 20 miles of the ocean, a branch of the main chain, which proceeds E. and W. and cauſes the rapids in the river Surinam, about 80 miles from its mouth.

Guiana, *French*, is ſometimes called *Cayenne*, from a town of this name, ſituated on a ſmall iſle or delta, called Cayano. By the peace of 1801, the ſouthern boundary is the river Arawary or Aracary, and a direct line from its ſource to the Rio Blanco. The limit betwixt the French ſettlements and the Portugueſe is more clear and preciſe than that on the N., where an arbitrary and undetermined line, at the diſtance of about 1½ degree, or 100 geographical miles from the former, divides them from the Spaniſh and Dutch poſſeſſions, as far as the river Maroni on the E. The limit paſſing the Maroni at N. lat. 3° 15′ thence aſcends N. in a line with the river Mana, at the mouth of which was, or is, a French poſt about ten miles from the mouth of the river Maroni, which is in the Dutch poſſeſſions;

though, by other accounts, the Maroni is the boundary, with a Dutch poſt on one ſide, and a French on the other. From the Mana to the Arawary, the French ſhore is of conſiderable extent, being about 6°, or 360 geographical miles. Leſcallier computes the white inhabitants of the whole colony at 900; the mulattoes, or people of colour, may be 4 or 500, and the negroes 9000. Beſides the *Galibis* (which ſee) there are many other Indian tribes, moſtly of middle ſtature, but the women leſs, and not ſo well formed as the men. The Indians generally ſtain their ſkin of a red colour with roucou, or arnotto, a defence againſt the muſquitoes. They reckon time by the revolution of the moon and of the Pleiades. Some of them play on the flute, ſo as to produce a ſound reſembling the bellowing of an ox. Girls often chooſe their huſbands by preſenting drink, the acceptance of which conſtitutes the whole ceremony. To the vegetable and medicinal drugs enumerated under the article Cayenne, we may here add the arnotto (bixa orellana), the quaſſia, quaſſia ſimarouba, the ricinus or caſtor-oil nut, the caſſia fiſtula, the palms, cowhage, balſam of capivi, and the ipecacuanha; the troolies, with very large leaves, with which moſt of the houſes are thatched; the caoutchouc or elaſtic gum, the caruna, which is a ſmall tree, the farinaceous nut of which furniſhes the ſlow poiſon of the Accawau Indians, and the Ticuna poiſon proceeds from the roots of certain climbers called nibbees, which inhabit the entangled foreſts of the immenſe ſwamps of the country. Pinkerton's Geog. vol. iii. For other particulars, ſee CAYENNE.

GUIANA, *Portugueſe*, is a portion of Guiana generally conſidered, whoſe length may be computed from the mouth of the Arawary to the vicinity of the Rio Negro, about 11 degrees, or 660 geographical miles; while the medial breadth, from the mountains of Tumucurang to the Maranon, may be four leagues or 240 geographical miles. The greater part of this extenſive country is occupied by ſavage tribes whoſe names are little known; but the Portugueſe, from their convenient ſtation at Para, on the mouth of the Tocantin river, have opened conſiderable intercourſe with the ſhores of the Maranon, and founded ſeveral ſtations, chiefly miſſionary, as far as the Rio Negro. The little fortreſs of Macapa, on the N. or rather W. of the mouth of the Maranon, was founded by the Portugueſe in 1688, and their right was confirmed, in oppoſition to the pretenſions of the French, by the treaty of Utrecht in the year 1713. On aſcending the courſe of the Maranon, the fortified village of Paru occurs; and at a noted ſtrait of the Maranon is the little fortreſs of Pauxis. Where the Rio Negro joins the Maranon, the Portugueſe have a fortreſs, lat. 3 9', according to Alcedo, who adds that they thence capture Indians for their mines, and that along the Rio Negro there are many miſſions of the Portugueſe Carmelites. The other Portugueſe ſettlements in Guiana are chiefly miſſionary ſtations, which, by the recent account of Depons, approach to the Spaniſh fortreſs of San Carlos, on the Rio Negro. N. lat. 1 53'. So that the preſent eaſtern boundary of Portugueſe Guiana extends to the great river Negro. The equator was the original boundary to the N., but the Portugueſe have extended their poſſeſſions two leagues farther, for there are ſituated the iſle St. Joſeph, and the mountain Gloria del Cocui, regarded as the preſent boundaries. Pinkerton.

GUIANA, *Spaniſh*, called in ſome maps New Cumana or New Andaluſia, a province of South America belonging to the Spaniards, comprehending an extent, according to Depons, of 1000 leagues in circumference. It is bounded on the S.E. by the Dutch and French poſſeſſions, on the S. by the Portugueſe, the line of demarcation paſſing nearly parallel with the lake of Parima, and the great chain of mountains called Tumucarang. The preciſe weſtern boundary is the weſtern mouth of the river Yapura, thence proceeding almoſt due north till it joins the weſtern limit. The boundaries aſſigned by Depons to Spaniſh Guiana are on the E. the Atlantic from the cape of Naſſau to the mouth of the Oronoko, a ſhore of only 30 leagues; on the N. and W. the Oronoko, till it receives the Guaviari, where it is bounded by the Portugueſe poſſeſſions. According to this writer (Travels, vol. ii. p. 353.) Spaniſh Guiana from the mouths of the Oronoko to the limits of the river Portugueſe occupies a ſpace of more than 400 leagues. Its breadth in the firſt 80 leagues to the E. is not more than 30 leagues S., where it is bounded by the poſſeſſions of the Dutch, but then its breadth increaſes to more than 150 leagues. Upon this immenſe ſurface it has but 34,000 inhabitants of all conditions and all colours, of whom 19,425 Indians are under the conduct of the miſſionaries, 6575 in the capital, and the remaining 8000 in the other villages. The greateſt population is from 50 leagues from the ſea to 130 leagues up the Oronoko. Depons divides Guiana into the Upper and Lower Oronoko; the capital being adopted as the point of diviſion. But this, however, he ſays, would more juſtly belong to the river Caroni, becauſe it bounds, on all the weſtern part, a territory that might properly be called an iſland; for it has the Oronoko to the N., the ſea to the E., the river Eſſequibo to the S., and the Caroni to the W. It forms almoſt a ſquare of 70 leagues from E. to W., and 30 leagues in its leaſt breadth from N. to S. America has few lands more fertile than thoſe within this circumference. Watered by a number of rivers, which for ages have augmented the bed of mould, they reproach man for his indolence and ſloth. The miſſionaries, notwithſtanding their zeal for making converts, have not yet penetrated more than 30 leagues from the coaſt; the interior parts being occupied by the Caribs, the moſt courageous and ferocious of all the Indians; and as the Dutch of Surinam are intereſted in extending their commerce in Spaniſh Guiana, they encourage the Caribs in their reſiſtance to the progreſs of the Spaniards. Upper Guiana comprehends every thing which is to the E. of the river Caroni, commencing a league above St. Thomas, and which depends on the miſſion of the Franciſcans. Such is the indolence of the inhabitants, that upon the moſt productive land in the world, few plantations are ſeen, which are badly cultivated; theſe are ſituated at 30 leagues to the S. of the capital of Guiana, on which the proprietors raiſe a little cotton and ſugar, and ſome country proviſions. The ſoil is excellent, eſpecially for tobacco. The moſt remarkable feature of Spaniſh Guiana is the courſe of the river *Oronoko*, for an account of which ſee that article. For an account of the capital, ſee SAN THOMAS. Depons, in forming a judgment of the riches or poverty of Guiana, eſtimates what the tithes produce. In 1803 the tithes of all Guiana ſold for 4000 hard dollars a year. Suppoſing that the farmer gained 50 per cent. and carry it to 6000, that would give an annual revenue of 60,000 hard dollars for every thing generally conſumed in Guiana, or exported from it. But in calculating the tithes, the products of the herds of the Capuchin miſſionaries are not allowed in the account, becauſe they are exempt. The horned beaſts which they poſſeſs are eſtimated at 150,000, which of courſe make a part of the riches of Guiana. There were, notwithſtanding, exported through the port of Guiana, from 1791 to 1794, in articles from this province, and alſo from that of Varinas, 10,380 oxen and 3140 mules; and they in return introduced 200 blacks, and 349,448 hard dollars,

dollars in ſpecie. From 1791 to 1795 they exported for Europe in ſilver 25,203 hard dollars, and in goods 363,397 hard dollars. At this day the commerce is reduced to leſs than one-half. At the end of 1803 there were in Guiana 34 ſmall veſſels employed in the coaſting trade in the colonies, and the trade was then in the hands of a few Catalonians.

Guiana-*Bark*, in the *Materia Medica*, the ſame with what is otherwiſe called *Sima-rouba*.

GUIB, Antilope *ſcripta*, Harneſſed antilope of Pennant, in *Zoology*, is a ſpecies of antelope with horns ſtraight, tapering, ſharp-pointed, and directed backwards, having two ſpiral edges along their whole length. The body is marked with two longitudinal white bands along the ſides, which are croſſed by others in a perpendicular direction, having the appearance of harneſs. Its habitat is Africa, living in large herds in the plains and woods. The horns are nine inches long, the ears broad. The general colour cheſnut; beneath each eye is a white ſpot, and on the thighs are white ſpots; the under part of the neck, a part of the cheeks, and the inner parts of the legs are white; the forehead and ridge of the back are black. It is 4½ feet long from the noſe to the rump, and two feet eight inches high; the tail is 10 inches long, and is covered with long hairs. It is called by the negroes Oulofes, or Jaloſes.

GUIBARA, in *Geography*, a town of the iſland of Cuba; 163 miles N. of St. Jago.

GUIBARRA, a river of Ireland, in the county of Donegal, which is of extraordinary breadth and depth for the ſhortneſs of its courſe. It falls into the Atlantic ocean ſome miles to the ſouth of the iſles of Arran.

GUIBERT, in *Biography*, a native of Parma, was chancellor to Henry IV. king of Germany; and, through his favour, he was advanced to the archbiſhopric of Ravenna. He was a man of turbulent paſſions, and is ſuppoſed to have been the projector of Cincius' inſurrection againſt Gregory VII. hoping, in caſe of his death or depoſition, to be appointed to ſucceed him. He at length attained his wiſhed-for object, and was, in 1084, conſecrated in the church of St. Peter, when he took the name of Clement the Third. In the following year a ſentence of excommunication was thundered out againſt him, in the council aſſembled by Gregory's legate at Quintileneberg, in Saxony. In the ſame year a council, held at Mentz, anathematized the prelates who had met at Quinteleneberg; and all perſons were forbidden, on pain of excommunication, to communicate with them, or their aſſociates. In 1087, upon the election of Victor III. Guibert was driven from Rome by the forces with which the princes of Capua and Salerno ſupported that pontiff's pretenſions, notwithſtanding which event he was ſoon re-eſtabliſhed in the poſſeſſion of that city. He was afterwards excommunicated and curſed anew by Victor, who preſided in perſon at the council of Benevento. During the pontificate of Urban II. Guibert was ſometimes maſter of Rome, and ſometimes a fugitive from that city, as the imperial or oppoſite party prevailed. He was at length finally expelled the city, and then driven from his biſhopric of Ravenna by pope Paſchal II. He retired to the mountains of Abruzzo, where he died ſuddenly in 1110, having made his claim to the papal character for the ſpace of 20 years. He was a man of great learning, eloquence and addreſs.

Guibert, Abbot, an hiſtorian, was born in the dioceſe of Beauvais in the year 1053. He was brought up in the monaſtery of St. Germer, and was, in 1104, elected abbot of Nogent-Sous-Couxi, in the dioceſe of Laon, where he died in 1124. His works conſiſt of his life, a treatiſe on preaching, and another on reliques; but his moſt valuable piece is the hiſtory of the firſt cruſade, commonly entitled "Geſta Dei per Francos."

Guibert, Jacques-Antoine-Hypolite, born at Montauban in 1743, was ſon of an officer of rank and merit, and ſerved, with his father, in many campaigns, in which he greatly diſtinguiſhed himſelf, and at length was appointed colonel-commandant of a corps, raiſed under the title of the Corſican Legion. In 1770 he publiſhed his principal work, entitled, "Eſſai Géneral de Tactique." This work was read with great applauſe by all perſons, who underſtood the ſubject, in Europe. In 1773 he made a tour in Germany and Hungary as far as Croatia, viſited the principal fields of battle, and collected details of every kind relative to military ſubjects. On his return to France he made an eſſay in dramatic hiſtory; and ſome of his pieces were repreſented with much applauſe. He undertook a "Hiſtory of the French Military," which was, in fact, to embrace the military ſyſtem of all the nations of Europe. He carried it as far as the eleventh century, but it has not been publiſhed. He was author of many other works. He died in May, 1790, leaving behind him a widow and one daughter. The regiment of Neuſtria, which he had commanded 10 years, gave a handſome teſtimony of their eſteem and regret for the deceaſed in a letter to his widow.

GUICCIARDINI, Francis, was born at Florence in 1482. After purſuing his ſtudies at Piſa and Bologna, he, at the age of twenty-three, read lectures upon the inſtitutes at Florence. After this he went embaſſador from the Florentine republic to Ferdinand, king of Arragon. By Leo X. the government of Modena and Reggio was committed to his care; and, in 1521, he was made governor of Parma, which city, as well as Reggio, he ſucceſsfully defended againſt the French. He received many other marks of favour and diſtinction from ſucceſſive popes. In 1523 Clement VII. conferred upon him the preſidency of all Romagna, and afterwards nominated him lieutenant-general of the papal army; but he was not ſufficiently ſkilful, or ſufficiently powerful to protect his ſovereign from the imperial arms. From 1531 to 1534 he was governor of Bologna, and exerted himſelf conſiderably to reſtore the Medici family in Florence. After the death of Clement he returned to his native city, where he was made counſellor of ſtate to duke Alexander. Upon the death of this prince, Guicciardini employed his influence in procuring the ſucceſſion of Coſmo; but not thinking himſelf ſufficiently conſidered by the new duke, he retired to literary occupation. His great work, which is known in ſeveral modern languages, *viz.* the "Hiſtory of Italy, during his own time," did not appear till many years after his death, on account, probably, of the freedom of ſome of its ſtrictures on many living characters. The hiſtory of Guicciardini is allowed to be one of the moſt valuable productions of the kind in that age. He had a good opportunity of knowing the facts concerning which he wrote; and his impartiality and veracity are very conſpicuous. His ſtyle is pure and eloquent, but ſometimes too diffuſe. Perhaps, however, it is the ſmallneſs of the events which his ſubject led him to deſcribe, that chiefly renders the narration tedious. The defects are, after all, very trifling compared with the excellencies, and they do not, by any means, prevent its being a ſtandard work, and a great honour to Italian literature.

Guicciardini, Lewis, nephew of the preceding, was born at Florence in 1521, and was educated with a view to literary leiſure. About the year 1550 he took up his reſidence in the Low Countries, where he continued till his death in 1589. He was author of many works, of which the principal is "A Deſcription of the Low Countries," which is in great eſteem for the accuracy of its relations. His other works are "Commentaries on the Affairs of Europe, particularly in the Low Countries, from 1529 to 1560." "Remarkable words and actions of Princes," &c. "Hours of Amuſement;" and a collection of the precepts and maxims of his illuſtrious relation. He was buried in the cathedral of Antwerp, where an honourable inſcription is placed to his memory.

We ſhould not have thought him entitled to notice, as a muſical writer, except to diſpute his opinion concerning the invention of counter-point.

In travelling through the Netherlands, in 1772, in ſearch of materials for a "General Hiſtory of Muſic," we did not quit Ghent without viſiting the principal libraries there, in hopes of meeting with ancient manuſcript muſic, which might aſcertain the aſſertion of Lodovico Guicciardini, that counter-point took its riſe, and was firſt cultivated in Flanders; but we neither found at the abbey of St. Peter (the oldeſt and richeſt in Flanders) nor at the Auguſtines, or Dominicans, where the libraries are very conſiderable, any thing to our purpoſe.

But at Antwerp we fully expected to meet with materials the moſt important to the hiſtory of counter-point, or muſic in different parts, as it was here, according to Lodovico Guicciardini, and, after him, ſeveral others, who took the fact upon truſt, that moſt of the great Flemiſh muſicians, who ſwarmed all over Europe in the 16th century, were bred.

The Abbé du Bos (Reflex. t. 1. ſect. 451.) after his eloge of Lulli (p. 45.) whom he calls "the greateſt poet-muſician of whoſe works we have any knowledge," aſſerts roundly that "muſic had its birth in Flanders;" and, in confirmation of this aſſertion, quotes Lodovico Guicciardini's Deſcription of the Low Countries, as an indiſputable voucher, in ſupport of the fact.

Guicciardini, indeed, gives a liſt of more than 20 eminent Flemiſh muſicians and Netherlanders, who flouriſhed at the end of the 15th, and during the 16th century, who were diſperſed in all the courts of Europe; but, unluckily, at the head of theſe he places John Tinctor de Nivelle, five leagues from Bruſſels, who, ſo far from arrogating to himſelf, or his countrymen, the invention of counter-point, or muſic in parts, gives it to an Engliſhman. Speaking of counter-point, he ſays: "Cujus ut ita dicam novæ artis fons et origo, apud Anglos, quorum caput Dunſtable exiſtit fuiſſe perhibetur." The title of Tinctor's tract, which we never ſaw, except in Padre Martini's collection, is the following: "Tract. muſices Explanat. manus, de Tenor. natura et propriet. de notis et Pauſis. de regul. valore, imperfect. et alterat. notar. de arte contrap."

The teſtimonies of Franchinus and Tinctor are very reſpectable, and do us great honour; yet we cannot conſcientiouſly, from conviction, ever accept of the gift. That the Netherlands produced excellent muſicians in the 15th and 16th centuries, cannot be denied; but that experiments in harmony were making, not only in England, but in every civilized part of Europe, long before the time of our countryman, Dunſtable, is equally certain. See Franco, Jos. Cotton, Hubald, Odo, Marchetto, and Odington.

To confeſs the truth, we have always regarded the teſtimony of L. Guicciardini and the Abbé du Bos, with reſpect to this point of muſical hiſtory, as equally ſuſpicious. Lodovico Guicciardini, who was a renegade Italian, ſettled at Antwerp, in the ſervice of the emperor Charles V. ſeems, in his hiſtory of the Low Countries, determined to give the people among whom he lived the honour of every uſeful as well as ornamental invention, in order to flatter his patron and benefactors, even at the expence of his native country, from which he had no farther hopes. The Abbé du Bos, from a contrary principle, wiſhed to give the honour to the Flemings, in order to pilfer it from them afterwards in favour of his own country, France.

GUICHE, La, in *Geography*, a town of France, in the department of the Saone and Loire, and the chief place of a canton, in the diſtrict of Charolles; nine miles N. N. E. of Charolles. The place contains 1047, and the canton 6355 inhabitants, on a territory of 217½ kiliometres, in twelve communes.

GUICHEN, a town of France, in the department of the Ille and Vilaine, and chief place of a canton, in the diſtrict of Rédon. The place contains 2660, and the canton 11,820 inhabitants, on a territory of 262½ kiliometres, in eight communes.

GUIDA, *Ital.* as *Dux*, in Latin, implies, in *Muſic*, the part in fugues and canons which leads off, or begins the ſubject, and which the *conſeguenza*, or part which comes in ſecond, is to anſwer. See Proposta, Antecedente, Presa, and Soggetto.

GUIDAGE, Guidagium, in *Ancient Law Writers*, money paid for ſafe conduct through unknown ways, or a ſtrange country.

GUIDES, in *Military Language*, are uſually the country people in the neighbourhood of an encampment; who give the army intelligence concerning the country, the roads by which they are to march, and the probable route of the enemy.

GUIDI, Alexander, in *Biography*, an Italian poet, was born at Pavia in 1650. At an early age he went to the court of Rannucio II. duke of Parma, by whom he was much favoured and eſteemed. He was firſt known as a poet, by the publication of ſome lyric poems, and a drama, entitled "Amalaſunta in Italia." He afterwards viſited Rome, and frequented the court of the abdicated queen Chriſtina, who employed him to compoſe a piece of muſic to celebrate the acceſſion of James II. of England. He endeavoured to reform the Italian poetry, but his example was but little followed. His poems are ſpirited and vigorous, and he is thought to have happily transfuſed into the Italian language the fire and vehemence of Pindar. He attempted a verſion of the Pſalms, but was interrupted in the employment by a call from prince Eugene, governor of Lombardy, to aſſiſt in a plan for diminiſhing the public burthens. For this he was enrolled in the number of Pareſe patricians. He now returned to Rome to complete a metrical verſion of the homilies of Clement XI. As he was travelling to preſent the pope with a copy of the work, he diſcovered an error of the preſs, which chagrined him ſo much, that it was ſuppoſed to be the cauſe of a fit of apoplexy, that carried him off at Freſcati, in June 1712.

GUIDICCIONI, John, was born at Lucca in 1550. Having received an excellent education, he was introduced to the ſervice of cardinal Alexander Farneſe, afterwards pope Paul III. He became very intimate with Annibal Caro, and with many other men of letters at Rome. When his patron was elevated to the popedom, he was made governor of the city, and biſhop of Foſſombrone. In 1535 he was ſent nuncio to the emperor Charles V. whom he accompanied in his expedition to Tunis, and on other journeys. He was, about the year 1539, made preſident of Romagna, and afterwards commiſſary-general of the pontifical army, and governor of the Marche. So well did he act his part in all theſe employments, and ſo much dexterity and judgment did he diſplay in all difficult caſes, that he would probably have been raiſed to the dignity of cardinal had he not been carried off by a diſeaſe in 1541. He was author of an oration to the republic of Lucca, of many letters, and of a number of poems which gave him a high reputation. His works have been ſeveral times printed. He ſucceeded beſt in grave ſubjects, and particularly in lamenting the calamities to which Italy was at that time expoſed.

GUIDO **Aretino**, or **Guido d'Arezzo**, a monk of the order of Saint Benedict, who flouriſhed in the eleventh century, and diſtinguiſhed himſelf by framing a new method of teaching boys to ſing, and laying the foundation of the preſent ſyſtem of muſic. Few particulars concerning the life of this ingenious monk would have been known, if, luckily for his fame, he had not himſelf recorded perhaps the moſt important and honourable events of his life, in a letter to his friend Michael, a monk of Pompoſo, which cardinal Baronius has inſerted in his Eccleſiaſtical Annals, vol. xi. p. 74, and introduced it with an account of his having invented "a new method of teaching muſic, by which a boy might make a greater progreſs in a few months, than a man of intelligence and aſſiduity uſed to do in ſeveral years." This author likewiſe informs us that the ſingular ſervice which Guido had rendered muſic, having been communicated to pope Benedict VIII. that pontiff ſent for him to Rome, and treated him with great kindneſs: a circumſtance which happened, according to Baronius, in the year 1022.

It ſeems, however, as if Guido had not been ſo far dazzled by the ſplendour of a court, or the honours he had received at Rome, as to remain long in that city; for Benedict dying in 1024, we find by his own letter to the monk Michael, that his ſucceſſor, John XX. or, as ſome ſay, the XIXth. had ſent three meſſengers to invite him to return to Rome. On his arrival there a ſecond time, his reception from the new pontiff was ſtill more flattering than from his predeceſſor. He frequently condeſcended to converſe with him freely on the ſubject of his muſical diſcoveries; and when Guido firſt ſhewed him his Antiphonarium, or notation of the maſs for the whole year, his holineſs regarding it as a prodigy, would not quit his ſeat till he had learned to ſing a chant in it by Guido's new method, and had by this means accompliſhed that himſelf which he hardly believed poſſible when it was reported to have been done by others.

The pope, deſirous to retain him in his ſervice, preſſed him to continue at Rome; but Guido, finding himſelf unable, from the bad ſtate of his health, to bear the approaching heat and bad air of that city during ſummer, left it, upon a promiſe of returning thither in winter, to explain his new ſyſtem in a more ample manner to his holineſs.

When he quitted Rome he made a viſit to the abbot of Pompoſo, a town in the duchy of Ferrara, who ſo ſtrongly ſolicited him to ſettle him in his convent, that at length he conſented, in hopes, as he ſays, "of extending the fame of that great monaſtery by his future labours."

Guido Aretinus has been miſtaken by Merſennus, Voſſius, and others, for Guitmond, monk of St. Lufrid, in the dioceſe of Evreux in Normandy, afterwards biſhop of Averſa, who wrote againſt the hereſies of Berenger; he has been confounded by ſome Italians, likewiſe, with Guitton d'Arezzo, the poet, and one of the founders of the Italian language, who flouriſhed about the time of Dante, by whom he is celebrated, as well as by Petrarca, Redi, and almoſt all the poets of Italy.

Few perſons who ſpeak or write on the ſubject of the preſent ſyſtem of muſic expreſs the leaſt doubt of counterpoint having been invented by Guido, a monk of Arezzo, in Tuſcany, about the year 1022. But there is nothing more difficult than to fix ſuch an invention as this upon any individual; an art utterly incapable of being brought to any degree of perfection, but by a ſlow and gradual improvement, and the ſucceſſive efforts of ingenious men during ſeveral centuries, muſt have been trivial and inconſiderable in its infancy; and the firſt attempt at its uſe neceſſarily circumſcribed aud clumſy.

Guido, however, is one of thoſe favoured names to which the liberality of poſterity ſets no bounds. He has long been regarded in the empire of muſic as *lord of the manor*, to whom all ſtrays revert, not indeed as chattels to which he is known to have an inherent right and natural title, but ſuch as accident has put into the power of his benefactors; and when once mankind have acquired a habit of generoſity, unlimited by envy and rival claims, they wait not till the plate or charity-box is held out to them, but give freely and unſolicited whatever they find without trouble, and can relinquiſh without loſs or effort.

But, in order to aſcertain with ſome degree of method and accuracy how much modern muſic has been indebted to this celebrated monk, it ſeems neceſſary to give a liſt and analyſis of the writings that have been attributed to him. The tract which is moſt frequently mentioned, and, except by the few that have ſeen it, is ſuppoſed to contain all the inventions with which Guido has been inveſted, is the Micrologus. Of this work there are three copies among the MSS. in the king of France's library at Paris; the moſt ancient account of which, No. 7211, is of the twelfth century; and of this we obtained a tranſcript, which was collated with the other two. It is a ſhort treatiſe in monkiſh Latin, and full of obſcurities, containing an account of the author's method of teaching boys to ſing, with rules for the proper performance and compoſition of the plain chant.

Though it is natural to expect to find in this treatiſe an account of the inventions and improvements commonly attributed to him; yet it is vain to ſeek them. He does not *expreſsly claim* any of the inventions; and his expreſſions are ambiguous, even where he ſeems to ſpeak as an inventor; it is always—*nos* ponimus—*noſtris* notis—*noſtram* diſciplinam. Sometimes this ſeems to be only the dignified egotiſm of an author, and ſometimes it ſeems literal. One of the additions to the ſcale of the ancients, he ſeems, however, clearly to diſclaim. The account is that he added the Greek gamma at the bottom of the ſcale; but in this treatiſe his account of the notes begins thus: "In primis ponitur Γ Græcum *à modernis adjectum*."

Another expreſſion ſeems to imply that the diſtinction of B flat and B natural was not of his invention; for he ſays, "b vero rotundum—adjunctum vel molle *dicunt; they* call. Yet, in his ſecond chapter, where he gives the notes, he ſeems to ſpeak as if this invention was his own: between a and ♮, ſays he, we put another b, which we make round; but the firſt we make ſquare, thus a. b ♮. c. &c."

His invention of the hexachords muſt have been poſterior to this treatiſe; for, when he gives the ſcale he never mentions them; nor is the term once uſed in the whole manuſcript.

His ſcale is always mentioned as going up to e e; but in the Micrologus he only gives it up to d d. The other note we ſuppoſe was added afterwards, when his ſcale was arranged into hexachords. See Scale, Gammut, and Hexachords.

He ſeems, by his manner of expreſſing himſelf, to claim the honour of having added the *tetrachord ſuperacutarum* as he calls it; for he ſays, "*addimus*, hic eiſdem literis, ſed variis figuris, tetrachordum ſuperacutarum," &c. Theſe notes, ſays he, many call ſuperfluous. "*Nos*, autem, maluimus abundare, quam deficere."

The invention of the ſyllables *ut*, *re*, *mi*, *fa*, *ſol*, *la*, muſt likewiſe have been poſterior to this treatiſe; for they are not once mentioned in it.

The method which Guido uſed in teaching the boys of his monaſtery to ſing, was by making them practiſe with the monochord, for the diviſion of which he gives ſome plain and eaſy rules, cap. 3. But here it is of importance to obſerve that he ſuggeſts no other than the old diviſion of Pythagoras. For the title of his tract, "on the diviſion of the monochord," tells us, that he follows the principles of Boetius, who was a Pythagorean in harmonics. The *diatonum ditonicum*, which the abbé Rouſſier ſo much prefers to all others, and in which the fourth conſiſts of two major tones and a limma: $\frac{8}{9} \times \frac{8}{9} \times \frac{243}{256}$, is the arrangement with which the ear of Guido was ſatisfied; nay, he ſays, *no other diviſion can be found*. He never ſeems to have heard of Ptolemy's diviſion into major and minor tone and ſemitone; which, indeed, forms the only intervals that are conſiſtent with harmony, or with the major third being admitted as a concord.

For a further account of his celebrated epitome, or compendium, ſee MICROLOGUS.

In the French national library at Paris, beſides three copies of the Micrologus, the following tracts, No. 7211, go under his name: "De ſex motibus vocum à ſe invicem, et dimenſione earum." "Ejuſdem Rhythmus." "Ejuſdem Liber de Muſica." Part of theſe MSS. were tranſcribed in the eleventh, and part in the thirteenth century.

In the Vatican, a dialogue on muſic, which begins, "Quid eſt Muſica?" is given to Guido; but we find it afterwards to be the "Enchiridion" of Odo, abbot of Cluny.

Padre Martini, in his "Saggio di Contrappunto," p. 32, gives a long paſſage from a tract by Guido: (Formulæ Tonor. ex Codice Mediceo Laurent. XLIX.) "Sunt præterea alia muſicorum genera aptata," &c. This work is called by Guido himſelf, in his letter to Michael the monk of Pomposo, "Antiphonarium," and is frequently quoted under that title by others.

And in the liſt of authors annexed to his "Storia Muſica," vol. i. p. 457, the worthy and exact P. Matini inſerts "De artificio novi cantus, et menſura monochordi Guidonis," apud Piz. Theſ. Anecd. Nov. tom. vi. There are two diſtinct tracts, the latter of which is likewiſe in the Laurentine library at Florence, under the title "De diviſione monochordi, ſecund. Boetium." He likewiſe, in the ſame volume, quotes "Epiſt. ipſius Guidonis ad Michaelem Monachum Pompoſianum, ex Cod. Ambroſ."

There is a ſmall volume of MSS. in the Britiſh Muſeum, No. 3199, which contains fifteen of the twenty chapters of Guido's Micrologus; a ſhort tract, "De Conſtitutionibus in Muſica," which ſeems to belong to that in which the famous paſſage occurs that was ſo ſevere on the ſingers of his time, and which has ſince been often quoted with pleaſure, as applicable to their ſucceſſors: "Temporibus noſtris ſuper omnes homines fatui ſunt cantores."

Guido, in the prologue to his Antiphonarium, (apud Gerburtum, tom. ii. p. 68.) ſpeaks of ſingers with ſtill more bitterneſs, in the following lines:

Muſicorum et cantorum
Magna eſt diſtantia,
Iſti dicunt, illi ſciunt,
Quæ componit muſica.
Nam qui facit, quod non ſapit,
Definitur beſtia.
Cæterum tonantis vocis
Si ludent (al. Laudent) acumina,
Superabit philomela,
Vel vocalis aſina.
Quare eis eſſe ſuum
Tollit dialectica.
Hac de cauſa ruſticorum
Multitudo plurima,
Donec fruſtra vivit, mira
Laborat inſania
Dum ſine magiſtro nulla
Dicitur antiphona.

Between a ſinger and muſician
Wide is the diſtance and condition;
The one repeats, the other knows,
The ſounds which harmony compoſe.
And he who acts without a plan
May be defin'd more beaſt than man.
At ſhrillneſs if he only aim
The nightingale his ſtrains can ſhame;
And ſtill more loud and deep the lay
Which bulls can roar and aſſes bray.
A human form 'twas vain to give
To beings merely ſenſitive,
Who ne'er can quit the leading-ſtring;
Or pſalm, without a maſter, ſing.

In his Antiphonarium, Guido ſpeaks of lines and ſpaces, and of coloured lines. Here alſo is the hymn "Ut queant laxis reſonare fibris," in old eccleſiaſtical notation; and "Tu patris ſempiternus es filius," written in the ſame manner as it is printed in this volume, p. 35. This tract is of conſiderable length, and clears up ſeveral points which the Micrologus had left diſputable. In ſect 3d, "Quid eſt armonia?" he gives a fair definition of harmony in the ſenſe it is now underſtood: "Armonia eſt diverſarum vocum apta coadunatio, &c."—and ſpeaks of organum as ſynonymous with *ſymphonia* and *diaphonia*, diſtinct from the inſtrument called an *organ*. But here, in treating of *ſymphona vocum*, no 3ds are mentioned, and his harmony in four parts conſiſts only of 4ths, 5ths, and diapaſons, or 8ths.

In completing the ſcale, or ſeptenary, he quotes Virgil: "Orpheus obloquitur numeris ſeptem diſcrimina vocum." Then, after giving rules for diateſſaroning, and diapenting, or organizing in a regular ſeries of 4ths and 5ths, he enumerates the eccleſiaſtical tones, and finiſhes by calling them by their Greek names: as "primus tonus vocatur hypodorius, ſecundus hypophrygius, &c."

Guido, both here and in the Micrologus, uſes the terms *authentic* and *plagal* for the modes, and likewiſe the Greek diſtinctions of *protus*, *deuterus*, *tritus*, and *tetrardus*. We find in the monks Hubald and Odo, who are both more ancient writers than Guido, theſe terms, and many others, which are ſtill retained in the muſic of the modern Greeks; a proof, that, before the ſeparation of the two churches, the Romans had their chants from the Greeks.

There is likewiſe in the ſame volume a ſhort tract, "De Tonis," which we ſhould have ſuppoſed to have been Guido's Antiphonarium, if we had not unſucceſsfully tried to find in it ſome remarkable paſſages of that work, which we remembered to have ſeen cited elſewhere.

There are ſo few means by which a monk devoted to an obſcure and tranquil ſtate can arrive at celebrity without quitting the plain path which piety and the duties of his profeſſion have marked out for his purſuit, that Guido ſeems to have excited the envy of his brethren by attempting it. Luckily the ſtudy of muſic was not incompatible with the rules of his order; and while he ſeems to lament the malignant effects of that enmity which his ſucceſsful ſtudies had created, he eſtabliſhed a reputation among the liberal and candid part of mankind, which has laſted near 800 years. It was, perhaps, a ſtimulus to exceſſive devotion that the monks ſeldom exerciſed their pens but in endeavours to ſwell their legends, by tranſmitting to poſterity the actions of thoſe inſane mortals, who, by anticipating infernal torments, were honoured with the venerable title of ſaints. But theſe lives have long ceaſed to be read, even where the mind has little elſe to feed on; while the fame of thoſe who have bequeathed to their deſcendants ſome durable memorial of their exiſtence, which intereſts tradition, will never fade away; and had the life of Guido been written, though pregnant with few events, it would have been peruſed with avidity as long as the art, whoſe powers he extended, ſhall afford pleaſure to mankind.

It now remains, either by paſſages from his own works, or from the teſtimony of writers nearly contemporary, to try to aſcertain the inventions that have been aſcribed to him: ſuch as the gammut, or Greek gamma added to the bottom of the Greek ſcale; lines, ſpaces, and clefs; the harmonic-hand, hexachords, and ſolmiſation; points, counterpoint, diſcant, organizing, and the polyplectrum, or ſpinet. But theſe will be found ſo amply diſcuſſed, ſeparately, under their ſeveral heads, that we muſt refer our curious readers to their alphabetic order; as by adding them to the preſent article, already of conſiderable length, we ſhould render it too long.

Though hiſtorical integrity may ſtrip Guido of ſome of the muſical diſcoveries which careleſs enquirers had beſtowed upon him, and though his claims to others are rendered doubtful, yet his name ſhould ſtill remain reſpectable among muſicians for the ſervices he did their art, in the opinion of his contemporaries, and others who have given teſtimonies of their approbation very ſoon after the period in which he ived. Theſe muſt be far better judges of his merit than we can be now, who no longer want his aſſiſtance, and are ſcarcely able to underſtand what he intended to teach. But an obſcure monk, whoſe merit could penetrate the ſovereign pontiff's palace, without cabal or intereſted protectors; whoſe writings in leſs than a century ſhould be quoted as authorities for muſical doctrines in parts of Europe very emote from the place of his reſidence; at a time too when he intercourſe between one nation and another was not acilitated by travelling, commerce, or the preſs, and during one of the darkeſt periods of the human mind, ſince it has been enlightened by religion and laws; ſuch a one muſt have conferred benefits on ſociety which cannot be eſteemed nconſiderable; ſince, in ſpite of all theſe diſadvantages, hey could ſo ſuddenly extend their effects, and intereſt the moſt poliſhed and intelligent part of mankind.

The origin and progreſs of modern harmony will be ound traced under the ſeveral denominations of *Diaphonia*, *Organum*, *Diſcant*, and *Counterpoint*, which ſee.

Guido Rheni, a painter whoſe name ranks high among he ſecond rate profeſſors of the art he practiſed. He was born at Bologna in 1574, and early in his life was placed as pupil with Denis Calvert, a Fleming; but the Carracci having founded their ſchool at Bologna, he entered it, and s by many conſidered as their principal pupil. Certainly none but Domenichino is entitled to diſpute that praiſe with him; and if his aſtoniſhing work of the Communion of St. Jerome had been equally ſupported by his other labours, Guido's title would fall to the ground, or rather would never have been exhibited. It appears that the Carracci did not poſſeſs ſufficient manlineſs and love of the art to rejoice in the extraordinary progreſs of this young pupil; who threatened to rival at leaſt, if not ſurpaſs, their own claims to public applauſe. They became jealous of him; and Ludovico diſgracefully attempted to depreciate his pupil by oppoſing Guercino to him. Annibal himſelf is ſaid to have cenſured Albani for having conducted Guido thither, alarmed at his aſpiring talents, his graceful manner, and ambitious deſire to excel.

It is not, however, in their ſtyle that he wrought, but he choſe for himſelf his objects and manner of imitation; and his various ſtyles exhibit how anxiouſly he ſought for fame: at one time imitating Paſſerotti, at another Carravaggio, and then, ſtimulated by a remark of A. Carracci, framing one for himſelf; the reverſe of Carravaggio's, all gentleneſs and ſoftneſs. Skilful in execution, he had no difficulty in imitating whatever he deſired: his pencil was light, and his touch free and delicate; and he took great pains to finiſh his pictures; not with minute detail, but with great roundneſs in the figures, correct arrangement of the folds of his draperies, which he perfectly underſtood, and made great uſe of in filling up his canvas, and the moſt careful management of all the inferior parts, ſuch as tables, vaſes, jewellery, &c. which aſſiſt in compleating the forms of groups, connecting the chiaro-ſcuro, and producing harmony of colouring, by ſcattering various hue over the work.

The beauty he ſtrove to render in his females, he ſought for in the antique; and the group of Niobe furniſhed him with his principal ſource. He has frequently expreſſed the pathetic and the tender. One of his heads has been noticed in our article on expreſſion, (ſee Expression, in *Painting*,) which is in poſſeſſion of the venerable preſident of the Royal Academy. It exhibits our Saviour with the crown of thorns upon his head, and has been admirably engraved by Sharp. It is not poſſible for painting to go beyond it in the perfect attainment of its object, the expreſſion of pious reſignation under acute ſuffering of mind and body, with beauty and truth of character. Mr. Fuſeli, in his late edition of Pilkington, has given juſtly the character of the generality of Guido's works; he ſays, "his attitudes ſeldom elevate themſelves to the fine expreſſion and graceful ſimplicity of the face: the grace of Guido is the grace of theatre, the mode, not the motive, determines the action: his Magdalens weep to be ſeen, his hero throws herſelf over Leander, Herodias holds the head of her victim, his Lucretias ſtab themſelves, with the ſtudied airs, and ambitious poſtures, of buſkined heroines; it would however be unjuſt not to allow there are exceptions from this affectation in his works. Helen departing with Paris, is one which alone might atone for every other blemiſh. In her divine face, the ſublime purity of the Niobe is mixed with the charms of the Venus; the wife, the mother, give indeed way to the lover; but ſpread a ſoft melancholy which tempers her fervour with dignity. This expreſſion is ſupported by the careleſs unconſcious elegance of her attitude, whilſt that of Paris, ſtately, courteous, inſipid, gives him more the air of an ambaſſador, attending her as proxy, than that of a lover carrying her off for himſelf."

In his male figures he too cloſely follows the forms of his model, and rarely ever deviates to the ideal form of the antique. Feminine beauty, infantine ſimplicity, and whatever is ſoft and gentle in its impreſſion, ſuited beſt with his genius; and his rapidity of execution, enforced into exertion by his need to maintain the waſte of an inſatiable appetite for gaming, has ſtocked the world plentifully with them. Madonnas, Cleopatras, Lucretias, &c. &c. which flowed with eaſe and intereſt from his pencil, are to be met with in every collection. He alſo produced many very large works of aſtoniſhing power; in the executive part particularly. His Aurora leading Apollo mounted in his chariot, and ſurrounded by the hours; the altar piece at St. Philip Neri, at Fano; his penitence of St. Peter, in the Zampieri palace; and many others atteſt the juſtice of that eſtimation in which the talents of Guido have always been, and ſtill continue to be held. He died in 1642, at the age of 68.

GUIDON, Fr. a ſmall ſign, equivalent, in *Muſic*, to *Moſtra*, Ital. and index or *direct*, in Engliſh, its form is this , and its uſe to indicate the ſound which begins the next line. And if this note or ſound is accidentally ſharp, flat, or natural, the guidon, or direct, muſt likewiſe be accompanied by the ſame accident. See Index and Mostra.

Guidon, in *Heraldry*, is a ſemi-circular banner, uſed at funerals, on which are painted the creſt and motto of the deceaſed, with ornaments. This trophy cannot properly be carried in any funeral proceſſion except that of a field officer.

Guidon is alſo a name given to a ſmall banner with the arms of Ulſter painted upon it, uſed only at the funeral of a baronet.

Guidon, in *Military Language*, a ſort of flag, or ſtandard, borne by the king's life-guard; being broad at one extreme, and almoſt pointed at the other, and ſlit, or divided, into two.

Guidon alſo denotes the officer who bears the guidon. The guidon is that in the horſe-guards, which the enſign is in the foot. The guidon of a troop of horſe takes place next below the cornet.

Guidons, *Guidones*, or *ſchola guidonum*, was a company of prieſts eſtabliſhed by Charlemagne, at Rome, to conduct and guide pilgrims to Jeruſalem, to viſit the holy places: they were alſo to aſſiſt them in caſe they fell ſick, and to perform the laſt offices to them in caſe they died.

GUIDONIA, in *Botany*, was named by Plumier, Nov. Gen. 4. t. 24, in honour of Guido Creſcentius Fagon, phyſician to Louis XIV., to whom Linnæus dedicated another genus under his ſurname. See Fagonia.

The *Guidonia* of Plumier is therefore the *Samyda* of Jacquin and Linnæus, but his ſuppoſed ſpecies include the *Guarea* of the latter. See Guarea and Samyda.

GUIDONIS Glandula. See Glandula.

GUIDORE, in *Geography*, a river of Ireland, in the county of Donegal, which flows into the Atlantic ocean, to the north of the iſles of Arran. It is of ſhort courſe, but wide at its mouth.

GUIDOTT, Thomas, in *Biography*, a phyſician, was born at Lymington, in Hampſhire, in 1638, but his family were originally from Florence. He ſtudied medicine at Oxford, and, after having taken his bachelor's degree, he went to Bath, where he practiſed with conſiderable ſucceſs. In 1679 he came to London. It would appear that he was a man of merit and reputation, as he was invited, in 1684, to teach anatomy at Copenhagen, and in 1690, a profeſſor's chair in medicine was preſented to him at Venice, and another at Leyden. But it is not known whether he accepted either of theſe offers; for his biographers confine themſelves to the mention of his writings relative to the mineral waters of England. Theſe were written both in Latin and Engliſh, with various titles, as "On Natural Baths and Mineral Waters," Lond. 1673. "De Thermis Britannicis," 1691, &c. He alſo publiſhed ſome tranſlations, among which is the book of Theophilus "de Urinis." Eloy.

GUIENNE, in *Geography*, a diſtrict of France, being part of a government under this appellation before the revolution. It lies northward of Gaſcogne, between 44° and 45° 40′ N. lat. being 36 leagues N. to S. and 72° from W. to E. It was ſubdivided into ſix parts, *viz.* on the W. Bourdelois, on the N. Perigord, on the E. Rovergne, on the S. Bazadois, in the centre Agenois and Quercy. The ſoil of Bourdelois, the moſt conſiderable diviſion, is partly light and ſandy, and partly fertile. Its principal products are cheſnuts, figs, and wine. The appellation Guienne is derived, by corruption, from Aquitania, itſelf derived from the abundance of its rivers and ſprings of water.

GUIERA, in *Botany*, "the *Guier* of Senegal." No other account is given of the origin of the name. Juſſ. 320. Lamarck. Illuſtr. t. 360.—Claſs and order, *Decandria Monogynia.* Nat. Ord. *Onagræ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, bell-ſhaped, with five equal upright teeth. *Cor.* Petals five, erect, equal, lanceolate, inſerted into the calyx, much exceeding its teeth. *Stam.* Filaments ten, thread-ſhaped, larger than the petals, five rather ſhorter than the reſt; anthers incumbent, roundiſh, two-lobed. *Piſt.* Germen inferior, longiſh, five-angled, ſlightly hairy; ſtyle thread-ſhaped, nearly equal to the ſtamens; ſtigma capitate, notched. *Peric.* Capſule extremely long, narrow, five-angled, exceſſively hairy, crowned with the calyx, of one-cell. *Seeds*, about five, minute, each hanging by a thread.

Eſſ. Ch. Calyx five-cleft, ſuperior. Petals five. Capſule very long, five-ſided, hairy, of one cell. Seeds five, hanging by a thread.

1. G. *glanduloſa.* Native of Senegal, from whence it was brought to M. de Juſſieu, who favoured us with a ſpecimen, by M. Rouſſillon, a ſurgeon, in 1790. Adanſon had found it there, and pointed out ſome of the characters to Juſſieu, but no mention is made of this ſingular plant in his own works. The *ſtem* is ſhrubby or arboreſcent, with oppoſite round branches. *Leaves* on ſhort thick downy ſtalks, oppoſite, about an inch long, broadly elliptical, obtuſe with a ſmall point, entire, with one rib, and many parallel veins connected by fine reticulations; both ſides very finely downy or hoary, eſpecially the under one. *Stipulas* none. The flowering *branches* are lateral, oppoſite, ſhort, bearing a few much ſmaller, more obovate, and more downy leaves. *Flowers* yellowiſh, in ſhort, denſe, capitate, terminal ſpikes. *Bracteas* four under each ſpike, not half an inch long, ovate, acute, entire, reflexed, deciduous. The outſide of the calyx, and under ſide of the leaves and bracteas, are beſprinkled with dark glandular dots, as in *Hypericum perforatum.* The habit and leaves of this ſhrub convey an idea of a ſimple-leaved *Hedyſarum*, while the infloreſcence and flowers look like a *Mimoſa.* The *fruit* is altogether peculiar, being about two inches long, crowned with the permanent flower, and denſely clothed with innumerable ſoft ſilky hairs of a tawny or ruſty hue, at leaſt after long keeping. Theſe have ſcarcely any exiſtence in the infant germen. We cannot conceive any reaſon for removing this genus to the *Myrti*, to which Juſſieu ſuſpects it may be more akin than to his *Onagræ*, where he has placed it. There are many points of affinity between it and *Epilobium.*

GUJERJINLIK, in *Geography*, a town of Perſia, in the province of Adirbeitzan; 25 miles N.N.W. of Urmia.

GUIFFA, in *Ornithology.* See Loxia *Tridactyla.*

GUIFONI, in *Geography*, a town of the iſland of Corſica; 13 miles S. of Corte.

GUIGNAN, an iſland in the Eaſt Indian ocean, near the E. coaſt of the iſland of Samar, about 20 miles in circumference. N. lat. 11° 21′. E. long. 125° 56′.

GUIGNETTE, in *Ornithology*. See TRINGA *Hypoleucos*.

GUIGNON, JOHN PETER, in *Biography*, an eminent muſician, born at Turin 1702, and who eſtabliſhed himſelf early in France, where he began to exerciſe his profeſſion on the violoncello; but he ſoon quitted that inſtrument to devote himſelf wholly to the violin, and became ſuperior to all the maſters who had preceded him. He acquired ſo great a reputation, that, in 1733, he was received into the king's chapel and chamber bands, and appointed muſic-maſter to the dauphin and madame Adelaide. In 1741, he was inveſted with the office of *roi des violons*, king of the violins, a title afterwards lowered to that of *king of the minſtrels*. Of this ſovereignty, both in England and France, we ſhall endeavour to trace the origin, progreſs, and abolition elſewhere. See *king of the* MINSTRELS.

In 1773, Guignon, finding his ſubjects turbulent and factious, he reſigns his crown, and leſt future fidlers ſhould be equally troubleſome to future ſovereigns, obtained the total abolition of its power and dignity.

This *ci-devant* monarch, and celebrated artiſt, died at Verſailles, in 1774, of a paralytic ſtroke. He had retired, in 1762, from all public exerciſe of his profeſſion.

No performer (ſays M. Laborde) had a greater bowhand, or drew a better tone from his inſtrument.

His houſe was always a gratuitous ſchool for all young people who wiſhed to learn the violin, and many of his pupils have become eminent muſicians.

Guignon was the firſt who formed favourite airs into duets for two performers on the violin, a *parti equali*.

Theſe new kinds of *double ſolos* were executed at the Concert Spirituel by the author and Mondonville, who perfectly underſtood and ſupported each other. No compoſition or performance was ever better received by the public, than theſe admirable *duets*, which have been ſince often imitated, but rarely in ſo charming a manner. Eſſai ſur la Muſique, tom. iii.

GUILANDINA, in *Botany*, ſo named by Linnæus, in memory of Melchoir Guilandinus, a Pruſſian, whoſe real name Haller preſumes was Wieland, and who after ſeveral extenſive journeys into Paleſtine, Egypt, Africa, and Greece, was carried priſoner into Barbary; but being redeemed by the celebrated Fallopius, afterwards ſucceeded him in the botanical chair at Padua, and died in 1587 or 1589. Haller characterizes him as a learned but deſultory writer, an acrimonious critic, even of the excellent Conrad Geſner, but eſpecially of Matthiolus, whom he violently hated. He had little or no merit as a practical botaniſt, nor did he ſcarcely attempt to deſcribe or define any plants. He publiſhed a learned eſſay on the *Papyrus*, in quarto, at Venice in 1572, and various controverſial epiſtles. His *Synonyma Plantarum*, one of the earlieſt works of its kind, appeared long after his death, in 1608, at Frankfort, in octavo.—Linn. Gen. 207. Schreb. 279. Willd. Sp. Pl. v. 2. 534. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 55. Juſſ. 350. Lamarck. Illuſtr. t. 336. Gærtn. t. 148. (Bonduc; Plum. Nov. Gen. 24. t. 39.)—Claſs and order, *Decandria Monogynia*. Nat. Ord. *Lomentaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, inferior; tube ſhort, turbinate, permanent, oblique at the orifice; limb in five deep, nearly equal, ſpreading, oblong, rounded, obtuſe, deciduous ſegments, the two uppermoſt a little the ſhorteſt, and the lower one rather longeſt. *Cor.* Petals five, inſerted into the neck of the calyx; the uppermoſt roundiſh, concave, aſcending, rather the ſhorteſt; the reſt oblong, broadeſt in their forepart, rounded at the extremity, ſpreading and rather reflexed, longer than the calyx, the two loweſt a little longer than the two middle ones. *Stam.* Filaments ten, awl-ſhaped, thicker and moſt hairy at their baſe, decumbent, inſerted into the neck of the calyx, ſhorter than the corolla, unequal, the lower ones being gradually longer than the upper; anthers incumbent, oblong. *Piſt.* Germen ſuperior, oblong, ſomewhat ſtalked; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma ſimple, obtuſe. *Peric.* Legume rhomboid, compreſſed, ſlightly tumid, of one cell and two valves, its upper ſuture convex. *Seeds* few, globoſe, ſlightly compreſſed, very hard.

Eſſ. Ch. Calyx of one leaf, ſalver-ſhaped. Petals five, inſerted into its neck, nearly equal. Legume of two valves and one cell. Seeds few, ſtony.

Obſ. Schreber, who has properly followed Lamarck and others in ſeparating from the Linnæan *Guilandina G. dioica* and *G. Moringa*, (ſee GYMNOCLADUS and HYPERANTHERA,) obſerves that he has ſeen only male flowers of the *Bonduc* and *Bonducella*, and therefore ſuppoſes they are either dioecious or polygamous. Our ſpecimens have ſtamens and piſtil in the ſame flowers.

1. G *Bonduc.* Linn. Sp. Pl. 545. (Frutex globulorum; Rumph. Amb. v. 5. 89. t. 48.)—Prickly. Leaflets ſcattered, ovate, acute; the prickles on their ſtalks ſolitary.—Native of the Eaſt and Weſt Indies, where the Engliſh call it Nicker-tree. It has long ſince been raiſed in our ſtoves, but does not arrive at ſufficient perfection to bloſſom. Rumphius deſcribes it as a very prickly, trailing, and widely-ſpreading *ſhrub*, rather than a tree, entangling itſelf with all around it, but not riſing to any great height. The *leaves* are doubly and abruptly pinnate, their ſtalks variouſly twiſted or curved, beſet underneath with ſcattered ſolitary hooked prickles; the leaflets, according to Rumphius, of four or five fingers' breadth long and two broad, (it muſt always be recollected that his figures are diminiſhed,) on ſhort little ſtalks, ovate, acute, entire, ſmooth. *Flowers* in long, terminal, taper, denſe ſpikes or cluſters, of a tawny yellow, with a long, reflexed, awl-ſhaped, downy bractea under each of their partial ſtalks. *Legumes* three or four inches long, prickly, containing two, three or four ſeeds, which are very hard, grey and ſhining, like boys' marbles, and marked with horizontal ſtreaks. Theſe ſeeds are often kept in cabinets among ſhells, &c. and are ſaid to cauſe coſtiveneſs. The natives of Amboyna devour about 40 of them for ſeveral ſucceſſive days, to render themſelves invulnerable when going to war.

2. G. *Bonducella.* Linn. Sp. Pl. 545. (Globuli majores; Rumph. Amb. v. 5. 92. t. 49. f. 1. Caretti; Rheede Hort. Mal. v. 2. 35. t. 22. Bonduch, Pianta indiana; Zann. Iſt. 44. t. 17. Acacia glorioſa, lentiſci folio, &c.; Pluk. Phyt. t. 2. f. 2.)—Prickly. Leaflets oppoſite, elliptical, acute; the prickles on their ſtalks in pairs.—Native of both Indies, from whence its ſeeds were brought very early to Europe, and raiſed in hot-beds, but the plants have not long thriven. This differs from the preceding in having much ſmaller and more elliptical *leaflets*, regularly two-ranked and oppoſite, with a pair of prickles at the baſe of their partial ſtalks. The *ſeeds* are but two in each legume, otherwiſe there is no great difference. By Rumphius's account this and the former ſeem to be imperfectly dioecious. *G. Bonducella* is the moſt known of the two, though often miſtaken for the former, and is what Lamarck has figured, though not very accurately.

3. G. *Nugæ*. Linn. Sp. Pl. 546. (Nugæ ſylvarum; Rumph. Amb. v. 5. 94. t. 50.)—Stem ſmooth. Leaflets oppoſite, ovate, acute; the prickles on their main ſtalks in pairs. Legume ſmooth.—Native of Amboyna, only known to botaniſts by Rumphius's deſcription and plate. It is a weak trailing *ſhrub*, with a hard wood which diſtils gum when wounded. The hooked prickles on the main ſtalks of its *leaves* are very troubleſome to thoſe who walk where it grows. The *flowers* are of a fine yellow, without *bracteas*. *Legume* ſmooth and naked, containing only one or two ſquare black ſeeds.

4. G. *paniculata*. Lamarck. Dict. v. 1, 435. Willd. n. 4. (Caca Mullu; Rheede Hort. Mal. v. 6. 33. t. 19.)—Stem and leaf-ſtalks prickly. Flowers in panicled cluſters, without bracteas. Legume ſmooth, ſingle-ſeeded.—Native of watery places on the coaſt of Malabar, and other parts of the Eaſt Indies, flowering in June and July. It is as large as an apple-tree, with prickly *branches*, and bipinnate, ſmooth, firm, evergreen *leaves*, whoſe ſtalks bear ſcattered hooked prickles. *Flowers* in panicled cluſters, without bracteas, yellow. *Legume* ovate, pointed, filled with one large ſeed like a bean, of a ſhining white.

5. G. *axillaris*. Lamarck Dict. v. i. 435. Willd. n. 5. (Ban Caretti; Rheede Hort. Mal v. 6. 35. t. 20.)—Stem and leaf-ſtalks prickly. Leaflets ovate. Flowers ſolitary, axillary. Legume hairy, ſingle-ſeeded.—Native of thick woods in Malabar, towards the mountains. *Rheede*. The *leaves* are large, ſimply pinnate, of two or three pair of ovate entire ſmooth leaflets and an odd one. *Flowers* remarkable for being ſolitary and axillary. They are of a greeniſh yellow. *Legume* like the laſt, but externally villoſe. Lamarck, with his uſual acuteneſs, has referred theſe two laſt ſpecies to *Guilandina*, of the propriety of which there can be no doubt, though they eſcaped Linnæus, who indeed ſeldom adopted any thing from plates, without ſeeing ſpecimens.

GUILD, Gild, or Geld. See Gild and Geld.

GUILDFORD, or Gildford, in *Geography*, a borough and market town of Surrey, England, conſiſts of three pariſhes, and is a place of antiquity and curioſity. In the time of the Saxon heptarchy it was a royal villa, and given by king Alfred to his nephew Ethelwald. Other Saxon kings reſided here. After the conqueſt it continued to be a place of note, and ſeveral monarchs occaſionally fixed their palace here. In the year 1216, the caſtle of Guildford, with others in this part of the country, were ſeized by Lewis, dauphin of France. The cuſtody of the caſtle was committed in 1267 to William Aguillon, ſheriff of Surrey and Suſſex. Since that time it has been occupied by different perſons, and has been repeatedly attacked by contending parties. The lofty thick walls of the keep-tower ſtill remain, to ſhew the ſtyle and character of the architecture. Beſides the caſtle there appear to have been a palace formerly in this town, and alſo two monaſteries, parts of one of the latter ſtill remain. Guildford appears to have been firſt incorporated by king Henry I., and as a borough ſent members to parliament in the 23d year of king Edward I. The right of election, in 1699, was veſted in the freemen and freeholders paying ſcot and lot, and reſident in the town. The number of voters, however, is only about 120, the majority of whom are under the influence of lords Onſlow and Grantley. By a charter of Henry VIII. the corporation conſiſts of a mayor, ſeven magiſtrates, and fixteen bailiffs. Guildford gives the title of earl to the family of North. Among the eſtabliſhments in this town, is a grammar-ſchool, which is well endowed, and provided with a commodious houſe. In the year 1789 a county-hall was built here, with ſuitable offices, and at the ſame time a playhouſe was erected. The river Wey, which runs at the weſtern ſide of the town, at the foot of ſteep hills, was made navigable to this place in the year 1656, by which means a conſiderable trade in corn, malt, beer, &c. is carried on with the metropolis. In the town are three churches, reſpectively dedicated to St. Mary, St. Nicholas, and the Holy Trinity. The latter church fell down in the year 1740, but it has ſince been rebuilt of brick. The town is well provided with fairs and a market: there being three of the former yearly; and one of the latter weekly. Guildford is 30 miles S.W. of London, and contains 464 houſes and 2634 inhabitants.

GUILD-HALL, or Gild-Hall, the great court of judicature for the city of London.

In it are kept the mayor's court, the ſheriff's court, the court of huſtings, court of conſcience, court of common council, chamberlain's court, &c.

Here alſo the judges ſit upon *niſi prius*, &c.

Guildhall, in *Geography*, a townſhip of America, in Eſſex county, Vermont, on Connecticut river, containing 296 inhabitants.

GUILFORD, a townſhip of Franklin county, Pennſylvania, containing 1343 inhabitants.—Alſo, a townſhip in Windham county, Vermont, on the W. bank of Connecticut river, containing 2256 inhabitants.—Alſo, a poſt-town of Connecticut, in New Haven county, on the ſouth ſide of Long iſland ſound, about 18 miles E. by S. of New Haven city. It is large, divided into five pariſhes, and was ſettled in 1639. The Indians called it "Menuncatuck." It contains 3601 inhabitants.—Alſo, a county in Saliſbury diſtrict, North Carolina, bounded E. by Orange, W. by Rowan, S. by Rockingham county, and N. by Virginia. It is noted for the extenſive and rich tracts called New Garden, Buffaloe, and Deep river lands. It contains 9442 inhabitants, including 905 ſlaves. Its chief town is Martinville.

GUILLAUME, a town of France, in the department of the Maritime Alps, and chief place of a canton, in the diſtrict of Paget-Theniers. The place contains 1210, and the canton 4494 inhabitants, on a territory of 485 kiliometres, in 8 communes.

GUILLEM, in *Ornithology*, the name given in many parts of England to the bird called by authors *lomwia*, and in ſome places the *kiddaw* and *ſea-hen*. See Colymbus *Troile*.

GUILLEMEAU, James, in *Biography*, a ſurgeon, was born at Orleans in 1550. He was one of the moſt celebrated pupils of Ambroſe Paré: for having entered upon the ſtudy of ſurgery with a mind cultivated by the belles lettres, and an extenſive acquaintance with the languages, the treaſures of the ancients were open to him, and he was prepared for the work of obſervation. He ſucceeded his great maſter in his practice both at Paris and in the army, and was for a long period ſurgeon to the great hoſpital, or Hôtel-Dieu, in that metropolis. He acquired ſo high a reputation that he was honoured with the appointment of ſurgeon in ordinary to the kings Charles IX. and Henry IV. He died in the midſt of his active duties and diſtinguiſhed honours, in March 1612. His works, which were not few, likewiſe contributed to raiſe his reputation. His firſt publication was a tranſlation of Treatiſe on Surgery of Ambroſe Paré into Latin, printed at Paris in 1582, folio. His next work was a ſmall treatiſe, entitled "Apologie pour les Chirurgiens," 1593. The remainder of his writings is contained in a collection of his "Œuvres de Chirurgie," printed at Paris in 1598, and in 1612; and at Rouen in 1649, ſome of which were publiſhed ſeparately. Theſe are "Tables Anatomiques,"

ques," with figures from Veſalius;—"Hiſtoire de tous les muſcles du corps humain, &c.;"—"Traité de la generation de l'homme;"—"L'heureux accouchement des femmes;"—"Traité ſur les abus qui ſe commettent ſur les procédures de l'impuiſſance des hommes et des femmes;"—"La Chirurgie Francoiſe, recueillies des anciens Médecins et Chirurgiens, &c."—"Traité des plaies recueillies des Leçons de M. Courtin;"—"Operations de Chirurgie recueillies des anciens Medecins et Chirurgiens;"—"Traité des maladies de l'œil;" and laſtly, "Traité de la parfaite methode d'embaumer les corps;" which contains a report of that operation, as performed upon the bodies of Charles IX. and Henry III. and IV. See Eloy. Dict. Hiſt.

GUILLEMITES, an order of monks in Flanders, whoſe habit reſembles that of the Ciſtercians; they follow the rule of St. Auguſtine, and are governed by a ſuperior, who does not take the title of provincial, and is elected every four years.

GUILLEMOT, in *Ornithology*. See Colymbus *Grylle*.

GUILLESTRE, in *Geography*, a town of France, in the department of the Higher Alps, and chief place of a canton, in the diſtrict of Embrun; nine miles N.N.W. of Embrun. The place contains 1057, and the canton 7838 inhabitants, on a territory of 387½ kiliometres, in 11 communes.

GUILLET, de Saint George, George, in *Biography*, born at Thiers in Auvergne, was the firſt hiſtoriographer of the Academy of Painting and Sculpture; to which office he was elected in the year 1682. He was author of many works of conſiderable reputation, as "Athene Ancienne et Nouvelle;"—"Lacedemone Ancienne et Nouvelle." Theſe, it was known, were his own productions, though he pretended to have taken them from the papers of his younger brother. He publiſhed alſo "A Hiſtory of the Grand Viziers' Coprogli," &c.;—"The Life of Mahomet II."—"The Hiſtory of Caſtrucio Caſtrani," tranſlated from the Italian of Machiavel:—"Les Arts de l'homme d'Epée, ou Dictionnaire du Gentilhomme," in two volumes. He died at Paris in 1705.

GUILMAIN, Gabriel, a muſician, born at Paris in 1705. He manifeſted from his infancy a ſtrong paſſion for the violin, and acquired celebrity on that inſtrument before he was 20. In 1738 he was received into the king's band and chapel. The favour of his prince, and the love of his brethren of the ſtring, ſeemed to promiſe him a proſperous and happy old age, when, in 1770, he was unhappily ſeized with a fit of inſanity, and under a willow tree gave himſelf 14 wounds with a knife, on the road from Paris to Verſailles, near Chavilie, and was interred the next day in the church yard of that village. The derangement and ſelf-ſlaughter of our poor countryman Jery Clarke of the king's chapel were ſaid to have been occaſioned by the paſſion of love; but we are not told the cauſe of the fatal cataſtrophe which at 65 terminated the exiſtence of Guilmain!

He left behind him 17 different works for the violin and harpſichord. Guilmain was one of the firſt performers, to whom the violin is obliged for the aſtoniſhing perfection to which its execution has been ſince brought. Laborde.

GUILT Rents. See Gild.

GUIMARÆNS, in *Geography*, a conſiderable walled town of Portugal, in the province of Entre Minho Douro, 1850 paces in circuit, containing ſix pariſh churches, ſix convents, four hoſpitals, fifteen ſquares, fifty-ſeven ſtreets, eight gates, four bridges, and about 6000 inhabitants; ſituated partly on an eminence and partly on a plain; four leagues S.S.E. of Braga. Here is a manufacture of linen, in high eſtimation. N. lat. 41° 25′. W. long. ° 57′.

GUIMARAS, one of the Philippine iſlands, about 30 miles in circumference, covered with trees, and producing a great quantity of ſarſaparilla; about ſix miles from the iſland of Panay. N. lat. 40° 45′. E. long. 122° 30′.

GUIN, or Guien, a river of Africa, or rather a branch of the river Joliba, which flows from the Dibbie lake, and after purſuing a northern courſe, encloſing on that ſide the iſland Guinbala, paſſes near Tombuctoo to the S. of it, and joins the other branch of the Joliba, which paſſes ſouthward of Guinbala; and both together form the Neel Abeed, called alſo the Guin river, which purſues its courſe towards the Eaſt.

GUINALA, a town of Africa, in the country of the Biafares. N. lat. 11° 25′.

GUINBALA. See Jinbala.

GUINEA, an extenſive region in the S.W. part of Africa, which is divided into the two large countries of Upper and Lower Guinea, the latter being commonly called Congo. Theſe two, taken together, extend above 2500 miles along the ſea-coaſt. Upper Guinea is generally divided into three parts, *viz.* Malaguetta, or the Grain-coaſt, Guinea Proper, and Benin, which together extend 500 leagues from E. to W. For an account of the Grain-*coaſt*; ſee that article. Guinea proper extends from cape Palmas to the river Volta, about 140 leagues along the ſea-coaſt, which bounds it on the ſouth. It has the kingdom of Benin on the E., Gago and Melli on the N., and Malaguetta on the W. This country is divided by the Europeans into two parts, *viz.* the Tooth, Ivory, or Quaqua coaſt, and the Gold Coaſt; the former extending from cape Palmas to the river Sueira da Coſta, and the latter from thence to the river Volta. (See Ivory *Coaſt* and Gold-*coaſt*.) For an account of Benin; ſee Benin. Lower Guinea, or Congo, is bounded on the N. by Upper Guinea, or the kingdom of Benin, on the W. by the Ethiopic ocean, on the S. by the kingdom of Mataman, reckoned part of Cafraria; but on the E. and N.E. its boundaries have not been accurately aſcertained. The extent of this country from cape Lopo, S. lat. 1°, to cape Negro, S. lat. 23 30′, is about 16° 30′, or about 990 Engliſh miles; its extent eaſtward is not known. It is watered by many rivers, and would be very fruitful, if it were better cultivated by the lazy negroes. The mountains abound with gold, ſilver, copper, and iron; but the mines of the latter metal are only thoſe that are worked, chiefly for the purpoſe of making arms. Congo is commonly divided into Loango, Congo proper, Angola, and Benguela. See each reſpectively.

Guinea, *New*, or Papua, an iſland of the Pacific ocean, ſituated N. of New Holland, and ſeparated from it by Endeavour ſtrait, as captain Cook has ſatisfactorily aſcertained. It is divided from New Britain in the S.E. by Dampier's ſtrait; though ſome have ſuppoſed, that in this direction the Louiſiad of Bougainville may be diſcovered to be joined, at leaſt in part, with Papua, while other parts may conſiſt of detached iſles.

Although this extenſive territory has not yet been completely inveſtigated, yet it is generally allowed to be a vaſt iſland, extending from what is abſurdly called the Cape of Good Hope, or more properly White Point in the N.W., probably to cape Rodney in the S.E., a length of more than 1200 miles by a medial breadth of perhaps 300, and thus far ſuperior in ſize to Borneo, formerly reputed the largeſt of iſlands. This iſland preſents to our notice a country, the moſt intereſting of any in Auſtralaſia, as it partakes of the opulence of the Moluccas, and their ſingular varieties of plants and animals. The land of Papua is ſaid to have been firſt diſcovered by Soavedra, a Spaniſh captain, in 1528, who had ſailed from Mexico, by the command of Cortes to explore the Spice iſlands from that quarter. It is ſaid that Soavedra called it New Guinea, from an apprehenſion that it was under the ſame meridian with the African Guinea; but without admitting ſuch a degree of ignorance in a profeſſed mariner, it is more probable that this name was given by Le Maine near a century after, as ſynonymous with another, that of the "Iſles of Gold." On this extenſive territory, favoured by nature and no leſs enriched by the choiceſt productions, there is no European ſettlement. The inhabitants of the northern part are called Papous, whence ſprung the name of the iſland; and tradition reports that they are akin to the Moluccans. They are black, and are ſaid to have the woolly hair of negroes; but this latter circumſtance may be the effect of art; and it ſeems that in ſome parts they have the true Malay complexion and features. In the interior is a race called "Haraforas," probably Papuans of a lower claſs, who live in trees, which they aſcend by a notched pole, drawing it after them to prevent ſurpriſe. The habitations of the Papuans are built on ſtages in the water, thus reſembling the Borneans and other nations in the Aſiatic iſles. The women ſeem to be moſt induſtrious, and employ themſelves in making mats, and pots of clay, which they afterwards burn with dry graſs, or bruſh-wood: they will even wield the axe, while the men are indolent, or preparing for the chace of wild hogs. The aſpect of theſe people is hideous; the men being ſtout in body, with ſkin of a ſhining black, rough, and marked with traces like thoſe occaſioned by the leproſy, eyes large, noſes flat, mouth from ear to ear, lips, eſpecially the upper one, exceedingly thick, woolly hair, either ſhining black, or fiery red, dreſſed in a vaſt buſh reſembling a mop, 2½ or 3 feet in circumference, in which they ſtick a comb with four or five diverging teeth, and ſometimes ornamented with feathers of the birds of paradiſe; ſome increaſe their deformity by boring their noſes and paſſing through them rings, pieces of bone, or ſticks, and others, by way of ornament, wear round their necks the tuſks of boars. The heads of the women are not ſo large as thoſe of the men, and in the left ear they wear ſmall braſs rings. The men go naked, excepting a ſmall wrapper round the waiſt, made of the fibres of cocoa. The women, in general, uſe a covering of the coarſe Surat baftas, tucked up behind, ſo as to leave their bodies and thighs expoſed to view. The children have no ſort of cloathing. The religious tenets of the Papuans have not been much examined. Their tombs, made of the rude coral rock, are ſometimes marked with ſculptures. Their chief commerce is with the Chineſe, from whom they purchaſe their inſtruments and utenſils, and in return they furniſh them with ambergreaſe, ſea-ſlugs, tortoiſe-ſhell, ſmall pearls, birds of paradiſe, lories, and other birds, which the Papuans are very ſkilful in drying. Some ſlaves, probably captives taken in war, are alſo exported. Capt. Dampier, who, at an early period, made ſeveral diſcoveries on the coaſt of Papua, particularly admired the proas, which are pictureſque, and well managed. The coaſts of this country are lofty, and in the interior mountain riſes above mountain, richly clothed with woods. The ſhores abound with cocoa trees, and navigators have much admired the country, which deſerves ſuperior cultivation. Papua is the choſen reſidence of the ſplendid and ſingular birds of paradiſe, of which 10 or 12 ſorts are enumerated by Mr. Pennant; they are ſuppoſed to breed in Papua, and during the dry, or weſtern monſoon, they migrate, in flocks of 30 or 40, to the iſles of Arroo. During their flight they cry like ſtarlings, but when ſurpriſed with a ſtrong gale they croak like ravens, and aſcend to the ſuperior regions of the air. They alight on the higheſt trees, ſeeming to feed on berries, and, as ſome ſay, on nutmegs and butterflies; and they are either ſhot with blunt arrows, or caught with bird-lime, or nooſes. The bowels and breaſt-bone being extracted, they are dried with ſmoke and ſulphur, ſold for nails or bits of iron, and exported to Banda. Papua alſo boaſts of elegant parrots and lories; and the crowned, or gigantic pigeon, almoſt equals a turkey in ſize.

Some of the ſmall iſlands adjacent to this comparative continent, are better known than the main land of Papua. At the N.W. extremity the chief iſles are Waijoo and Salwatti; and the ſmaller iſles of Wolcket, Famia, Piamis, Wagiol, Laib, Wiag, and Sinag, ſerve to fix the boundary between Auſtralaſia and the iſlands in the Oriental Archipelago; Gag and Gibbi, from their proximity to Gilolo, belonging to the latter. Farther to the S. are the Papuan iſlands of Arroo and Timorlaut, the boundary here paſſing on the E. of Nila, one of the ſmall Aſiatic iſles, among which Serro muſt be claſſed. On the E. of Benda the boundary may paſs to the S. of Mamabek, then winding N.W. to the E. of Myſol, will leave Popo in the Oriental Archipelago, while Wolcket claſſes with the Papuan iſlands. Pinkerton's Geog. vol. ii.

GUINEA, a gold coin, ſtruck and current in England.

The value, or rate of guineas, has varied: this coin was firſt ſtruck at the value of twenty ſhillings; by the ſcarcity of gold, it was afterwards advanced to twenty-one ſhillings and ſix-pence; but it is now ſunk to twenty-one ſhillings. The pound weight troy of gold is cut into forty-four parts and a half; each part makes a guinea. See GOLD, STANDARD, and MONEY.

This coin took its denomination, *guinea*, becauſe the gold, whereof the firſt was ſtruck, was brought from that part of Africa, called *Guinea*; for which reaſon it likewiſe bore the impreſſion of an elephant.

GUINEA *Company*. See COMPANY.

GUINEA *Hen*. See NUMIDA *Meleagris*.

Guinea hens naturally herd together in large numbers, and breed up their young in common; the females taking care of the broods of others, as well as of their own. They breed very well with us. Their fleſh is tender and ſweet; generally white, though ſometimes black. They are not ſo tame and domeſtic as our own fowls, and particularly they will not lay in houſes, but get into the hedges and among buſhes, where they lay and hatch; but this is the occaſion of great loſs among them, the wild vermin deſtroying a great part of their young brood. The female alſo is leſs careful about the great buſineſs of hatching and taking care of them, than any other bird we are acquainted with: the beſt method, therefore, is to ſet other fowls upon the eggs of this kind. The young fowls of this kind are very beautiful; they look like ſo many partridges. Their beaks and legs are red, and their whole plumage is at that time of the colour of the partridge.

The hen, if her neſt is found, and the eggs at times taken away, but ſo as always to have one there, will continue to lay till ſhe has depoſited a hundred, or ſometimes a hundred and fifty eggs, which are very well taſted. This is a very active and ſprightly bird, and of an unquiet and troubleſome diſpoſition to the owner. It runs very ſwiftly, in the manner of the quail and partridge; but its wings are ſhort, and it is not made for flying; yet at night it will not rooſt among other fowl, but gets upon a houſe or tree, or any other high and ſafe place. The cry of the bird is ſharp and diſagreeable to many ears, and it is almoſt continually making it. It is of a quarrelſome diſpoſition, and will be miſtreſs of the yard: its agility, and the ſharpneſs of its beak, generally obtain it the victory with whatever bird it fights. The *pin-*

tado is ſo common in America, that many have ſuppoſed it native there: but this is not the caſe: the origin of the bird is in Guinea, where they are found in flocks of two or three hundred, that perch on trees, and feed on worms and graſshoppers; and the firſt that were ever brought into America, were brought in the year 1508, with the cargoes of negro ſlaves. The Spaniards, neither at that time, nor ever ſince, have attempted to tame them, or render them domeſtic, uſeful birds, but let them go looſe and wild in the ſavannas, where they have increaſed to ſuch prodigious numbers, that they may well appear native, and are ſeen in vaſt flocks together, and are called *marroon pintades* by the Spaniards and French. Obſerv. ſur les Cout. de l'Aſie, p. 190.

Guinea *Henweed.* See Petiveria.

Guinea *Pepper.* See Capsicum.

Guinea *Pig.* See Cavia *Cobaya.*

Guinea *Weeſel.* See Mustela *Galera.*

Guinea *Wheat.* See Zea and Maize.

Guinea *Worm.* See Chaetia and Dracunculi.

GUINEARA, in *Geography*, a town of Hindooſtan, in the circar of Ruttunpour; 10 miles S.W. of Ruttunpour.

GUINES, a town of France, in the department of the Straits of Calais, and chief place of a canton, in the diſtrict of Boulogne; 6 miles S. of Calais. The place contains 2600, and the canton 11,482 inhabitants, on a territory of $157\frac{1}{3}$ kiliometres, in 17 communes.

GUINET, or Gwynned, a townſhip of America, in Montgomery county, Pennſylvania, containing 906 inhabitants.

GUINETTA, in *Ornithology*. See Tringa *Hypoleucos.*

GUINGAMP, in *Geography*, a town of France, in the department of the North coaſt, and principal place of a diſtrict. N. lat. 48° 33'. W. long. 3° 4'. The place contains 5190, and the canton 12,248 inhabitants, on a territory of $142\frac{1}{2}$ kiliometres, in 8 communes.

GUINIAD, or Gwiniad, *i. e. whiting*, ſo called on account of the whiteneſs of its ſcales, the *ſalmo lavaretus* of Linnæus, in *Ichthyology*, is a name given by ſome to the fiſh known among authors by the name of *ferra*, a fiſh of the truttaceous kind, common in the lakes of Wales, particularly in that called Llyntegid, near Bala, in Merionethſhire, and ſome of the northern counties of England; and in the laſt of theſe places called the *ſchelley*. It is alſo found in the lakes of Switzerland, Italy, Norway, Sweden, Lapland, Scotland, and Ireland. The head is ſmall, ſmooth, and of a duſky hue; the eyes large, the noſe blunt at the end, the jaws of equal length, the mouth ſmall and without teeth; the branchioſtegous rays nine; the covers of the gills ſilvery, powdered with black; the back is a little arched, the colour gloſſed with a deep purple and blue, but near the lateral lines aſſumes a ſilvery caſt tinged with gold; the ſide-line is ſtraight, and is formed of diſtinct ſpots of a duſky hue; the belly is a little prominent, and quite flat at the bottom; the firſt dorſal fin, near the middle, conſiſts of fourteen branched rays; the ſecond is near the tail, and is thin and tranſparent; the pectoral fins have eighteen rays, the ventral twelve, and the anal fifteen, which are all branched at their ends; the tail is much forked; the ſcales are large, and adhere to the body.

The guiniad has an inſipid taſte, and will not keep long. Their ſpawning ſeaſon in Llyntegid is in December. Camden obſerves, that this fiſh never wanders into the river Dee, and that the ſalmon never ventures into the lake: this is generally, but not univerſally, the caſe. Pennant, and Phil. Tranſ. vol. lvii. for 1767, p. 211.

GUINNETH, John, in *Biography*, was a native of Wales, of very poor parentage, but ſupported in his ſtudies by a beneficent clergyman, who allowed him an exhibition. In 1531, being then a ſecular prieſt, and having ſpent twenty years in the ſtudy and practice of muſic, and compoſed the reſponſes for the whole year in diviſion-ſong, and many maſſes and antiphons for the uſe of the church, he ſupplicated for the degree of doctor, and obtained it upon payment of twenty-pence; and in 1533 he was preſented to the rectory of St. Peter, in Weſt Cheap. He wrote "A Declaration of the ſtate wherein Heretics do lead their lives," and other controverſial tracts mentioned by Wood and Tanner.

GUINTHER, John, or Guinterius, was born in 1487, at Andernach, a ſmall town in Germany, in the circle of the Lower Rhine. His real name was *Winther*. He was of obſcure birth, but evinced his zeal for knowledge from his child-hood. At twelve years of age he went to Utrecht, where he ſtudied the belles-lettres, and particularly the Greek language with great ardour; but his ſcanty means were inſufficient for his ſupport, and he went to Deventer, where he lived ſome time by the aſſiſtance of ſuch as commiſerated his ſituation, and is even ſaid to have been compelled to beg his bread. But labour and induſtry having enabled him to overcome the hardſhips of fortune, he went to Marpurg, with the intention of cultivating natural philoſophy. Here he gave ſuch public proofs of his erudition, that he was engaged by the inhabitants of Goſlar to inſtruct their young people; but he ſoon quitted this employment, to accept one more ſuited to his talents, having been appointed profeſſor of Greek at Louvain. His diſpoſition, however, inclined him to the profeſſion of medicine; and, after a time, he repaired to Paris, at that period the moſt flouriſhing ſchool of medicine in Europe, where his merit procured him the patronage and friendſhip of ſeveral diſtinguiſhed perſons, eſpecially of cardinal Du Bellay, for whoſe zealous kindneſs he ever after retained the moſt lively gratitude. Guinther was 37 or 38 years of age when he went to Paris in 1525. He took the degree of bachelor in 1528, and of doctor in 1530, when half the expences were remitted to him. Though a foreigner, he was appointed phyſician to Francis I., and practiſed his profeſſion in Paris during ſeveral years. He alſo gave private lectures on anatomy, and is ſaid by ſome of his biographers to have made ſome diſcoveries in that ſcience; Winſlow, in a theſis maintained in 1717, calls him "Primus Anatomes in Academia Pariſienſi Reſtaurator Guinterius Andernacus;" nevertheleſs, Veſalius ſpeaks contemptuouſly of his anatomical ſkill.

The reputation of Guinther had reached the north of Europe, for he was invited by Chriſtian III. of Denmark, who made him the moſt advantageous offers, to repair to his court. But in 1537, the diſturbances which took place on the ſcore of religion, compelled him to quit that kingdom, which he now regarded as his own country. He retired to Metz, whence the war ſoon compelled him to paſs to Straſburgh. Here he was received with honour by the magiſtrates, and had a chair aſſigned him by the faculty; and he practiſed with great ſucceſs and reputation; his viſits extended at times over the greater part of Germany, and even into Italy. At length, letters of nobility were gratuitouſly conferred on him by the emperor Ferdinand I. He lived, however, but twelve years to enjoy theſe honours, being ſeized with an ardent fever, at the houſe of a noble patient; whence he was carried home, and he died on the 4th of October, 1574, at the age of 87.

The works of Guinther are numerous, conſiſting partly of tranſlations of the beſt writings of the ancient phyſicians, and principally of commentaries and illuſtrations of them, and of the ſubjects of which they treat. For a catalogue of the titles of his works, we muſt refer the reader to Eloy, who has occupied ſeveral pages in detailing them, together with brief notices of the works themſelves. See his Dict. Hiſt. de la Medicine.

GUIOA, in *Botany*, ſo denominated by Cavanilles, in honour of Joſeph Guio and Sanchez, who in his voyage along with Louis Née, made many beautiful and accurate coloured botanical drawings. Cavan. Ic. v. 4. 49. Claſs and order, *Octandria Monogynia*. Nat. Ord. *Sapindi*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of five roundiſh concave, equal, permanent leaves. *Cor.* Petals five, ſhorter than the calyx and alternate with it, obovate, inſerted into the outſide of an annular nectary, which is fleſhy, and obſcurely five-ſided. *Stam.* Filaments eight, awl-ſhaped, equal, ſhorter than the calyx, inſerted into the inner ſide of the nectary; anthers incumbent, ovate, two-celled. *Piſt.* Germen ſuperior, ſomewhat ſtalked, ovate, triangular; ſtyle very ſhort; ſtigma awl-ſhaped, ſimple. *Peric.* Capſules three, coriaceous, compreſſed, rounded, ſpreading, affixed laterally to the central column, each of two valves and one cell. *Seeds* ſolitary, lenticular, affixed to the baſe of the column, in a membranous arillus.

Eſſ. Ch. Calyx five-leaved. Petals five, ſmaller. Stigma ſimple, acute. Capſules three, compreſſed, of two valves, and one cell. Seeds ſolitary, in a membranous arillus.

1. G. *lentiſcifolia*. Cavan. Ic. t. 373. A *ſhrub*, ſix feet or more in height, found in *Babao*, one of the Friendly iſles, not far from the ſea-ſide, flowering in June and July. *Leaves* alternate, abruptly pinnate, compoſed of three pair of elliptic-lanceolate, ſtalked, entire leaflets, of a coriaceous texture and ſmooth ſurface. *Flowers* ſmall, in terminal compound panicles, reddiſh.

Nearly allied to the *Molinæa* of Commerſon and Juſſieu, but the three ſeparate bivalve capſules ſeem, by the figure and deſcription, to render it generically diſtinct.

GUIOLE, La, in *Geography*, a town of France, in the department of the Aveyron, and chief place of a canton, in the diſtrict of Eſpalion; 24 miles N.N.E. of Rhodez. The place contains 1973, and the canton 5176 inhabitants, on a territory of 222½ kiliometres, in 9 communes.

GUIOMERE, a kingdom or country of Africa, on the Ivory coaſt, near cape Apollonia, having narrow limits towards the ſea, but extending itſelf towards the inland parts: it is rich and populous, furniſhes conſiderable quantities of gold and ivory, and afforded formerly, by perpetual wars, a plentiful market of ſlaves.

GUIPUSCOA, a diſtrict of the province of Biſcay, in Spain, of a triangular form, and ſo mountainous, that it may be conſidered as one continued mountain. It is bounded on the N. by the bay of Biſcay, and the gulf of Gaſcony; on the E. by Navarre and Lower Navarre, in France; on the S. and S.E. by Alava, and on the W. by the country of the Four Towns, which is long and narrow, incloſed between the lordſhips of Biſcay, Guipuſcoa, Old Caſtile, and Alava, and which ſeparates Guipuſcoa from Biſcay Proper. It is 18 leagues from W. to E., and 12 from N. to S. Its capital is Toloſa, and its other towns are Vergara, Placencia, Fontarabia, and St. Sebaſtian. The coaſt of this diſtrict, or province, is about 10 leagues in extent, in which are three principal parts, *viz.* Fontarabia, Los Peſages, and St. Sebaſtian. Its chief rivers are, the Bidazoa, the Deva, the Urola, the Oria, the Uramea, and the Araxes; and, like Alava, it is watered by a great number of ſtreams and brooks:. the Zaraya divides theſe two diſtricts. Guipuſcova enjoys the ſame privileges as the lordſhip of Biſcay, except, that, as frontier of the kingdom, it receives garriſons, and is defended by fortified towns. It was independent of the crown of Caſtile till the year 1200, when, of its own accord, it ſubjected itſelf to Alphonſo VIII. The inhabitants of this country have always made their own laws; and there are extant treaties concluded between them and foreigners, relative to war and peace. Their two principal privileges are; 1ſt, that of the voluntary tax, or gratuitous gift, which amounts annually to 31,250*l.*; 2dly, of not being liable to the quintos, a levy of men, by which the crown of Spain claims one out of every five.

The climate of Guipuſcoa is tolerably mild and temperate, on account of the ſea-breeze which refreſhes the air in ſummer, and ſoftens it in winter. The wheat produced in this country is not ſufficient for the conſumption of its inhabitants. Grapes have degenerated; but there are orchards of apples which yield very good cyder. Foreſts and woods abound; ſuch as oaks, beach, cheſnuts, aſh, walnut, poplar, elm, and lime. Where theſe trees do not prevent, the land is every where cultivated, and produces pulſe, maize, turnips, flax, &c. The cultivation of trees is well underſtood and much practiſed in this country. There are fifteen iron forges in this diſtrict. The commercial company eſtabliſhed at Sebaſtian by Philip V. in 1728, under the names of Caraccas and Guipuſcoa, has done infinite ſervice, by procuring for Spain an important branch of trade, which was in the hands of the Dutch. This company, however, was ill-managed, and ſuſtained a conſiderable loſs at the commencement of the war between England and America, in conſequence of which it ſunk, and was depreſſed.

GUIR, a river of Fez, which runs into the Atlantic; N. lat. 33° 45′.

GUIRACA, a ſea-port of South America, in the province of St. Martha; 15 miles E. of St. Martha.

GUIRA-ACANTAGARA, in *Ornithology*, the name of a Braſilian bird of the wood-pecker kind, and of the ſize of our large ſpotted wood-pecker. See Cuculus *Guira*.

GUIRA-BERABA. See Motacilla *Guira*.

GUIRACENOIA. See Tanagra *Braſilienſis*.

GUIRACOEREBA. See Certhia *Cyanea*.

GUIRA-GUAINUMBI. See Ramphastos *Momota*.

GUIRANHEEMGATA. See Emberiza *Braſilienſis*, and Tanagra *Violacea*.

GUIRA-PEREAOTU. See Tanagra *Flava*.

GUIRAPUNGA. See Ampelis *Variegata*.

GUIRAQUEREA. See Caprimulgus *Jamaicenſis*, and *Torquatus*.

GUIRARU-NHAENGETA. See Lanius *Nengeta*.

GUIRATANGEIMA. See Oriolus *Icterus*.

GUIRATINGA. See Heron.

GUIRATIRICA. See Loxia *Dominica*.

GUIRAUPIAGARA, in *Zoology*, the name of a ſpecies of ſerpent found in America, and ſo called from its love of eggs, the word expreſſing a devourer of eggs. It is a long ſlender ſnake, black on the back, and yellow on the belly; it is a great climber of trees, and rolls about among their upper branches, as ſwiftly as if ſwimming in water; it is a great enemy to birds, deſtroying vaſt quantities of their eggs. Ray's Syn. Animal. p. 329.

GUIRGHIN, in *Geography*, a town of Africa, in the kingdom of Fonia. N. lat. 12° 15′. W. long. 16°.

GUIRON. See Giron.

GUISA, in *Geography*, a town of the iſland of Cuba; 35 miles N. of Trinidad.

GUISARD, Peter, in *Biography*, a phyſician, was born in 1700, in the neighbourhood of Montpellier, and educated in the Proteſtant religion. He contended, with great credit, for one of two vacant profeſſorſhips at that place in 1731, but was unſucceſsful. He afterwards had the offer of the chair of Dr. Marcot, who was called to court; but it was neceſſary that the profeſſor who held it ſhould be a Roman Catholic. On this condition he declined it; but having ſeriouſly examined the tenets of that religion, he afterwards embraced it. He then went to Paris, where he practiſed with great reputation; but his love for his country induced him to return to Montpellier, where he died on the 17th of September, 1746, in the 46th year of his age. He left three works, *viz.* "Quæſtiones Medico-Chirurgicæ duodecim pro Cathedra regia vacante," Montpel. 1731. "Practique de Chirurgie, ou Hiſtoire des Plaies, &c." 1733; and laſtly, "Eſſai ſur les Maladies Veneriennes," 1741. Eloy. Dict.

GUISCARD, Robert, duke of Apulia and Calabria, the ſeventh ſon of Tancred, a gentleman of Lower Normandy, was born towards the commencement of the 11th century, and was diſtinguiſhed amidſt a family of warriors by his vigorous and enterpriſing ſpirit in the exerciſes of the camp. His elder brothers had all paſſed into Italy, and by their merit had attained the dignity of chiefs. Robert, as deſirous of fame as any one of them, followed their ſteps, croſſed the Alps as a pilgrim, and raiſed a band of ſoldiers from the adventurers of Italy. His early ſucceſſes againſt the Greeks and natives of Calabria, cauſed a number of Norman volunteers to flock to his ſtandard. He, by his own influence, procured his elevation to the dignity of count and general of the military republic. He proceeded in the conqueſt of Calabria; but, in conſequence of ſome exceſſes, incurred papal excommunication. The breach was ſoon healed, and Nicholas II. inveſted him with Apulia and Calabria, and all the lands in Italy and Sicily, which he could conquer from the Greeks or Saracens. About this period, Robert aſſumed the title of duke of Apulia, Calabria, and afterwards of Sicily. He employed great vigour and activity in reducing the maritime cities which held out for the Greeks, and at length made himſelf maſter of almoſt the whole that conſtitutes the modern kingdom of Naples. In 1081 he invaded the Eaſtern empire, but underwent many loſſes from ſhipwreck and the enemy; and his ſon Bohemond, who commanded the naval force, was defeated by a Venetian fleet. Under theſe difficulties, the emperor Alexius Comnenus marched againſt him with an army greatly ſuperior in numbers. Robert, however, gained the battle of Durazzo, and the town ſurrendered. In this engagement, Robert's wife, Gaita, daughter of the prince of Salerno, fought by his ſide. The emperor, Henry IV., who had marched towards Apulia to make a diverſion in favour of Alexius, afterwards turned his arms againſt pope Gregory VII., and making himſelf maſter of Rome, inveſted the pontiff in the caſtle of St. Angelo. Robert, conſidering himſelf a vaſſal of the holy Roman ſee, marched, in 1084, to his relief; but the emperor, dreading the terror of his name, did not venture to wait his approach. Robert liberated the pope, who accompanied his deliverer back to Salerno, where he died. In the cloſe of the ſame year he made a ſecond expedition into Greece, and defeated the united fleets of the Greeks and Venetians in three engagements. He next turned his arms againſt the maritime parts of Greece, and the adjoining iſlands, but an epidemic diſorder ſtopt his career, and he died in the iſland of Cephalonia, July 1085. He was, as we have ſeen, a perſon of great civil and military talents, brave and politic; hence he obtained the ſurname Guiſcard, from a word ſignifying craft or prudence in the Norman dialect. According to his biographers his ambition was but little tempered either with humanity or a ſenſe of juſtice: he purſued his own aggrandizement with ſteady ſteps. He was affable, and courteous to his companions in arms, plain in his dreſs and manners, rapacious in acquiring wealth, and liberal in beſtowing it.

Guiscard, in *Geography*, a town of France, in the department of the Oiſe, and chief place of a canton, in the diſtrict of Compiegne; 5 miles N. of Noyon. The place contains 1287, and the canton 9436 inhabitants, on a territory of 187½ kiliometres, in 26 communes.

GUISCHARD, Charles Gottlieb, in *Biography*, called Quintus Icilius, was born at Magdeburg, where his father was a chief magiſtrate. Having completed the elementary parts of his education, he ſtudied at the univerſities of Halle, Marpurg, and Leyden, where he applied to the claſſics, theology, and the oriental languages. By the intereſt of the ſtadtholder, he was appointed enſign in a regiment in the ſervice of the United Provinces, and in 1751 he was promoted to a company. Encouraged by the prince, whoſe patronage he expected, he reſolved to diſtinguiſh himſelf by ſome literary labour, and began to collect and prepare materials for his "Memoirs Militaires ſur les Grecs et les Romans." In conſequence of this undertaking he obtained permiſſion to viſit England, where he remained a year, and brought the work to a concluſion. In the mean time, the ſtadtholder died, and with a view of obtaining the favour of his ſucceſſor William V., he dedicated his memoirs to him. They were publiſhed in two volumes quarto, were received with much approbation, and went through five editions in France and Holland. In 1757 he entered as a volunteer in the allied army, acquired the eſteem of Ferdinand of Brunſwick, and was recommended to the notice of Frederic II. of Pruſſia, who ſent for him to Sileſia, kept him near his perſon, and often converſed with him on the art of war, as practiſed by the ancient Greeks and Romans. On account of his great knowledge on this ſubject, he was ſo highly eſteemed, that the king gave him the name of Quintus Icilius, the commander of Cæſar's tenth legion, when he appointed him to the command of a regiment formed out of the refuſe of all nations, during the heat of the war. Guiſchard greatly diſtinguiſhed himſelf, and continued till the end of the war to diſcharge, amidſt much danger, the arduous taſks aſſigned him. At the general peace the king retained him at Potſdam, and he was one of the few perſons whom his majeſty admitted into his convivial parties; and to whom he gave the freeſt acceſs to his library and coins, which latter Guiſchard increaſed ſo much, that he valued both at the ſum of a hundred thouſand dollars. His former courſe of life, and the hardſhips to which he had been expoſed by his profeſſion, brought on infirmities, which became ſo painful to him, that he was accuſtomed to compare them to the torture of the rack, and which at length put an end to his exiſtence. He died on the 13th of May, 1775, in the fifty-firſt year of his age. Frederic purchaſed his library of his heirs for the ſum of 12,000 dollars. Beſides the work already mentioned, he was author of "Memoires Critiques et Hiſtoriques ſur pluſieurs Points d'Antiquitès Militaires," in four volumes, octavo. This work is regarded as particularly uſeful to young people in ſtudying ſome of our beſt claſſics, particularly Cæſar's Commentaries.

GUISE, Francis de Lorraine, duke of, was eldeſt ſon of Claude de Lorraine, duke of Guiſe, and was born at the caſtle of Bar, in 1519, and early diſtinguiſhed himſelf in arms. He acquired great glory in the defence of Metz in 1553, againſt the emperor Charles V. He was afterwards declared by Henry II. lieutenant-general of the kingdom, and entruſted with all the authority of the crown. In 1558 he took Calais, which had long been in the hands of the Engliſh, and which had ſerved as an entrance into France, in the wars between the two countries. At the acceſſion of Francis II., whoſe wife, Mary, queen of Scots, was niece to the Guiſes, the duke and his brother the cardinal were placed at the head of the government. At this period the Calviniſts, headed by the prince of Condè, engaged in the conſpiracy of Amboiſe, and its defeat was chiefly owing to the vigilance of the duke of Guiſe, who was lieutenant-general of the kingdom. This victory was not uſed with much moderation, and a great number of executions followed: Condè would unqueſtionably have ſhared the ſame fate, had not the demiſe of the king prevented it. After this event the influence of the Guiſes abated, and they formed only one of three parties, which were balanced by the art of Catharine de Medicis. Liberty of conſcience, and the right of public worſhip according to their own views, were granted to the Calviniſts, a meaſure particularly mortifying to the bigotry of the Guiſes. At this period, the duke was the cauſe of a terrible maſſacre of Proteſtants at Vaſſy, who had aſſembled there for the purpoſes of divine worſhip. When the magiſtrate, who was called before the duke, excuſed himſelf for permitting this religious aſſembly, upon the ground of the edict of toleration, Guiſe, in a rage, clapping his hand to his ſword, exclaimed, "here is what ſhall cut the knot of your deteſtable edict." The maſſacre was a ſignal for civil war, and the duke was the chief on the Catholic ſide, and he was, deſervedly, the principal object of the hatred of the perſecuted Proteſtants. Hiſtory, however, records a fact highly to his honour, but which, it muſt be admitted, little accords with the practice of the duke, or with the principles of the religion, as they were at that time avowed. A fanatic was taken who had formed a plan of aſſaſſinating him. The man was brought before him, and aſked what offence he had given him to excite ſuch an attempt. "No other," replied the enthuſiaſt, "than that of your being the inveterate enemy of my religion." "Well," ſaid the duke, "if thy religion bids thee murder me, mine commands me to forgive thee: judge between them." The victory of Dreux, in 1562, is chiefly aſcribed to Guiſe; in this the prince de Condè was taken priſoner, and, according to the manner of the age, ſhared that night the duke's bed: though they were mortal enemies, the duke ſlept ſoundly all night, while the prince could ſcarcely cloſe his eyes. Not long after this, he was ſhot by a Calviniſt gentleman, as he lay before Orleans. He died February 24, 1563, at the age of forty-four. By writers on his own ſide he is repreſented as the model of true heroiſm, but his good qualities were undoubtedly very much balanced by a furious party-ſpirit, and by an immoderate ambition that brought great evils on his country.

Guise, Henry de Lorraine, duke of, eldeſt ſon of the preceding, born in 1550, was diſtinguiſhed by his great valour, and a ſhot which he received, and which left a great ſcar on his cheek, gave him the name of Balafrè. By his engaging manners he became the idol of the army and people. He at length aſpired to nothing leſs than ſupreme authority; cauſed the revocation of every privilege granted to the Proteſtants, demanded the publication of the decrees of the council of Trent, the eſtabliſhment of the infernal inquiſition, and the ceſſion of ſeveral cautionary towns. He obtained great ſucceſs againſt the Proteſtants, and was regarded by the Catholics with an enthuſiaſtic attachment, as the deliverer of the nation. The party grew inſolent by ſucceſs, and they openly avowed that they would dethrone the king. The ducheſs of Montpenſier, ſiſter to the Guiſes, carried at her girdle a pair of golden ſciſſars, which ſhe did not ſcruple to declare were deſigned to give the king the clerical tonſure, previouſly to ſhutting him up in a convent. In 1588 the ſtates-general of the kingdom were aſſembled at Blois. The demands of the leaguers became more and more audacious, and Henry evidently tottered on the throne. The king now began to concert meaſures to free himſelf of his rival; he is ſaid to have diſtributed with his own hands poignards to choſen men of his guards. Guiſe heard of the plot, and laughed at its impotency; but as he advanced to the preſence chamber, even at the door of the cabinet, in which the king was, he was ſuddenly pierced with many ſtabs. He fell, exclaiming "my God, have mercy on me!" His brother, the cardinal, who had encouraged him in all his ambitious projects, was ſeized and put to death the next day. So bitter was the hatred of their enemies, that they did not reſt contented till they had literally burnt their bodies to aſhes, leſt their adherents ſhould make relics of their remains. He was at his death thirty-eight years of age. He reſembled his father in civil and military qualities, but was much more criminally ambitious. With religion ever in his mouth, his conduct was exceſſively licentious.

Guise, Henry de Lorraine, duke of, grandſon of the preceding, born in 1614, was brought up to the church, and from his connections was provided with much preferment, which he reſigned at the death of his elder brother. Inheriting the qualities of his anceſtor, he entered into a conſpiracy againſt the French government, which being diſcovered before it was ripe for execution, he was obliged to retire to Rome. While in that city he received an application from the Neapolitans, who had revolted from Spain, to come and aſſume the chief command. He readily embarked, and arrived at Naples in November 1647. Here he quickly eſtabliſhed his authority, and marching out of Naples with a ſmall army, he took poſſeſſion of Averſa, and gained ſeveral advantages over the Spaniards. He next eſtabliſhed a regular government, and became exceedingly ſevere and deſpotic in his adminiſtration. He expected to become king of Naples and Sicily, of which the pope had offered the inveſtiture, inſtead of which, he was taken by the enemy, and kept priſoner in Spain four years, when he was ſet at liberty through the interceſſion of the prince of Condè. In 1654 he embarked in a new expedition fitted out by the cardinal Mazarin, for the recovery of Naples, but it was attended with no ſucceſs. After this he was employed at court, obtained the poſt of chief chamberlain, and was the perſon delegated to receive Chriſtina of Sweden on her entrance into France. His manners were now ſo ſoftened down, that he ſhone in the buſineſs of a courtier, but ſome part of his conduct proved that he had little of the principle of true honour in him. He died in 1664. His memoirs on the Neapolitan enterprize were publiſhed in one volume quarto.

Guise, William, an Engliſh divine, was born at Ablead's court, near Glouceſter, in the year 1653. Having laid in a good ſtock of elementary learning, he was entered a commoner of Oriel-college, Oxford, whence he was removed to All-ſouls' college, of which he was choſen fellow. Here he took his degrees, and obtained the reputation of a firſt-rate ſcholar, particularly in Oriental learning. He died at the age of thirty, in the year 1683, of the ſmall pox, before he had ſcarcely begun to apply his vaſt ſtores of knowledge to the public ſervice. His poſthumous work is "Miſnæ Pars; Ordinis primi Zeraim Tituli Septem, Latine

tine vertit et Commentario illuſtravit Gulielmus Guiſius, 1690." The editors of the "Acta Eruditorum," pronounced the author to be a man of profound learning, and an immortal ornament to the univerſity of Oxford. He had, when he died, undertaken an edition of Abulfeda's Geography.

Guise, in *Geography*, a town of France, in the department of the Aiſne, and chief place of a canton, in the diſtrict of Vervins, ſituated on the Oiſe; 20 miles N. of Laon. The place contains 3039, and the canton 13,998 inhabitants, on a territory of 160 kiliometres, in 22 communes.

GUISHDEN, a river of Ireland, in the county of Mayo, which flows into Lough Conn.

GUISO, a town of Japan, in the iſland of Niphon; 10 miles N. E. of Meaco

GUITARRA, Spaniſh; *Guitarre*, Fr.; *Chitarra*, Ital.; *Guitar*, Engl. all derived from *Cithara*, which ſee.

The Spaniſh guitarra is of a much larger ſize than the chitarra of Italy, or the guitarres uſed in France or England. It is ſtrung with bowel-ſtrings, and, in form, it ſeems to have been conſtructed on a ſection of a pumpkin or gourd, to which is adjuſted a belly of deal, and a neck at the upper part of the body of the inſtrument. It has ten frets, dividing each ſtring into ſemitones: of theſe the tenſion muſt be extremely tight round the neck, for fear of their giving way.

The ſtrings are faſtened to a bridge fixed to the lower part of the belly, and ſupported by a nut at the end of the neck. The ſtrings are governed by pegs or metal pins at the back of the neck. The inſtrument had at firſt but four ſtrings, which have ſince been encreaſed to five double ſtrings, of which the three firſt are tuned uniſons, and the fourth and fifth octaves to each other. Sometimes the fifth ſtring has no octave leſt it ſhould overpower the reſt; and the firſt ſtring is ſo often falſe that it is frequently played ſingle.

This inſtrument is tuned and played ſo many different ways, that it muſt be ſtrung according to the pitch and tuning.

In compaſs it is two octaves and a fifth, from A in the firſt ſpace in the baſe, to E in the fourth ſpace in the treble.

The tuning, like that of the lute, is entirely by fourths, except one major third: A D G B E.

The tablature of the guitar in Spain and Portugal is ſtill the ſame as that of the lute; but in moſt other countries, its notation is the ſame as for the harp or pianoforte.

In the ancient tablature, letters of the alphabet, or ciphers, are uſed for the melody and accompaniment. This method, though ancient, is preſerved for the convenience and carriage of the hand, the arrangement of the fingers, the clearneſs of the tone, the harmony and facility of execution. If this inſtrument is not ſtudied as much as the harpſichord or pianoforte, it is hardly poſſible to find the poſitions of the hand with ſufficient readineſs.

In France they uſe the firſt eleven letters of the alphabet, from *a* to *l* upon each ſtring for the ten frets, which produce eleven ſemitones, ſetting off from the open ſtring at the nut, that is, without touching the ſtring with the finger, which is expreſſed by an *a*; the firſt fret by a *b*, and the others ſucceſſively.

Other ſigns are alſo uſed for the fingers of the two hands; that of the left-hand, which is occupied with every part of the neck, is ſemi-circular, thus ⌣, when the notes muſt be played ſmooth in paſſing from note to note, deſcending; and the contrary ⌒, when the notes are to be played ſmooth in aſcending. This is done by letting the fingers fall on the ſtrings with ſpirit and force; ſo that the firſt touch of the ſtring by the end of the finger ſhall produce the ſound. The wavering, unſteady and plaintive tone, produced by the preſſure of the finger, for the continuance of the tone, reſembles what is called a cloſe ſhake on the violin: the ſhakes, beats, and ſhifts to form a moveable nut from fret to fret, will require long practice.

The ſigns for the right hand, which ſerves as a kind of bow, and of which the execution is upon the belly of the guitar, are little ſtraight lines |, or ſemicircles, placed under the letter which ought to be touched with the thumb; the points :.:.: which are placed under thoſe to be touched with the firſt, the ſecond, and third finger, are indications for taking off or keeping on the finger in arpeggios. There are marks for ſweeping the chords upwards, and others downwards. The tails downwards imply ſtriking the notes from top to bottom, and upwards the contrary.

As to the notes expreſſed by the letters placed on the five lines or ſtaff, which are to be pinched or thrummed, they repreſent the five ſtrings of the guitar. When many letters follow each other, of the ſame value, only one note is written for the firſt of them: for example, one quaver or crotchet for the whole bar, and even many bars of which the notes are of the ſame kind, till another note ſucceeds of greater or leſs value. In this reſpect the ſame ſingle characters are uſed as in other muſic, and the ſame reſts, &c.

There are two ways of performing on this inſtrument, either by ſweeping or pinching the ſtrings; many affect one way more than the other; ſome uſe both ways, occaſionally, which is preferable. The moſt extenſive, and the moſt ſuſceptible of execution, is the pinching of the ſtrings. The arpeggios are more harmonious, becauſe all the ſtrings are in vibration; but they muſt be touched very lightly and delicately with the right hand, and with firmneſs, and correct poſition of the left hand, to produce a good effect; for nothing is ſo eaſy as to metamorphoſe this inſtrument, of which the harmony may be rendered ſo ſweet, into a mere kettle.

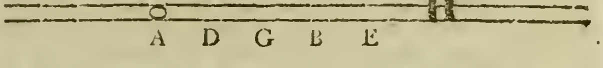
The ſtrings are pinched or thrummed between the roſe and the bridge; but the arpeggios ought to be made between the roſe and the laſt fret of the neck, that is, about the middle of the ſtrings, to avoid the harſhneſs reſulting from the playing too near the bridge, where the ſtrings are more ſtubborn and unmanageable than towards the middle.

Of the Strings.—The choice of ſtrings requires great care, for their ſize, proportions, and truth, eſpecially for the uniſons, of which, if either is falſe, they never can be tuned.

The ſilvered, or whipped ſtrings, have two inconveniences: the one is of wearing out and cutting the frets: the other, ſtill greater, of overpowering the other ſtrings, particularly in ſweeping the chords.

There are indeed chords in which they have a good effect, when they give the fundamental baſe; but as that does not happen very frequently, the ſilvered ſtrings muſt be touched very gently.

The following repreſentation of the neck of the large Spaniſh guitar will ſhew how the inſtrument is tuned.



Obſervations on the Repreſentation of the Neck or Finger-board of the Guitar.—The names of the notes are written on the neck, at the place over which the fingers are to fall, the neareſt to the fret poſſible, but never above the fret. No finger muſt be near the nut marked *a,* becauſe the tone of the open ſtring begins there, and it is by the open ſtrings that the inſtrument is tuned.

In the progreſſion of the octave, by half-notes, no flats appear in the ſcale given, ſharps only being marked to avoid confuſion; but thoſe ſharps would be flats in other keys: beginning, for example, at B♭, and mounting by half-notes, no ſharps would be wanted.

As to the form of the letters uſed as repreſentatives of notes, they are Gothic, particularly 6 and ⌈; and the long letters lean a little to prevent their mixing with each other. This notation is very ancient, and the ſame as that of the lute, 2 or 300 years ago. See MACE. See *Plates* VII. and IX. *on Muſic.*

This guitar is ſuperior in tone, expreſſion, and power, to the common guitar ſtrung with wire. About 45 years ago, ſoon after the conſpiracy at Liſbon, of Malagrida and others, a Portugueſe gentleman, or muſician, with the appearance of a gentleman, of the name of Meneſis, probably involved in the plot, reſided ſome time in London, ſeemingly as a man of faſhion, who performed in a very ſuperior manner on the large Spaniſh guitar ſtrung with cat-gut or bowel-ſtrings. He was ſo great a maſter of the inſtrument, and ſo able a muſician, that he played voluntaries upon it in the ſame full and learned manner of a great performer on the organ; led off ſubjects, purſued them in three and four parts with ſcience and fancy through all the keys of legal modulation; and in ſlow movements, his taſte and expreſſion were equally admirable with the learned and maſterly effuſions of his allegros.

This is not a traditional account, for we were ſo fortunate ourſelves, as to hear him perform at lord Eglington's with lord Kelley, Bach, and Abel, all good judges and ſevere critics.

The common guitar uſed in England has frequently had fits of favour in this country. About 50 years ago, its vogue was ſo great among all ranks of people, as nearly to break all the harpſichord and ſpinet makers, and indeed the harpſichord maſters themſelves. All the ladies diſpoſed of their harpſichords at auctions for one-third of their price, or exchanged them for guitars; till old Kirkman, the harpſichord maker, after almoſt ruining himſelf with buying in his inſtruments, for better times, purchaſed likewiſe ſome cheap guitars and made a preſent of ſeveral to girls in milliners' ſhops, and to ballad ſingers, in the ſtreets, whom he had taught to accompany themſelves, with a few chords and triplets, which ſoon made the ladies aſhamed of their frivolous and vulgar taſte, and return to the harpſichord.

But during the guitar paroxyſm, not a ſong or ballad was printed, without its being tranſpoſed, and ſet for that inſtrument, at the bottom of the page; as in the beginning of the laſt century was done for the common flute. The old tablature, however, was thrown aſide, and the ſame notation adopted for the guitar as for other inſtruments; but confined to the key of C natural, except by Marella, a good player on the inſtrument, and not a bad compoſer, who tuned and taught the guitar in the key of A major.

It is difficult to trace the origin of the guitar. The reſt of Europe had it from the Spaniards, to whom it was probably brought by the Moors. It is, however, the general opinion in Spain, that it is as ancient as the harp. Either through reſpect for this opinion, or from the ſweet reverie which it inſpires, being congenial with the national, tender, gallant, diſcreet, and melancholy character; whether, in ſhort, the ſilence of the beautiful nights in Spain, when the inhabitants are moſt alert and active, is moſt favourable to its mild and dulcet harmony, we know not; but it is eſtabliſhed there as a national inſtrument. It has had the ſame ſucceſs among the Portugueſe and the Italians; and ſeems to have been at all times the favourite inſtrument of warm climates: it is ſo portable, and graceful of carriage, that ſerenaders, nocturnal revellers, and day-break lovers, prefer it to all other tuneful interpreters of paſſion.

The Portugueſe having loſt a battle, 14,000 guitars were found on the field of battle. Menagiana. tom. 1.

The tone of this inſtrument is ſo ſoft and ſolemn, that the moſt profound ſilence is neceſſary for its refinements and delicacy to be enjoyed. Only the coarſer part of the inſtrument can be heard through the leaſt noiſe.

It is made to be heard alone, or with a voice. It is unfit for a concert, and has therefore given way to the lute and theorbo, as theſe have ſince done to more powerful inſtruments.

In France, ſome lovers of muſic revived, a few years ago, the paſſion for this inſtrument, which was in great vogue there in Louis XIVth's time; and was a very ſociable companion of French vandevilles, paſtorials, and brunettes, of which, ſays M. Laborde, it augments the charms.

GUITGUIT, in *Ornithology*. See CERTHIA.

GUITRES, in *Geography,* a town of France, in the department of the Gironde, and chief place of a canton, in the diſtrict of Libourne; eight miles N. of Libourne. The place contains 933, and the canton 10,169 inhabitants, on a territory of 202½ kiliometres, in 13 communes.

GUITTONE D'AREZZO, FRA, in *Biography*, an Italian poet of the thirteenth century, was a native of the place whence he takes his name. He was a brother of the military order of the Virgin Mary, and poſſeſſed a ſufficient ſtock of piety to become the founder of a monaſtery in Florence. His poems were in great eſteem, and he is ſaid to have been the firſt who gave regularity to the Italian ſonnet. His poems are to be met with in ſeveral collections of ancient poetry. Forty of his letters were publiſhed by Bottari, at Rome, in 1745. He died in the year 1299.

GUJURAT, or GUJERAT, in *Geography*, a town of Hindooſtan, in the ſoubah of Lahore; 50 miles N. of Lahore. N. lat. 32° 37′. E. long. 73° 25′.

GUIZARRA, a town of Africa, in Barca; 20 miles E. of Augela.

GULA, in *Anatomy*, the œſophagus or gullet; that conduit by which animals take down food into the ſtomach.

GULÆ *Vaginalis.* See VAGINALIS.

GULA, in *Architecture*, the neck of the capital of a column; alſo the wavy member called cymatium or ogee. In a horizontal moulding, when the greateſt projection is the concave part, it is called a cima-recta, and when the greateſt projection is the convex part, it is called a cima-reverſa. See the articles CYMATIUM, CIMA-RECTA, CIMA-REVERSA, and OGEE.

GULAMBER, in *Geography*, a town of Curdiſtan; 30 miles N.W. of Sherezur.

GULAMERICK, a town of Curdiſtan; 60 miles S.S.W. of Van.

GULANNESS, a cape on the coaſt of Scotland, the ſoutherly point where the Frith of Forth enters the German ſea, as Fifeneſs forms the northerly. N. lat. 56° 5′. W. long. 2° 44′.

GULASISI, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to a very ſmall and very beautiful ſpecies of parrot.

GULBE, in *Architecture*, the ſame as gorge.

GULDENSTEIN, in *Geography*, a town of Denmark, in the iſland of Funen.—Alſo, a town of the duchy of Holſtein; 20 miles S.S.W. of Oldeburg.

GULE *of Auguſt*, the day of St. Peter *ad vincula*, which is celebrated on the firſt of Auguſt.

It is called the gule of Auguſt, from the Latin *gula, a throat*, for this reaſon, that one Quirinus, a tribune, having a daughter that had a diſeaſe in her throat, went to pope Alexander, the ſixth from St. Peter, and deſired of him to ſee the chains that St. Peter was chained with under Nero, which requeſt being granted, and ſhe, kiſſing the chains, was cured of her diſeaſe: whereupon the pope inſtituted this feaſt in honour of St. Peter, and, as before, this day was termed only the calends of Auguſt; it was on this occaſion called indifferently either the day of St. Peter *ad vincula*, from what wrought the miracle; or the gule of Auguſt, from that part of the virgin whereon it was wrought.

Gules, in *Heraldry*, ſignifies the colour of red.

The word is French *gueules*, which Fa. Moued derives from the Hebrew *glud* or *guludid*, a reddiſh pellicle or ſkin appearing on a wound when it begins to heal; but F. Meneſtrier reproaches him, that there were no ſuch words in the Hebrew tongue. This, however, is not ſtrictly true: all the eaſtern languages, the Hebrew, Chaldee, Syriac, and Arabs, ſay, גלד, *gheld*, for *cutis*, *pellis*: whence the Arabic *gulud*: and in the general, the word *gules* ſignifies *red*, among moſt of the oriental nations: the Arabs and Perſians give the name to the roſe. Others, with Nicod, derive the name *gules* from *gula*, the throats of animals being generally red; or from the Latin *cuſculium*, which is the κοκκος of the Greeks, or ſcarlet grain.

The ſame colour, in the coats of noblemen, is by ſome called *ruby*, and in thoſe of ſovereign princes, *Mars*; but this is no ſtanding practice.

In engraving, gules is expreſſed by perpendicular ſtrokes drawn from the top of the eſcutcheon to the bottom; it is alſo marked with the letter G.

This colour is reputed a ſymbol of charity, valour, hardineſs, generoſity; and repreſents blood-colour, cinnabar, and true ſcarlet. It is the firſt of all colours uſed in armoury; and is of that account, that anciently it was prohibited any perſon to wear gules in his coat-armour, unleſs he were a prince, or had permiſſion from the prince.

Spelman, in his Aſpilogia, ſays, that this colour was particularly honoured by the Romans, as it had been before by the Trojans; and that they painted the bodies of their gods, and of their generals that triumphed, with vermilion. Under the conſuls, the Roman ſoldiers wore red, whence they were denominated *ruſſati*. Joan. de Bado Aureo adds, that the red dye, which the Greeks call *Phœnician*, and we *ſcarlet*, was firſt uſed by the Romans, to prevent ſeeing the blood iſſue from wounds in fight.

In effect, gules has always been eſteemed an imperial colour: the emperors were cloathed, ſhod, and had their apartments furniſhed with red; their edicts, diſpatches, ſignatures, and ſeals, were of red ink and red wax, whence the name *rubrics*.

GULF, or Gulph, in *Geography*, an arm or part of the ocean, running up within the land, and forming a capacious bay between two promontories.

The word comes from the French *golfe*, and that from the Italian *golfo*, which ſignify the ſame. Some deduce theſe farther, from the Greek κολπος; which Guichart again derives from the Hebrew גאב, *gob*: Du Cange derives them from the barbarous Latin *gulfum* or *gulfus*, which ſignify the ſame thing.

Such is the gulf of Venice, called alſo the Adriatic ſea; the gulf of Conſtantinople, called the Black ſea; the gulf of Perſia, called the Red ſea; the gulf of Lyons; the gulf of Sidra, near Barbary; the gulf of Mexico, of St. Lawrence, of California; the gulf of Bengal, and thoſe of Cochinchina and Kamtſchatka.

A gulf is ſtrictly diſtinguiſhed from a *ſea*, becauſe the latter is larger; from a *bay* or ſinus it is again diſtinguiſhed, by its being greater than the ſame.

Some will have it eſſential to a gulf, to run into the land through a ſtrait or narrow paſſage.

The ſea is always moſt dangerous near gulfs, becauſe of the currents being penned up by the ſhores.

Gulf, or Gulph, in *Mining*, is one of thoſe numerous appellations in different places, for a fiſſure or *Fault*, ſee that article. Ground that is broken, ſoft and mixed, is ſaid to be *gulfy*.

Gulf, or *Trough*, is applied to the ſunk pieces of ſtrata between two parallel faults, which ſometimes occur, and are called gulfs of that ſubſtance or ſtratum which happens to occupy the ſurface of the ſunk piece; or if the ſtrata are wholly ſunk, and gravel occupies the place of what would otherwiſe have been a deep chaſm or a lake, it is called a gravel gulf.

A remarkable ſhale gulf occurs in the town of Buxton in Derbyſhire, extending from the brook ſouthward, up to Dr. Buxton's houſe; theſe faults, and the great one in which they terminate, that bounds all the great Derbyſhire limeſtone tract, on the north-weſt and ſouth, clearly occaſion the hot ſprings of this place. Another remarkable ſhale gulf occurs in the limeſtone north-eaſt of Wirkſworth town, which is of conſiderable length and depreſſion, and formerly ſeems to have occaſioned hot ſprings here, before the mine-ſoughs entirely diverted the courſes of the ſprings in all this diſtrict. A more remarkable ſhale gulf than either of the former, occurs on the north of Dowal in Hartington, entirely ſurrounded by four lime-ſtone hills of conſiderable height, (ſee ſection in Phil. Mag. plate 2. vol. xxxi.), having ſhake-holes and ſwallows around it, which clearly point out the line of fault, which ſurrounds this piece of ſhale, with its inferior ſtrata, about a mile long and a furlong wide, and has depreſſed, or ſunk it, about 5 or 600 yards at the leaſt. Dowal is one of the moſt ſurpriſing places, perhaps, in all England.

Gulf *of Florida*. See Bahama *Straits*.

Gulf *Stream*, a remarkable current in the ocean, which runs along the coaſt, at unequal diſtances from Cape Florida to the iſle of Sables and the banks of Newfoundland, where it turns off and runs through the Weſtern iſlands; thence to the coaſt of Africa, and along that coaſt in a ſouthern direction, till it arrives at, and ſupplies the place of thoſe waters, carried by the conſtant trade winds from the coaſt of Africa towards the W., thus producing a conſtant circulating current. This ſtream is about 75 miles from the ſhores of the ſouthern ſtates, and the diſtance increaſes as you proceed northward. The breadth of it is about 40 or 50 miles, widening towards the north. Its common rapidity is three miles an hour. A north-eaſt wind narrows the ſtream, renders it more rapid, and drives it nearer the coaſt. North-weſt and weſt winds produce a contrary effect. The gulf ſtream is ſuppoſed to be occaſioned by the trade winds that are conſtantly driving the water to the weſtward, which, being compreſſed in the gulf of Mexico, finds a paſſage between Florida and the Bahama iſlands, and runs to the north-eaſt along the American coaſt. This hypotheſis is confirmed by another fact: it is ſaid, that the water in the gulf of Mexico is many yards higher than the weſtern ſide of the continent in the Pacific ocean. It is highly probable that the ſand carried down by great rivers into bays, and the current out of theſe bays meeting with the gulf ſtream, by their eddies, have formed Nantucket ſhoals, cape Cod, George's bank, the iſland of Sable, &c. Skilful navigators, who have acquired a knowledge of the extent to which this ſtream reaches on the New England coaſt, have learnt in their voyages from Europe to New England, New York, or Pennſylvania, to paſs the banks of Newfoundland, in about 44° or 45° N. lat., to ſail thence in a courſe between the northern edge of the gulf ſtream and the ſhoals and banks of Sable iſland, George's bank, and Nantucket, by which they make better and quicker voyages to America. It is obſerved by Mr. Rennell (Phil. Tranſ. vol. lxxxiii. p. 2.) that ſome currents, after being projected into the ſea, never again approach the ſhore; but preſerve, to a very great diſtance, nearly the direction in which they were projected, as well as a conſiderable degree of their original velocity, and temperature. The gulf ſtream, he ſays, is a wonderful inſtance of this kind; which originating in a body of *pent-up* waters, in the gulf of Mexico, is diſcharged with ſuch velocity through the ſtraits of Bahama, that its motion is traceable through the Atlantic, to the banks of Newfoundland; and may poſſibly extend much farther. In a ſimilar manner, he ſays, the current of the bay of Biſcay continues its courſe, which may be about N.W. by W. from the coaſt of France, to the weſtward of Scilly and Iceland. In order to explain the manner in which waters *pent-up* may produce a current, this ingenious writer refers to an experiment of the late Mr. Smeaton. In a canal of about four miles in length, the water was kept up *four inches* higher at one end than at the other, by the mere action of the wind along the canal. The effect of a ſtrong S.W. or N.W. wind, on our own coaſts, is well known; namely, that of raiſing very high tides in the Britiſh channel, or in the Thames, and on the eaſtern coaſts, as theſe winds reſpectively blow: becauſe the water, that is accumulated, cannot eſcape quick enough, by the ſtrait of Dover, to allow of the level being preſerved. Alſo, that the Baltic is kept up *two feet* at leaſt, by a ſtrong N.W. wind of any continuance, and that the Caſpian ſea is higher by *ſeveral* feet, at either end, as a ſtrong northerly or ſoutherly wind prevails. Conſequently, as water pent up, in a ſituation from which it cannot *eſcape*, acquires a higher level, ſo, in a place where it can *eſcape*, the ſame operation produces a current; and this current will extend to a greater or leſs diſtance, according to the force with which it is ſet in motion, or, in other words, according to the height at which it is kept up by the wind. In relation to this ſubject we ſhall further obſerve, that it is perhaps on account of currents that the Red ſea is found to be about 25 feet higher than the Mediterranean; their direction may poſſibly have been ſomewhat changed in the courſe of many ages, and with it the level of the Mediterranean alſo; ſince the floor of the cathedral at Ravenna is now ſeveral feet lower with reſpect to the ſea than it is ſuppoſed to have been formerly, and ſome ſteps have been found in the rock of Malta, apparently intended for aſcending it, which are at preſent under water.

A chart of this gulf-ſtream was publiſhed by Dr. Franklin in 1768, principally from the information of capt. Folger. This was confirmed by the ingenious experiments of Dr. Blagden, publiſhed in 1781, who found that the water of the gulf ſtream was from ſix to eleven degrees warmer than the water of the ſea through which it runs; which muſt have been occaſioned by its being brought from a hotter climate. He aſcribes the origin of this current to the power of the trade-winds, which, blowing always in the ſame direction carry the waters of the Atlantic ocean to the weſtward, till they are ſtopped by the oppoſing continent on the W. of the gulf of Mexico, and are thus accumulated there, and run down the gulf of Florida. (Phil. Tranſ. vol. lxxi. p. 335.) Governor Pownal has given an elegant map of this gulf ſtream, tracing it from the gulf of Florida northward as far as cape Sable in Nova Scotia, between the Canary iſlands and Senegal, increaſing in breadth as it runs, till it occupies five or ſix degrees of latitude. The governor likewiſe aſcribes this current to the force of the trade-winds protruding the waters weſtward, till they are oppoſed by the continent, and accumulated in the gulf of Mexico. He ingeniouſly obſerves, that a great eddy muſt be produced in the Atlantic ocean between this gulf ſtream and the weſterly current produced by the tropical winds, and in this eddy are found the immenſe fields of floating vegetables, called Saragoſa weeds, and Gulf weeds, and ſome light woods, which circulate in theſe vaſt eddies, or are occaſionally driven out of them by the winds. (Hydraulic and Nautical Obſervations by governor Pownal, in 1787.) It is probable, that in proceſs of time, the narrow tract of land on the W. of the gulf of Mexico, may be worn away by this elevation of water daſhing againſt it, by which this immenſe current would ceaſe to exiſt, and a wonderful change take place in the gulf of Mexico and Weſt Indian iſlands, by the ſubſiding of the ſea, which might probably lay all thoſe iſlands into one, or join them to the continent.

Gulf, in *Rural Economy*, a term provincially applied to a mow, or bay-full in a barn.

Gulf *Stead*, the name provincially uſed to a bay or diviſion of a barn. It is ſometimes written *goafſted* and *gaſtead*.

GULFAR, in *Geography*, a town of Portugal, in the province of Beira; 13 miles N.E of Viſeu.

GULISTANI, a town of Perſian Armenia; 25 miles S.E. of Kanja.

GULKIRAS, a town of Aſiatic Turkey, in the government of Sivas; 22 miles from Amaſieh.

GULL, in *Ornithology*. See Larus.

Gull *Iſland*, in *Geography*, a ſmall iſland on the coaſt of Newfoundland, near cape St. John.—Alſo, a ſmall iſland near the coaſt of North Carolina, in Pamlico ſound. N. lat. 35° 28′. W. long. 76° 17′.

GULLABGUNGE, a town of Hindooſtan, in the circar of Bilſah; 15 miles N. of Bilſah.

GULLAPALOOR, a town of Hindooſtan, in the circar of Rajamundry; 30 miles N.E. of Rajamundry.

GULLARY, a town of Hindooſtan, in Viſiapour; 16 miles N.W. of Baddammy.

GULLET. See Œsophagus.

GULLIES, in *Geology*, is a term applied to the narrow, deep, and ſmall vallies formed or deepened by torrents of water on the higher parts of the ſkirts of mountains. (Kirwan's Geo. Eſſays, p. 181.) Sometimes ſuch are called dingles, dumbles, ravines, &c. The gullies frequently preſent very favourable opportunities for examining the ſtratification of a mountain: and after examining theſe, it will be important to examine the vallies into which the gullies empty themſelves, and to note the ſtate of rounding and mixture, which the matters diſplaced by the waters from the gullies have undergone, and the diſtances to which they have been carried downwards: much intereſting information on which ſubject, will be found in M. De Luc's Elementary Treatiſe on Geology, page 90 to 107.

GULLIES, in *Engineery*, is a name in ſome places for the iron tram-plates or rails laid for the uſe of tram-waggons.

GULLIPANAIG, in *Geography*, a town of Hindooſtan, in the Carnatic; 28 miles W.S.W. of Madura.

GULMA, a town of Morung; 85 miles E. of Amerpour.

GULNY, a town of Aſia, in the country of Caſhy; 14 miles S.E. of Caſhy.

GULO. See GLUTTON.

GULO, in *Zoology*. See URSUS *Gulo*.

GULOICK, in *Architecture*. See IMPOST.

GULT, in *Geography*, a town of Pruſſia, in the circle of Natangen; nine miles S.S.W. of Lick.

GULUBUR, a town of New Navarre; 125 miles S.S.W. of Caſa Grande.

GULUS, in *Ancient Geography*, a river of Mauritania Cæſarienſis, whoſe mouth is placed by Ptolemy in the gulf of Numidia, between thoſe of Ampſaga and Igilgili.

GULYAVAN, in *Natural Hiſtory*, a name given by the people of the Philippine iſlands to a very beautiful bird, common in that part of the world; it is of the ſize of a turtle-dove, and is very beautifully variegated with black and gold-coloured feathers. It feeds on fruits.

GULZOW, in *Geography*, a town of Hinder Pomerania; 17 miles S.E. of Cummin.

GUM, GUMMI, a mucilaginous or reſinous juice, exuding through the pores of certain plants or trees, chiefly of tropical climates, by natural clefts or artificial inciſions, and hardening on the ſurface, by means of the ſun and air, into tenacious tranſparent maſſes of an irregular form. They are commonly diſtinguſhed into *gum mucilage* and *gum reſin*.

GUM *Mucilage* is characteriſed by the following eſſential chemical properties: it is inſipid, diſſoluble in water, forming with it a viſcid tranſparent fluid; but not diſſoluble in alcohol, not coagulated by heat, nor cryſtallizable; but after the aqueous ſolution has been evaporated to dryneſs, it is again ſoluble in water without ſeeming to have undergone any material change. When kept for ſome time it is ſlowly altered, and becomes mouldy and ſomewhat ſour. By being heated to ignition it ſwells and ſoftens, aſſumes a yellow, brown, and black colour, exhales a denſe vapour of a pungent acid ſmell, and burns with much flame: at length a ſoft ſpungy coal remains.

The pureſt of the gum-mucilages is gum arabic or Senegal: and ſimilar to this, but inferior in quality, is the amber-coloured gum that oozes from cracks in plum, peach, apricot, pear, cherry, and other fruit trees; and which may alſo be obtained from ſeveral plants, ſuch as the lichens, the leaves of the comfrey, and mullein, the root of the hare-bell, and the whole plant of the marſh-mallow, by ſimple decoction and evaporation to dryneſs. In order to obtain gum from the lichen, a well known moſs, that grows abundantly on foreſt and fruit trees, and in the north of Europe and America, growing to the length of a foot or more, gives food to deer and other animals, lord Dundonald gives the following directions. (Phil. Mag. vol. x.) Below the ſkin of the lichen is a green reſinous ſubſtance, and the reſidue of the plant conſiſts chiefly of gum and of fibrous matter, which is not acted upon by water. In order to ſeparate the ſkin and reſinous matter, the plant muſt be ſcalded two or three times with boiling water, which cauſes the ſkin to crack, ſwell, and peel off. It is then to be put into a boiler, containing about three quarts of water for every pound of the plant, and about half an ounce of potaſh or ſoda, which aſſiſts the extraction; and the boiling ſhould be continued till the liquor acquires a conſiderable degree of gummy conſiſtence. The liquor is next to be ſtrained from the plant, and freſh water added to the ſame material, for the purpoſe of further exhauſting the gum. The ſeveral liquors, after having been allowed to ſettle, and the drugs being removed, are to be boiled down in a regulated heat to the conſiſtence requiſite for uſe, but not further, leſt it ſhould burn and become coloured. Two or three boilings are neceſſary entirely to exhauſt the lichen of its mucilage. Another ſpecies of native mucilage is *gum* TRAGACANTH; which ſee. See MUCILAGE, and *gum* ARABIC.

GUM *Reſins* are the juices which flow from many kinds of trees, and which become concrete by the evaporation of their fineſt fluid parts, nearly in their natural ſtate, and retaining for a conſiderable time the ſenſible properties of ſmell and taſte. They combine, as their name imports, the diſtinguiſhing properties of *gum* and *reſin*; and therefore gum-reſins are not perfectly ſoluble either by water, by oils, or by ſpirit of wine ſingly: a kind of ſolution is effected by the aid of trituration, *e. gr.* in water; but the reſinous part remains ſuſpended, and forms a kind of emulſion, being divided but not diſſolved, whilſt the gummy part is entirely ſoluble in water, and forms a mucilage with it. The reſinous part gives them the property of burning with much flame, melting in drops by the heat; and the gummy part, their partial ſolubility in water. For the complete ſolution of a gum-reſin, the reſinous part muſt be ſeparated from the gummy part, by applying alternately a ſpirituous and watery menſtruum. The clear liquor remaining, when the gum-reſin has ſubſided, always retains ſome of the taſte and ſmell of the ſubſtance employed. All gum-reſins are combined of ſubſtances not mutually ſoluble by each other, and therefore the compound bodies reſulting from their mixture muſt be opaque: all thoſe concrete juices that are not evidently tranſparent, may, from hence, be reaſonably ſuſpected, to be of a gummy reſinous nature; ſuch are *myrrh*, *galbanum*, *olibanum*, *ammoniacum*, *ſagapenum*, *opopanax*, *aſſa-fœtida*, &c. See RESINS. Some of the gum reſinous juices are mixed with a kind of extract (ſee EXTRACT), or a coloured and bitter ſubſtance, ſoluble in water and alcohol; and alſo tan (ſee TAN) is very commonly united to them. It is obſerved, upon the whole, that the term gum-reſin is more properly a pharmaceutical than a chemical diſtinction.

Gum-reſins, for medical purpoſes, ſhould be rendered pure, by boiling them in water until they ſoften, and then paſſed through a hempen cloth; afterwards let them be ſet by, that the reſinous part may ſubſide. Pour off and evaporate the ſupernatant ſolution by a water-bath, and towards the end of the inſpiſſation mix intimately the reſinous part with the gummy. Thoſe which melt eaſily may be purified by putting them into an ox-bladder, and holding them in boiling water, until they become ſoft enough to be ſeparated from their impurities by preſſure through a hempen cloth.

Dr. Pringle, in his Obſervations on the Diſeaſes of the Army, tells us that gums are all powerful antiſeptics.

Theophraſtus ſpeaks of a way of multiplying plants, performed *per lachrymas*, by means of the gum or reſin; but Agricola takes this to be only practicable where there are ſeeds accidentially fallen into the gum.

GUM *Aloes*. See ALOES.

GUM *Ammoniac*. See AMMONIAC.

GUM *Anime*. See ANIME.

GUM *Apples*, in Languedoc, and ſome other parts of France. The juice of apples will ſometimes exſudate through their rind, and congeal all about them in form of a clear white gum, hard like ice, becauſe of its being ſoon dried in the ſun into a thin cake. The people call ſuch an apple *pomme gelée*, or a *frozen apple*. It is very common to ſee apples covered in part with this gum in ſeveral ſpecks; but it is more rare to meet with them wholly ſo. The gum is inſipid to the taſte.

We have one plant cultivated in ſome gardens, which yields in the heat of ſummer ſuch another white, icy, and taſteleſs gum. This is the common rhubarb, of the ſtalks of the leaves of which tarts are made. The ribs of the larger leaves of this plant, in June and July, are covered with large tranſparent drops of this gum, and an ounce of it may be ſometimes collected from a ſingle plant. Philoſ. Tranſ. N 224.

The common plums and ſloes in our hedges alſo afford the ſame clear and taſteleſs white gum. If they are wounded on purpoſe for it, they uſually throw more or leſs of it out at the wound; but this is after ſome time, and is not in ſo large a quantity as what they naturally throw out. The common laurel alſo affords a little tranſparent, white, and taſteleſs gum of no ill effect, though its leaves are poiſonous. And it ſeems, upon the whole, that this clear juice is not peculiar to apples, or to two or three plants only; but that a great number, even moſt of them, do contain it, if we knew by what means to get it from them.

GUM *Arabic*. See ARABIC.

GUM *Aſſa-fœtida*. See ASSA-*fœtida*.

GUM *Bdellium*. See BDELLIUM.

GUM *Boils*. See *Diſeaſes of the* GUMS.

GUM *Copal*. See COPAL.

GUM *Elemi*. See ELEMI.

GUM *Euphorbium*. See EUPHORBIUM.

GUM *Guaiacum*. See GUAIACUM.

GUM *Gutta*, or *gutta gamba*, or *ghitta gemou*, popularly *gamboge*. See GAMBOGE.

GUM *Lac*. See LACCA.

GUM *Manna*. See MANNA.

GUM *Maſtic*. See MASTIC.

GUM *Myrrh*. See MYRRH.

GUM *Opium*. See OPIUM.

GUM *Opopanax*. See OPOPANAX.

GUM *Sagapenum*. See SAGAPENUM.

GUM *Sandarach*. See SANDARACH.

GUM *Sanguis draconis*. See DRAGON's *blood*.

GUM *Scammony*. See SCAMMONY.

GUM *Seneca*, or *Senega*, is the gum ordinarily ſold by the druggiſts for gum Arabic, which it reſembles very nearly both as to form and virtue. It is either white, bordering on yellow, or of a deep amber colour, tranſparent, &c. It oozes out of a prickly ſhrub common enough in Africa, and of the ſame genus with that which affords the gum Arabic. The greater part of this gum is in larger and darker-coloured maſſes than the Arabic, and not ſmooth like it, but tough on the outſide. This is ſuppoſed to be the ſtrongeſt and moſt ſubſtantial, and the Arabic the pureſt and fineſt.

The gum Senegal is chiefly employed by the calico-printers, and in other buſineſſes where gums are made uſe of. A proper vehicle for water-colours in painting may be formed by mixing a third or fourth part of the gum Senegal with gum Arabic, for the former dries more ſlowly than the latter, which is ſubject to crack and ſeparate from the cartoon or grounds, on which the colour is laid with it, without ſome ſuch mixture.

The gum is brought to us from Senegal, whence its name. See GUM ARABIC.

GUM *Succory*, in *Botany*. See CHONDRILLA.

GUM, *Sweet*. See LIQUID-AMBER.

GUM *Tacamahaca*. See TACAMAHACA.

GUM *Tragacanth*. See TRAGACANTH.

GUM *Water*. See WATER.

GUM, in *Gardening*, a vegetable diſeaſe incident to fruit-trees of the ſtone kind, diſtinguiſhed by a morbid exudation of gummy matter from the wounded alburnum, or inner bark. It is ſuppoſed by Mr. Forſyth to ariſe from injudicious pruning, from bruiſes, or any injuries received in the wood or bark, which may happen from ſtrokes of the hammer in nailing, from pinching the ſhoots by nailing the ſhreds too tight, or by driving the nails too cloſe to the branches. And it may be occaſioned by leaving the foot-ſtalks of the fruit, or by pruning in ſummer and cutting the ſhoots to ſhort ſtumps, and by injuries ſuſtained by a careleſs application of ladders in nailing and gathering the fruit, &c., but it originates more particularly where large limbs have been lopped or broken off. It may be known before the gum itſelf makes its appearance by the bark at firſt becoming of a browniſh colour, and gradually growing darker, till at laſt the gum begins to ooze out like little bliſters. As ſoon as any of theſe marks are met with, the infected part ſhould be cut out with a ſharp inſtrument, and the compoſition and powder, which he has recommended, applied immediately. In doing this, the gum ſhould be cut out perfectly clean. It may be ſeen oozing out from between the wood and bark, and muſt be followed till the white clean bark and wood is arrived at. And afterwards, if any gum ſhould make its appearance it muſt be ſcraped off; which is beſt done when it is moiſtened with rain, as it can then be ſcraped off eaſily without hurting the bark of the tree. This buſineſs muſt be performed without delay, otherwiſe the diſeaſe will advance with rapidity, and greatly injure the trees or other plants which it may affect.

The ſame author alſo reccommends, that when trees are hollow they ſhould be examined carefully, to ſee whether any grubs have entered the bark and wood, which is known by their perforating the bark; and that where there are any, they ſhould be carefully cut out before the compoſition is applied to the tree.

It has been ſuggeſted by the author of the "Philoſophy of Gardening," that this exudation may, perhaps, be prevented from continuing to flow, by binding on the part, previouſly ſmoothed by a knife, thin ſheet lead, ſuch as tea is wrapped in, in ſuch a manner as to prevent the exudation and the conſequent exhauſtion of the tree. A piece of ſponge, ſoft leather, or Indian rubber, ſhould be bound on under it, till the part is healed. A ſtrong ſolution of green vitriol in water is likewiſe ſuppoſed capable of being uſeful, by being applied to the extremities of the exuding veſſels, and thus ſtimulating them into contraction, and by that means preventing the further diſcharge of this ſubſtance from the tree.

The nice application of a piece of freſh bark, taken from a ſimilar tree of inferior value, kept on by the elaſtic preſſure of a liſt bandage, is alſo ſuggeſted as worthy of being made a trial of in the ſame intention, where it can be done with propriety.

GUMS, *Diſeaſes of*. The gums, in the natural healthy ſtate, are not accounted very ſenſible parts; they may be divided with a lancet without any great deal of pain being occaſioned; and the preſſure of hard ſubſtances againſt them in maſtication is not productive of any injury. When inflamed, however, in conſequence of decayed teeth, a cold, or any other cauſe, they are affected with extreme ſenſibility, ſwell in a conſiderable degree, and cannot be touched, or preſſed, in the ſlighteſt manner, without much ſuffering being excited. We ſee, in the practice of ſurgery, numerous other inſtances in which parts, almoſt deſtitute of ſenſibility in the healthy ſtate, become inſupportably tender when affected with inflammation. The ligaments are naturally almoſt devoid of ſenſation; but in ſeveral diſeaſes of the joints, they are even much more painful than ſome other inflamed parts, which, when ſound, poſſeſs a vaſt deal of ſenſibility. In infancy, during the progreſs of dentition, ſhould there be inflammation of the gums, the ſlighteſt preſſure produces ſo much ſuffering, that children will even refuſe the breaſt, on account of the pain reſulting from the unavoidable preſſure of the nipple. On the contrary, when there is no inflammation, the gums are ſo inſenſible, that young children are pleaſed with ſucking or biting a hard cruſt. In old age, when all the teeth are loſt, the hardneſs and inſenſibility of the gums qualify them for performing the office of the teeth, and biting and bruiſing the food without pain.

Some of the diſeaſes of the gums originate from thoſe of the teeth, while others ariſe in an independent manner, quite unconnected with a diſeaſe of any other neighbouring part,

Of Gum-Boils, or Gum-Biles.—It is noticed by Mr. Hunter, that although ſuppuration cannot eaſily take place, within the cavity of a tooth, yet, it often happens, that the inflammation which extends beyond it is ſo great as to produce ſuppuration in the jaw, at the bottom of the ſocket, where the diſeaſed tooth is, ſo as to form a ſmall abſceſs there, commonly called a gum-bile.

This inflammation is often very conſiderable, eſpecially when the firſt ſuppuration takes place, being frequently more diffuſed than inflammations in other parts, and affecting the whole face.

As in all other abſceſſes the matter makes its own way outward, and ſince it cannot be evacuated through the tooth, it deſtroys the alveolar proceſſes, and tumefies the gum, generally on the forepart, either pointing directly at the root of the tooth, or ſeparating the gum from it. The matter is uſually diſcharged in one of theſe ways, and ſeldom on the inſide of the gum, though the latter occurrence is ſometimes obſerved.

Gum-biles moſtly proceed from an inflammation and ſwelling of the fang of a tooth, while the body of the ſame continues ſound. Sometimes they originate from a diſeaſe in the ſocket, or jaw, which has no connection with the tooth, and only affects it ſecondarily. Upon drawing ſuch teeth, ſays Mr. Hunter, they are generally found diſeaſed at or near the point, being there very rough and irregular, like ulcerating bones. The laſt kind of gum-biles may ariſe altogether from ſuch a cauſe, the appearance on the fang of the tooth being only an effect.

The ſame ſurgeon has explained, that theſe abſceſſes, whether ariſing from the teeth, or the ſockets, always deſtroy the alveolar proceſſes on that ſide where the matter is diſcharged, on which account the tooth is rendered more or leſs looſe. This event may be ſeen in many ſkulls, and alſo frequently in the living ſubject; for, when the alveolar proceſs is deſtroyed, on the outſide of the tooth, if the latter part be moved, the motion may be obſerved under the gum all along the fang.

When theſe abſceſſes have burſt through the gums they often cloſe up, and put on the appearance of being healed; but ſuch as diſcharge themſelves, between the gums and teeth, can never heal up, becauſe the gum cannot unite to the tooth. At certain periods, however, the diſcharge from them diminiſhes, owing to a ſubſidence of the ſuppuration; but, either expoſure to cold, or ſome other accidental cauſe, occaſioning a freſh inflammation, an increaſe of the ſuppuration is the conſequence, and either the old orifice in the gum becomes opened again, or the diſcharge by the ſide of the tooth is augmented. In the latter caſe, Mr. Hunter believes, that the affection is leſs ſevere than in the former, in which freſh ulceration is required for the paſſage of the matter.

Thus a gum-bile goes on for years, healing and opening alternately; the effect of which is, that the alveolar proceſſes are at length abſorbed, and the tooth gets looſer and looſer, till it either drops out, or is extracted.

Moſt probably, in all ſuch caſes, ſays Mr. Hunter, the communication between the cavity of the tooth and the jaw is cut off; yet it keeps in part its lateral attachments, eſpecially when the gum graſps the tooth; but theſe attachments are leſs when the matter paſſes between the gum and the tooth, though ſome of them are ſtill retained, particularly on the ſide oppoſite to the paſſage for the matter.

Gum-biles are eaſily known. Thoſe which open through the gum may be diſtinguiſhed by a ſmall riſing between the arch of the gum and the attachment of the lip. Upon preſſing the gum at the ſide of this point, ſome matter will commonly be obſerved oozing out at the eminence. This eminence ſeldom ſubſides entirely; for even when there is no diſcharge, and the opening is healed over, a ſmall riſing may ſtill be perceived, which ſhews that the gum-bile has been there.

Such gum-biles as diſcharge themſelves between the gum and the tooth, are always diſcovered by preſſing the gum, whereby the matter is forced out, and is ſeen lying in the angle between the gum and the tooth.

Mr. Hunter alſo acquaints us that theſe abſceſſes happen much more frequently in the upper jaw than in the lower, and more frequently to the cuſpidati inciſores and bicuſpides in that jaw than to the molares; ſeldom to the fore-teeth in the lower jaw.

Gum-biles, being generally the conſequence of decayed teeth, are more frequently met with in young and middle-aged perſons than in old; but, according to Mr. Hunter, they are moſt common to the ſhedding teeth, which are moſt liable to decay. A fungus will ſometimes ſhoot out of the orifice of a gum-bile, in conſequence of a luxuriant diſpoſition to form granulations on the inſide of the abſceſs, and the opening being backward to heal. The ſame thing frequently happens in iſſues, where the parts have a diſpoſition to granulate, but have not the power of healing, on account of an extraneous body being kept there. In the preſent caſe the tooth acts as an extraneous body; and, by the ſecretion of matter, the abſceſs is prevented from healing. There is no difference in the treatment of gum-biles, whether they ariſe from a diſeaſed tooth, or a diſeaſe in the ſocket.

When an abſceſs forms round the root of a tooth, the tooth, by loſing its connection with the other parts, loſes every power of union, as it is not endowed with the power of granulating. Hence it becomes an extraneous body, or at leaſt acts here as one, and that of the worſt kind, which, ſays Mr. Hunter, it is not in the power of any operation in the machine to get rid of. This is not the caſe with any other part of the body; for, when any other part becomes dead, the machine has the power of ſeparating it from the living by a proceſs called ſloughing, or exfoliation. (See EXFOLIATION and GANGRENE.) The mortified portion is thrown off, and a cure is effected. But, in the caſe of gum-biles, they can only be cured by the extraction of the tooth; and as this is the laſt reſource, Mr. Hunter obſerves, that every thing ſhould be done to make the parts as eaſy under the diſeaſe as poſſible, ſo that this operation may be poſtponed.

When the abſceſs has burſt through the gum, Mr. Hunter adviſes us to keep the opening from cloſing, with a view of preventing future gatherings. He recommends enlarging the opening, and keeping it enlarged till all the inſide of the abſceſs is ſkinned over, or the aperture in the gum loſes the diſpoſition to cloſe up. This will in a great meaſure prevent any future formation of matter, or at leaſt whatever is formed will find a ready outlet, ſo that no accumulation can happen. The end of the fang, indeed, will be expoſed; but, under ſuch circumſtances, it will not be in a worſe ſituation than when ſoaked in matter.

Mr. Hunter next remarks, that one method of doing this is to open the gum-biles by a crucial inciſion, the full width of the abſceſs, and fill it with lint, which ſhould be dipped in lime water, or a diluted ſolution of lunar cauſtic, made by diſſolving one drachm of the cauſtic in two ounces of diſtilled water; and the wound ſhould be dreſſed very frequently, as it is with difficulty that the dreſſing can be kept in. If this is not ſufficient to keep the wound open, it may be touched with the lunar cauſtic, ſo as to produce a ſlough; and the application may be repeated, if found neceſſary. Some difficulty is experienced in keeping on the dreſſings; but conſtant attention will make up for the inconvenience of ſituation.

Mr. Hunter alſo ſpeaks in favour of touching the ſurface of the abſceſs with the lapis ſepticus, and keeping the lip from coming into contact with the part for one minute, within which ſpace of time the cauſtic will penetrate to the bottom.

The ſurface of the bile ſhould be wiped as dry as poſſible, that the cauſtic may not do miſchief by ſpreading.

It has been a practice to extract the tooth, then file off any diſeaſed part of it, and immediately replace it. This method has often failed, in conſequence of the tooth being introduced into a diſeaſed jaw; but, occaſionally, it has ſucceeded.

When a gum-bile is formed on a back tooth, the treatment, according to Mr. Hunter, need not be ſo nice as when the abſceſs is ſituated upon any of the fore-teeth, becauſe appearances are then of leſs conſequence. Therefore the gum may be ſlit down upon the fang through its whole length, from the opening of the gum-bile to its edge, which proceeding will prevent any future union, while the healing of all the cavity of the abſceſs will prevent any future collection of matter. The wound afterwards reſembles the hare-lip. Hence this practice is not adviſable when the place of the cut would be much in view, as when the abſceſs is ſituated upon any of the fore-teeth. In theſe caſes, when the granulations protrude from the ſmall opening, a cure may be effected in the manner above-mentioned, or the granulations may be cut off with a knife or lancet. However, in general, a permanent cure cannot be thus effected, and the granulations riſe up again. It has been common in theſe caſes to ſlit the gum; but, ſays Mr. Hunter, it is a bad method whenever the defect is in ſight.—Hunter on the Teeth, part 2. ſect. 4.

Excreſcences from the Gum.—In conſequence of bad teeth excreſcences alſo ariſe from the gum, near, or in contact with the teeth which are diſeaſed. In general, ſuch growths may be eaſily removed with a knife, or any other cutting inſtrument which may be found moſt convenient. They will often riſe, in a day or two after the operation, as high as ever; but this newly generated matter generally ſoon dies, and the diſeaſe terminates well. They frequently have ſo much of a cancerous appearance as to deter ſurgeons from meddling with them; but Mr. Hunter believed, that, when they ariſe at once from the gum, and appear to be the only diſeaſed part, they have no malignant diſpoſition. However, this great ſurgeon had ſeen them with very broad baſes when the whole could not be removed, and yet no bad conſequences reſulted from the partial removal of them. In a few years they often riſe again, by which means a great deal of trouble is occaſioned.

After the extirpation it is often neceſſary to apply the actual cautery, in order to ſtop the bleeding; for, as Mr. Hunter obſerves, arteries, going to increaſed parts, are themſelves increaſed, and alſo become diſeaſed, and have not the contractile power of a ſound artery. (See Hiſtory of the Teeth, p. 170, third edit.) Averſe, however, as we are to the uſe of the actual cautery, we ſhould be reluctant to employ it without firſt being aſſured that the preſſure of a doſſil of lint, dipped in ſome ſtrong ſtyptic application, would not anſwer.

Treatment of the Gums in Dentition.—The firſt ſet of teeth, in making their way through the gums, give pain, and produce many other ſymptoms which often prove fatal to children. Mr. Hunter thought that theſe complaints were occaſioned in the following manner: The teeth, when they begin to preſs againſt the gums, irritate them, and commonly give pain. The gums are then affected with heat, ſwelling, redneſs, and other ſymptoms of inflammation. The gum is not cut through by ſimple or mechanical preſſure; but the irritation and conſequent inflammation produce a thinning or waſting of the gum at this part; for, ſays Mr. Hunter, it often happens, that when an extraneous, or a dead ſubſtance, is contained in the body, it produces a deſtruction of the part between it and that part of the ſkin which is neareſt it, and ſeldom of the other parts, excepting thoſe between it and the ſurface of a cavity opening externally, and that by no means ſo frequently. In thoſe caſes there is an abſorption of the ſolids, which are deſtroyed, and not a melting down, or ſolution of them into pus. The teeth are to be looked upon as extraneous bodies, with reſpect to the gum; and, as ſuch, they irritate the inſide of that part in the ſame manner as the pus of an abſceſs, an exfoliating piece of bone, or any other extraneous body, and therefore produce the ſame ſymptoms, excepting only the formation of matter. If, then, theſe ſymptoms attend the cutting of the teeth, there can be no doubt of the propriety of opening the way for them; nor is it ever, as far as Mr. Hunter's experience went, attended with any dangerous conſequence. Hunter on the Teeth, p. 80.

Dentition being a change which begins at a very early age, its ſymptoms are more diffuſed, more general, and more uncertain than thoſe of any diſorder of full-grown people, and they put on the appearance of a great variety of maladies; but theſe ſymptoms, ſays Mr. Hunter, become leſs various and leſs hazardous as the child advances in years. Hence the double teeth of the child, and particularly the ſecond ſet of teeth, or thoſe of the adult, are uſually cut without producing much diſturbance.

Theſe ſymptoms are ſo various in different children, and often in the ſame child, that it is difficult to conceive them to be from the ſame origin, and the varieties ſeem to baffle inveſtigation.

Both local and conſtitutional complaints are excited. Of the firſt kind may be reckoned the pain, which the child expreſſes when it is reſtleſs, uneaſy, rubs its gums, and puts every thing into its mouth. Inflammation, heat, and ſwelling of the gums, and an increaſed flow of the ſaliva, alſo happen.

The conſtitutional complaints are, fever and univerſal convulſion.

What Mr. Hunter termed the *partial* or *local* conſequential ſymptoms, are the moſt various and complicated. Theſe are diarrhœa, coſtiveneſs, loſs of appetite, eruptions on the ſkin, eſpecially on the face and ſcalp, cough, ſhortneſs of breath, with a kind of convulſed reſpiration, ſimilar to what is obſerved in the hooping cough, ſpaſms of particular parts, either by intervals or continued, an increaſed ſecretion of urine, and ſometimes a diminution of that ſecretion, a diſcharge of matter from the penis, with difficulty and pain in making water, imitating exactly a violent gonorrhœa.

The lymphatic glands of the neck are apt to ſwell; and when the child has a tendency to ſcrofula, the irritation will promote the origin of this laſt diſtemper.

With regard to the cure of the diſeaſes ariſing from dentition, it can only be temporary and local, even when directed to the real ſeat of the diſorder; and certainly, ſays Mr. Hunter, every method of cure which is not ſo directed, muſt prove ineffectual, as it can only operate by deſtroying the effect. Opiates, indeed, will in ſome degree take off the irritation, by deſtroying the ſenſibility of the part. But ſurely it would be better to remove the cauſe at once, than to endeavour from time to time to remove or palliate the effect. Mr. Hunter obſerves, that, when the ſympathy is partial, and not in a vital part, it would be better to allow it to continue than cure it, becauſe it might by ſuch means be rendered univerſal. For inſtance, ſays he, if it is a diarrhœa, the beſt way is to allow it to go on, or at leaſt only correct it if too violent, which is often the caſe.

Sometimes the ſtomach and inteſtines ſympathize ſo much as almoſt to threaten death, the ſmall quantity of nouriſhment which the ſtomach is capable of receiving being hurried off by the bowels.

As far as Mr. Hunter's experience taught him, cutting the gum down to the teeth appears to be the only method of cure. It acts either by taking off the tenſion upon the gum, ariſing from the growth of the tooth, or by preventing the ulceration, which muſt otherwiſe take place.

It often happens, particularly when the operation is performed early, that the gum will unite over the teeth, in which caſe the ſame ſymptoms will be produced, and they muſt be removed by the ſame method.

Mr. Hunter informs us, that he had performed the operation above ten times upon the ſame teeth, where the diſeaſe had recurred as often, and every time with the abſolute removal of the ſymptoms.

He notices the aſſertion that to cut the gum once will be ſufficient, not only to remove the preſent, but to prevent any future bad ſymptoms from the ſame cauſe. This he maintains is contradictory to experiment and the known laws of the animal economy; for frequently the gum, from its thickneſs over the tooth, or other cauſes, muſt neceſſarily heal up again, and the relapſe is as unavoidable as the original diſeaſe.

He adverts to the vulgar objection to the practice, that if the gum is lanced ſo early as to admit of re-union, the cicatrized part will be harder than the original gum; and, therefore, the teeth will find more difficulty in paſſing, and give more pain. He affirms that this is contrary to facts; for we find that all parts which have been the ſeat either of wounds or ſores, are always more ready to give way to preſſure, or any other diſeaſe, which attacks either the part itſelf or the conſtitution. Therefore each operation tends to make the paſſing of the teeth more eaſy.

The fore-teeth may be at firſt obſerved not upon the edge of the gum, but upon the fore-part, making riſings there, which appear whiter than the other parts, and the gums ſeem broader than uſual. At this period the inciſions muſt be made pretty deep, till the tooth be felt with the inſtrument, otherwiſe little effect will be produced by the operation; and this is the general rule with reſpect to the depth of the inciſion in all caſes.

When the grinders ſhoot into the gum they flatten its edge, and make it broad. They are more eaſily hit than the fore-teeth.

The operation ſhould not be done with a fine-pointed inſtrument, ſuch as a common lancet, becauſe, moſt probably, the point will be broken off againſt the tooth. A common lancet with its point rounded, is a very good inſtrument; but an inſtrument like a fleam would be the moſt convenient.

There is no need of any great delicacy in the operation, the gums being very inſenſible parts; and to cut through the whole gum down to the teeth, with certainty, when they are pretty deep, requires ſome force.

The gums will bleed a little, which may be of ſervice in taking off the inflammation. Mr. Hunter never ſaw a caſe in which the bleeding proved either inconvenient or dangerous. If it ſhould ever be troubleſome, there would be no great difficulty in ſtopping it. No application to the cut is neceſſary. See Hunter on the Teeth, p. 233—243.

Scurvy of the Gums.—The name of this very common diſeaſe is derived from its being attended with appearances ſimilar to thoſe which accompany the ſea-ſcurvy. The gums ſwell, become extremely tender, and bleed upon every occaſion; they are redder than natural, and their veſſels are exceedingly turgid.

When the gums firſt begin to be tender, it is firſt obſervable upon their edges. The common ſmooth ſkin of the gum is not continued to its very edge, but it becomes in that ſituation a little rough like a border, and ſomewhat thickened. The part of the gum between two teeth ſwells, and often puſhes out like luxuriant fleſh, which is frequently very tender.

Mr. Hunter alſo acquaints us that the inflammation is often carried ſo far as to make the gums ulcerate, ſo that in many caſes they have a common ulcer upon them, and ſome of the teeth are denuded by the ulceration. This is often on one part only, often only on one jaw; while, in ſome caſes, it is all along the gums of both jaws.

It frequently happens in this caſe that the alveolar proceſs diſappears by abſorption, in which event there is always a very conſiderable diſcharge of matter from the inſide of the gum and alveolar proceſs, flowing out in the direction of the tooth.

In many of theſe caſes, ſays Mr. Hunter, we find that, while the gums are ulcerating in one part, they are ſwelling and becoming ſpongy in another, and hanging looſe upon the teeth; and this often takes place when there is no where any ulceration. Hunter on the Teeth, p. 184—186.

At length the teeth become looſe, and in a few years drop out, one after the other, at ſhort intervals, until the perſon is rendered toothleſs. It is from this complaint that many perſons loſe their teeth at a very early period of life. Indeed moſt individuals are more or leſs ſubject to it, as the gums, in ſome part or another, although there be no ſymptoms of the diſeaſe, are likely to become preternaturally red, enlarged, and tender. Therefore, whenever a tendency to this diſeaſe is obſerved, great care ſhould be taken to apply ſuch means as will arreſt its progreſs. At its commencement, ſays Mr. Fox, it is very manageable, and may always be relieved by puncturing with the point of a lancet thoſe parts which appear unnaturally red or diſtended. The loſs of blood affords immediate relief; and whenever the ſlighteſt ſoreneſs, or an increaſed fulneſs of the gums, is perceived, the above plan of ſcarifying the veſſels will be found highly beneficial. Suppoſe the diſeaſe to have proceeded to that ſtage in which the gums become ſpongy or looſe in texture, the lancet ſhould be then uſed with greater freedom. Eſſential ſervice is always derived from the loſs of blood. In ſome caſes leeches, which draw away a larger quantity of blood, are attended with the beſt effects. Frequent recourſe ſhould be had to this treatment, which may be accompanied with the uſe of aſtringent lotions, ſuch as the infuſion of roſes with the tincture of myrrh, decoction of bark, ſolutions of alum, arquebuſade water, &c. In theſe caſes great benefit is derived from the uſe of ſea-water, and, Mr. Fox obſerves, that he always recommends it when it can be procured, directing it to be uſed warm if the gums be tender. Whenever the gums are diſpoſed to inflame in conſequence of this diſeaſe, much good may be expected from the free uſe of a tooth-bruſh. At firſt the gums are apt to bleed a little, by which the ſame benefit is obtained as from the lancet. By degrees the gums become more firm, and at length a hard bruſh may be uſed, without cauſing any loſs of blood, or giving the ſlighteſt pain.

When the gums are exceedingly tender, and have any tendency to ulceration, Mr. Fox recommends waſhing the mouth very frequently with barley water, ſweetened with honey. In two or three days, if the ſoreneſs is diminiſhed, the lancet is to be cautiouſly uſed with the diluted tincture of myrrh as a waſh.

When this treatment fails in making the edges of the gums heal, and they hang looſely about the necks of the teeth, Mr. Fox obſerves, that much good will be derived from the uſe of a ſolution of the argentum nitratum. He ſays, that if the diſeaſe be only partial, the cauſtic ſhould be applied with a camel's hair pencil dipped in the ſolution. This remedy is deſcribed as communicating a new action to the gums, and they generally get well in a ſhort time. Indeed, whenever the gums are very full, and diſcharge a good deal of offenſive matter, waſhing the mouth with a ſolution of lunar cauſtic is, according to Mr. Fox, a very excellent means of rendering the mouth ſweet and comfortable.

This remedy, when applied to the ſore edges of the gums with a hair pencil, may be uſed as ſtrong as in the proportion of a dram of the argentum, to an ounce of diſtilled water; but, if the mouth is to be rinſed with it, not more than one grain of the cauſtic ſhould be put to two ounces of water, leſt, by being too ſtrong and getting into the throat, it ſhould occaſion an unpleaſant nauſea.

Perſons, who are often troubled with inflammation of the gums, ought to have them ſcarified whenever they become painful, or are more turgid than uſual. By the loſs of a ſmall quantity of blood, the affection is immediately relieved, and kept from committing the ravages which have been related.

Mr. Fox adds, that in ſcarifying the gums, the lancet ſhould be applied longitudinally to thoſe parts, which are ſituated between the teeth, becauſe, if the gums are cut where they cover the fangs, they will ſhrink in healing, and leave the necks of the teeth expoſed. On the other hand, if the gums are lanced in the angles between the teeth, they will be drawn tighter in healing, and the teeth be eventually ſtrengthened. Fox on the Diſeaſes of the Teeth, p. 72—76.

Mr. Hunter ſuſpected, that what is commonly meant by the ſcurvy of the gums might proceed from various cauſes, as he had often ſeen the appearances attendant on the diſorder, in children of a manifeſtly ſcrofulous habit, as well as in adults and other perſons, who were in all other reſpects perfectly healthy. He thought that the practice of cutting away a part of the gums, when they were enlarged and apparently redundant, was not the beſt method. We do not, in this way, remove an adventitious ſubſtance, as when we deſtroy luxuriant granulations on a ſore; but a part of the gum itſelf is taken away. In a ſimilar manner, a part enlarged by inflammation might be reduced to its natural ſize, a plan which would certainly not be adviſeable. The ſame eminent writer believed, that whatever good has reſulted from ſuch practice has been owing to the bleeding; and that ſcarifying the gums anſwers the ſame purpoſe.

When there are reaſons for ſuppoſing the ſcurvy of the gums to ariſe from any peculiarity of conſtitution, we are recommended to try to correct ſuch peculiarity. When the habit is ſcorbutic, the original diſtemper muſt be removed; when it is ſcrofulous, Mr. Hunter thinks that ſcarifications may do harm, by wounding the parts In the laſt kind of caſe, he ſpeaks in favour of ſea-bathing, and waſhing the mouth frequently with ſea-water. Page 186—187. edit. 3.

Callous Thickenings of the Gums.—The gums are ſubject to ſome diſeaſes, which have no connection with the alveoli and teeth. A very common one is a hard, callous thickening of a part of the gum, ſimilar to an excreſcence. It frequently has a cancerous appearance, which deters the ſurgeon from interfering, though generally without reaſon. It often admits of being removed by the knife; but not always. Mr. Hunter ſtates, that the bleeding which follows is generally ſo conſiderable, that it is frequently neceſſary to apply the actual cautery.

Excreſcences of this kind ſometimes grow again, which ſubjects the patient to the ſame operation. Mr. Hunter has known of their being extracted as often as ſix times; but in ſuch caſes he ſuſpected that they really had a cancerous diſpoſition. Hunter on the Teeth, p. 188. edit. 3.

What more appertains to the foregoing ſubject, will be found in another part of this work. See Teeth, *Diſeaſes of.*

GUMACA, in *Geography*, a town on the N.E. coaſt of the iſland of Luçon. N. lat. 14° 21'. E. long. 122° 27'.

GUMARA, in *Ancient Geography*, an iſland of the Indian ſea, placed by Ptolemy near the iſland of Taprobana.

GUMBINNEN, in *Geography*, a town of Pruſſian Lithuania, containing two churches, 200 houſes, and 3000 inhabitants, with ſome manufactures of cloth; 65 miles E. of Konigſberg.

GUMBORITZ, a town of Ruſſia, in the government of Olonetz; 16 miles S. of Olonetz.

GUMIPOLLAM, a town of Hindooſtan, in Myſore; 53 miles N.N.E. of Bangalore. N. lat. 14° 48'. E. long. 78° 5'.

GUMISH-KANEH, a town of Turkiſh Armenia; 33 miles S.S.E. of Trebiſond.

GUMMA, a town of Japan, in the iſland of Niphon; 56 miles N. of Jeddo.

Gumma, a term in *Surgery*, denoting a ſwelling ariſing from the ſubſtance of a bone, and having ſuch a degree of ſoftneſs, as makes it in ſome meaſure yield to the finger. The appellation is ſaid to be derived from the reſemblance of the tumour to gum in conſiſtence. As theſe ſwellings increaſe in hardneſs, they are progreſſively called tophi, nodi, and exoſtoſes. Gummata are ſometimes ſymptoms of the venereal diſeaſe; but ſometimes they exiſt, without our being able to aſſign any reaſonable cauſe for their origin. See Exostoses, Nodes, Lues Venerea, &c.

GUMMI Olivæ, *olive gum*, in the *Materia Medica of the Ancients*. We meet with this name given to a drug they ſometimes uſed in coughs and diſeaſes of the lungs. This was the concreted juice or exudation of the olive-tree, called by the Greeks *δακρυα Ελαίας*, and by the Latins *gummi olivæ*.

GUMMURGE, in *Geography*, a town of Hindooſtan, in the circar of Chandail; 45 miles W.N.W. of Saipour.

GUMRA, a town of Africa, in Sahara, ſurrounded with earthen walls; 150 miles S. of Algiers.

GUMSOOR, a town of Hindooſtan, in the country of Oriſſa; 80 miles S.W. of Cattack. N. lat. 10° 45′. E. long. 84° 49′.

GUN, a fire-arm or weapon of offence, which forcibly diſcharges a ball, ſhot, or other offenſive matter, through a cylindrical barrel, by means of gunpowder.

Gun is a general name, under which are included divers, or even moſt ſpecies of fire-arms. They may be divided into *great* and *ſmall*. See ARMS.

For the hiſtory and invention of guns, ſee CANNON and GUNPOWDER.

For the uſe and application of guns, ſee GUNNERY and PROJECTILES.

GUN, *Bed of*. See BED.

GUN, *Boring of*. See *Boring of* CANNON and FOUNDERY.

GUN, *Carriage of*. See CARRIAGE.

GUN, *Charging of*. See CHARGE and CANNON.

GUN, *Chaſe*. See CHASE *guns*.

GUN, *Evening*, is generally a twelve pounder, that is fired every night about ſun-ſet, and every morning at ſun-riſe, to give notice to the drums and trumpets of the army to beat and ſound the retreat and the reveille.

GUNS, *Exerciſe of*, denotes the method of laying, loading, and firing the guns, at various diſtances from the butt or mark: Mr. Robins recommends a more extenſive exerciſe than that of firing with a conſtant charge at two or three marks, placed at known and invariable diſtances, in which the ranges, penetrations, and deflections of pieces, fired with all neceſſary diverſity of charge, elevation, and diſtance, ſhould be examined, and the reſult compared with the new principles explained under the article GUNNERY, &c. See EXERCISE.

GUN *Flint*, in *Technological Mineralogy*. The mode of manufacturing gun-flints, as we have obſerved in the article FLINT, has for a long time been involved in fable and myſtery: indeed, even in the Mémoires de l'Académie de France, we are told, "that there is never a deficiency of flints in thoſe countries where they have once been found; that, as ſoon as a quarry appears exhauſted it is ſhut up; and that when after a certain number of years it is re-opened, the flints are found there under the ſame circumſtances as before." The ſame erroneous idea is repeated in the French Encyclopédie, and other works; and it was not till lately that we have been made fully acquainted (by Haequet of Vienna and by Dolomieu) with the ſimple manner of manufacturing gun-flints in Gallicia and France, where they conſtitute an important article of commerce. The latter of the above naturaliſts has given an account of it in the Mém. de l'Inſtitut National des Sciences (Claſſe Mathématique et Phyſique, t. 3. an. ix.); the former in a monograph on this ſubject, written in the German language.

In France, the beſt flints are found in the neighbourhood of St. Aignan, in the department of the Loir-et-Cher, and in that of the Indre, and the departments that occupy the vallies of Seine-et-Marne: they occur as horizontal banks in fletz-limeſtone, particularly chalk, and alſo in marle. Among twenty of ſuch beds, or layers, ſituated one above the other at the diſtance of about twenty feet, there is generally only one, very ſeldom two, that furniſh good gun-flints: all thoſe of a good quality are coated with a white earthy rind. (See FLINT.) On the banks of the Cher, the flints are excavated by means of ſhafts of forty to fifty feet in depth, from whence levels or horizontal galleries are carried into the only good ſtratum which is known in that diſtrict; but on the banks of the Seine, in the hillocks of Rocheguyon, where the cliffs of chalks preſent broken precipices, the beds of flint are laid open to view: one of theſe beds, which contains the good ſort, is at about ſix fathoms diſtance from the upper ſurface of the great maſs of chalk.

The characters by which the good flints are diſtinguiſhed from thoſe leſs fit for being manufactured are the following: Their ſurface is rather convex, approaching to globular; thoſe that are amorphous, or of a very irregular form, ſuch as knobbed, branched, &c. are generally full of imperfections. Good flint nodules ſeldom exceed the weight of twenty pounds; nor are thoſe that weigh leſs than one or even two pounds conſidered as being of a good quality. Internally they ſhould appear unctuous and rather ſhining, with a grain too fine to be perceptible to the eye. The colour may vary from honey-yellow to blackiſh brown; but the tint ſhould be uniform in the ſame nodule. Their tranſparency ſhould be ſufficient to admit letters to be diſtinguiſhed through a piece of the ſtone of a quarter of a line thick, laid cloſe upon the paper. Their fracture ſhould be perfectly ſmooth and equal throughout, and the fragments ſlightly conchoidal. The laſt of theſe properties is the moſt eſſential, ſince on it depends the facility with which the nodule is divided into gun-flints. All flints that prove deficient in any one of the above characters, either naturally or by a long expoſure to the air, are called *intractable*, and rejected by the workmen.

The tools made uſe of by the *caillouteurs* (a name given to the makers of gun-flints in France) are four in number: 1. A hammer or mace of iron with a ſquare head (*Pl.* II. *Geology*, *fig.* 1.), the weight of which does not exceed two pounds; (but it may be of half that weight only,) with a handle of ſeven or eight inches long. This tool is not made of ſteel, for an exceſs of hardneſs would render the ſtrokes too hard or dry (as the phraſe is), and would ſhatter the nodules irregularly, inſtead of breaking them by a clear fracture.

2. A hammer with two points (*fig.* 2.) This is made of good ſteel, well hardened; its weight does not exceed ſixteen ounces; indeed it may weigh ten ounces only. Its handle is ſeven inches long, paſſing through it in ſuch a manner that the points of the hammer are nearer the hand of the workman, than the centre of gravity of the maſs. The form and ſize of the hammers of different workmen vary a little; but this diſpoſition of the points is common to them all, and is of conſequence to the force and certainty of the blow.

3. The diſk-hammer, or roller, a ſmall tool, called in French *roulette*, which repreſents a ſolid wheel, or ſegment of a cylinder, two inches and four lines in diameter (*fig.* 3.): its weight does not exceed twelve ounces. It is made of ſteel not hardened, and is fixed on a handle ſix inches in length, which paſſes through a ſquare hole in the centre.

4. A chiſſel tapering and bevilled at both extremities (*fig.* 4.), ſeven or eight inches long, and two inches wide, made of ſteel not hardened: this is ſet on a block of wood, which, at the ſame time, ſerves as a bench for the workmen.

To theſe four tools we may add a file, for the purpoſe of reſtoring the edge of the chiſſel from time to time.

After having ſelected a good maſs of flint, the following four operations are performed by the workman.

1. *To break the block.*—The workman, being ſeated on the ground, places the nodule of flint on his left thigh, and applies ſlight ſtrokes with the ſquare hammer, to divide it

into ſmaller pieces of about a pound and a half each, with broad ſurfaces, and almoſt even fracture. The ſtrokes ſhould be moderate, leſt the maſs crack and ſplit in the wrong direction.

2. *To cleave or chip the flint.*—The principal operation is to ſplit the flint well, or to chip off ſcales of the length, thickneſs, and ſhape adapted, to be afterwards faſhioned into gun-flints. In this part the greateſt degree of addreſs and certainty of manipulation are required. The fracture of the flint is not confined to any particular direction; it may be chipped in all parts with equal facility.

The workman holds the piece of flint in his left hand, not ſupported, and ſtrikes with the pointed hammer, No. 2, on the edges of the great planes produced by the firſt breaking, by which means the white coating of the flint is removed in the form of ſmall ſcales, and the maſs of the flint itſelf laid bare in the manner repreſented, *fig.* 5; after which he continues to chip off ſimilar ſcaly portions from the pure maſs of the flint. Theſe ſcaly portions are nearly one inch and a half wide, two inches and a half long; and their thickneſs, in the middle, is of about two lines. They are ſlightly convex below, and conſequently leave in the part of the flint from which they were ſeparated a ſpace ſlightly concave, longitudinally bordered by two, rather projecting, ſtraight lines or ridges, *fig.* 6. Theſe ridges, produced by the ſeparation of the firſt ſcales, muſt naturally conſtitute nearly the middle of the ſubſequent pieces; and ſuch ſcales alone as have their ridges thus placed in the middle are fit to be made into gun-flints. In this manner the workman continues to ſplit or chip the maſs of flint in various directions, until the defects uſually found in the interior render it impoſſible to make the fractures required, or until the piece is reduced too much to receive the ſmall blows by which the flint is divided.

3. *To faſhion the gun-flint.*—Five different parts may be diſtinguiſhed in a gun-flint. 1. The ſloping facet, or bevil part, which is impelled againſt the hammer of the lock of the gun: it is called by the French *mèche.* Its width ſhould be from two to three-twelfths of an inch: if it were broader it would be too liable to break; and if more obtuſe, the ſcintillation would be leſs briſk. 2dly. The ſides, or lateral edges, which are always rather irregular. 3dly. The back, or the part oppoſite the tapering edge: this is the thickeſt part of the flint. The French call it *talon.* 4thly. The under ſurface, which is uninterrupted and rather convex. And, 5thly. The upper face, a ſmall ſquare facet between the tapering edge and the back, which receives the upper claw of the cock; it is ſlightly concave. The French term for it is *aſſis.*

In order to faſhion the flint, thoſe ſcales are ſelected that have at leaſt one of the above-mentioned longitudinal ridges: the workman fixes on one of the two tapering borders to form the ſtriking edge; after which, the two ſides of the ſtone that are to form the lateral edges, as well as the part which is to form the back, are ſucceſſively placed on the edge of the chiſſel in ſuch a manner, that the convex ſurface of the flint, which reſts on the fore-finger of his left hand, is turned towards that tool. He then, with the roulette, applies ſome ſlight ſtrokes to the flint juſt oppoſite the edge of the chiſſel underneath; by which means the flint breaks exactly along the edge of the chiſſel.

4. The finiſhing operation is the trimming, or the proceſs of giving the flint a ſmooth and equal edge; this is done by turning the ſtone, and placing the edge of its tapering end on the chiſſel, in which ſituation it is completed by five or ſix ſlight ſtrokes with the roulette. This is termed *raffiler* by the French workmen.

The whole operation of making a gun-flint is performed in leſs than one minute. A good workman is able to manufacture a thouſand good chips or ſcales a day (if the flint nodules be of a good quality); and in the ſame manner he can faſhion 500 gun-flints in a day; ſo that in the ſpace of three days he is able to cleave and finiſh a thouſand gun-flints without farther aſſiſtance.

This work leaves a great quantity of refuſe, for ſcarcely more than half of the ſcales are good, and nearly half the maſs in the beſt flints is incapable of being chipped out, ſo that it ſeldom happens that the largeſt nodules will furniſh more than fifty gun-flints. Such ſcales as have a cruſt, or are too thick to be made into gun-flints, are uſed for the more common culinary purpoſe of ſtriking a light. Thoſe that are ſold at Paris are brought from the banks of the Seine, and are generally of a brown colour.

The gun-flints are ſorted out according to their perfection, and the uſe to which they are to be applied. They are claſſed into extra and common flints; flints for piſtols, muſkets, and fowling-pieces.

GUN, *Pointing of a*, ſo as to ſtrike diſtant objects, depends on two things, *viz.* 1. Tracing on the outſide of the piece a viſual line parallel to the axis, which is called *diſparting*, and is performed by taking half the difference of the diameters of the muzzle and baſe-ring, and ſetting it perpendicularly on the muzzle-ring directly over the centre; for then a line, which paſſes from that point in the baſe-ring, which is directly over the centre of the piece, to the extremity of the diſtance thus placed on the muzzle-ring, will, when the piece is truly bored, be parallel to its axis: ſee DISPART and *Line of* DIRECTION. 2. The other operation is the determining of the allowance to be made in diſtant ſhot for the incurvation of the flight of the bullet: this is greater or leſs (*cæteris paribus*) according to the different charges of powder made uſe of. Mr. Robins has determined, that ſuch a charge as produces a velocity between 1100 and 1200 feet in a ſecond, is in many caſes the moſt eligible: ſuppoſing, therefore, that the piece is loaded with ſuch a charge; in this caſe, if the ſhot were not retarded by the reſiſtance of the air, the range correſponding to one degree of this piece might be reckoned 450 yards, to two degrees 900, to three degrees 1350, &c. ſince, independently of the air's reſiſtance, the ranges at different elevations would be nearly in proportion to theſe angles, at leaſt as far as eight or ten degrees. But the reſiſtance of the air will occaſion a conſiderable alteration; becauſe, by diminiſhing the velocity of the bullet, it will render its track more incurvated than it would otherwiſe be, and diminiſh its range; and the ſmaller the ſhot, the greater would be the diminution. The following table will ſerve to ſhew the angles of elevation correſponding in different pieces to different diſtances, and will ſave the labour of computation.

Actual Range in Yards.	Angle of Elevation.									
	24 ℔		12 ℔		9 ℔		6 ℔		3 ℔	
1400	4	12	4	30	4	45	5	0	5	57
1200	3	26	3	40	3	50	4	0	4	30
1000	2	45	2	54	3	0	3	7	3	30
800	2	6	2	10	2	13	2	20	2	30
600	1	30	1	32	1	34	1	36	1	44
500	1	13	1	15	1	17	1	19	1	22
400		58		58½		59	1	0¼	1	3
300		43		43		43		44		43
200		27¾		28¼		23½		28¼		29¼
100		14		14		14¼		14½		15

By this table, when the diſtance of the object is known, the angle, by which the axis of the piece ought to be elevated above the viſual line, will be readily determined; and when this angle is known, the piece may be directed or pointed, by meaſuring the length of it from the middle of the baſe-ring to the middle of the muzzle-ring, and computing the tangent of the given angle of elevation to that radius, which may be done either by a table of tangents, or by ſuppoſing that to a radius of one foot, 21 of an inch is the tangent of a degree. Let C H B D (*Plate* I. *Gunnery*, *fig.* 1.) be the given piece, A B its axis, D E half the difference between the diameter of the muzzle-ring and baſe-ring, and C E the line of *diſpart*; then make C G equal to the tangent of elevation juſt found, and the line G E will be the proper line for pointing of the piece. In practice it will be ſufficient to erect only one perpendicular: *e. gr.* if G C exceed DE, their difference erected on the baſe-ring will, with the muzzle-ring at D, give the line of direction; but if D E exceed G C, the ſame difference erected on the muzzle-ring will, with the baſe-ring at C, give the direction of the piece. In diſtances leſs than 500 yards, it will be ſufficient to allow one-fourth of a degree for the inclination correſponding to every hundred yards, without having recourſe to the table. Mr. Robins obſerves, that the charge of powder producing the velocity above ſtated as the moſt eligible, is from one-ſixth to one-fourth of the weight of the bullet in powder; the different goodneſs of powder, and the difference in the length of pieces producing that diverſity. Robins's Tracts, vol. i. p. 312, &c.

The common mechanical method of directing cannon to a given object, is to find the centre-line, or two points, one at the breech and the other at the muzzle, by a ſmall inſtrument called the perpendicular, and then applying the two fore fingers to the baſe centre to look behind them, till the muzzle centre be made to cut the centre of the object; then the piece is properly directed: and having found the neceſſary elevation, place the centre of the quadrant in the bore, and raiſe or depreſs the piece till the plummet cuts the required elevation.

Gun, *Proving of a.* See Proving.

Gun, *Rifle.* See Rifle.

Guns, *Small,* include fire-locks, muſkets, muſketoons, carabines, blunderbuſſes, fowling-pieces, &c.

Piſtols and mortars are almoſt the only kinds of regular weapons, charged with gunpowder, that are excepted from the denomination of guns.

Since the article Fowling-*piece* was written, we have been able to collect ſome further information. We did not give any deſcription of the breechings of guns, which is of conſiderable importance in their ſhooting. Almoſt every maker has a breech of his own contrivance, though they are all, on the ſame principle, only alterations, without improvements, taken from the original patent, which was the late Mr. Henry Nock's. See *Plate* I. *Gunnery*, *fig.* 2.

a a, the ſcrew to fit the barrel.

c, the centre-hole or chamber.

d, the ante-chamber.

F, a ſcrew adapted to reach the ante-chamber, the only uſe of which is to enable the workman to cut the ante-chamber.

B B B B, the outſide circumference, which may be made to any convenient form.

The advantages ariſing from this breeching are, that the ſhot are thrown in a more perfect direction and with greater velocity: that the barrel is much leſs ſubject to grow partially foul: that guns on this principle, after being fired 20 or 30 times, loſe very little of their force, in compariſon with thoſe of the old conſtruction; that they are ſafer, and go off more inſtantaneouſly; alſo, they inflame the whole of the powder.

Gun-makers only diſtinguiſh two kinds of defects in their barrels; the grey, and the crack or flaw: the grey is that which we, under the article Fowling-*piece*, deſcribed as the flaw. The crack is of very little conſequence if near the muzzle of the barrel, but if at the breech end, though it may be mended, it is never done by reſpectable makers. The method of diſcovering it is by forcing it with water. The beſt barrels are never poliſhed inſide, as it is impoſſible to make a true cylinder with oil and emery, they are only fine draw bored. We have alſo, under the article before alluded to, ſaid that twiſted barrels throw their balls or ſhot with more accuracy than common ones; but here we beg leave to correct ourſelves, as that entirely depends on the boring and filing; the advantages of twiſted barrels are ſuperior ſtrength, elaſticity, and elegance.

After the barrels are bored true inſide, two perfectly cylindrical mandrils are introduced, one at each end; they are then put in a lathe, and the outſides turned to their proper ſubſtance, and conſequently muſt be of an uniform thickneſs of metal all round; but this is only done with town-made guns. Though it is known ſome makers bend the muzzles of guns, intended to kill at long diſtances, a little upwards, yet it is *by no means* to be recommended, as a barrel ſhould be as ſtraight as it is poſſible to make it. By frequent trials with long and ſhort guns, the latter are generally found to excel the former, if both guns are loaded with the ſame charge of powder and ſhot. For legal reſtrictions with regard to the uſe of guns, ſee the article Game.

Guns, *Great*, are called by the general name *cannon*, and make what we alſo call *ordnance* or *artillery*. See Cannon.

Gun, *Great*, at Dover caſtle, is a large braſs gun 24 feet long without, and 22 feet in the bore, beautifully adorned with flowers and emblematical figures in relievo, and ſeveral inſcriptions. This curious gun, vulgarly called queen Elizabeth's pocket piſtol, was a preſent from the emperor Charles V. to Henry VIII. while they were engaged together in a war with France. The charge of this gun is 15 pounds of powder, and it is ſaid to carry a ball ſeven or eight miles.

Gun is alſo a name given by the miners to an inſtrument uſed in cleaving rocks with gunpowder. It is an iron cylinder of an inch and quarter thick, and about ſix inches long, and having a flat ſide to receive the ſide of a wedge, and a hole drilled through it to communicate with the inſide of the hole in the rock. The hole is made of about eight inches deep, and in the bottom of it are put about two or three ounces of gunpowder; then this gun is driven forcibly in, ſo as to fill up the hole, and the wedge is driven in on its flat ſide to ſecure it. The priming at the hole is then fired by a train, and the orifice being ſo well ſtopped by this gun, the force of the powder is determined to the circumjacent parts of the rock which it ſplits. See Mine.

Gun-*room*, in a *Ship*, is the apartment on the after end of the lower or gun-deck, where the maſter-gunner and his crew rendezvous, get ready their cartridges, &c. and do all things belonging to their buſineſs. In ſmall ſhips of war, it is uſed by the lieutenants as a dining-room, &c.

GUNAISKOG, in *Geography*, a town of Sweden, in Warmeland; 34 miles N.W. of Carlſtadt.

GUNDANILLA, a town on the S. coaſt of the iſland of Porto Rico.

GUNDAVEE, a town of Guzerat, on a river which runs into the gulf of Cambay. The chief article of its trade is teak wood; 25 miles S. of Surat.

GUNDAVOW, a town of Guzerat, on the coaſt; 45 miles S.W. of Noanagur.

GUNDELFINGEN, a town of Bavaria, in the principality of Neuburg, ſituated on the Brenz, near the Danube; 19 miles N.E. of Ulm. N. lat. 48° 32′. E long. 10° 19′.

GUNDELIA, in *Botany*, ſo named by Tournefort, in honour of his companion and friend Mr. Andrew Gundelſcheimer, its diſcoverer, on the mountains of Armenia, during their journey. Tournef. Voy. v. 2 108. Cor. 51. t. 486. Linn. Gen. 453. Schreb. 593. Willd. Sp. Pl. v. 3 2402. Mart. Mill. Dict. v. 2 Juſſ. 175. Lamarck Illuſtr. t. 720. Gærtn. t. 163.—Claſs and order, *Syngeneſia Polygamia-ſegregata*. Nat. Ord. *Compoſitæ*, Linn. *Cinarocephalæ*, Juſſ.

Gen. Ch. *Common Calyx* ſcarcely any, except the leaves ſurrounding the compound receptacle. *Cor.* compound, tubular, uniform, the florets five, equal. Petal of each ſimple, club-ſhaped; its limb ſwelling, five-cleft, erect. *Stam.* Filaments five, capillary, very ſhort; anthers united into a long cylinder. *Piſt.* Germen ovate, immerſed in the receptacle, inferior, crowned with minute ſcales; ſtyle thread-ſhaped, longer than the corolla; ſtigmas two, revolute, but in the lateral florets ſimple. *Peric.* none, the ſeeds being altogether hidden in the receptacle. *Seeds* ſolitary, roundiſh, pointed, crowned with an obſolete border; the lateral ones abortive. *Common receptacle* conical, entirely covered with the partial ones, ſeparated from each other by three-pointed ſcales. *Partial receptacle* inverſely conical, obtuſe, quadrangular, truncated, with five little hollows, one of them in the centre, the others in the circumference, to receive the five florets.

Eſſ. Ch. Partial calyx none. Five hollows in the partial receptacle for five florets. Corolla tubular. Four of the florets male. Common receptacle ſcaly. Seed-crown a ſlight border.

1. G. *Tournefortii.* Linn. Sp. Pl. 1315. Mill. Ic. t. 287. Tourn. Voy. v. 2. t. 108. (Silybum Dioſcoridis; Rauw. It. t. 74.)—Native of dry ſtony places in Armenia, Syria, and near Aleppo, flowering in June. It was formerly in our gardens, introduced by Tournefort, but periſhed in the hard winter of 1739. The French have ſince recovered it from the Levant, and we have ſeen one plant alive at Paris. The habit is that of a thiſtle, or eryngo. *Root* perennial. *Stem* a foot high, branched, leafy, round, ſmooth. *Leaves* large, ſeſſile, ſlightly decurrent, pinnatifid, acute, with numerous irregular ſpinous teeth; their ſurfaces bright or glaucous green, with a purpliſh rib, and downy veins. Heads of *flowers* purple, terminal, ſeſſile, encompaſſed with a few ſmaller leaves, and ſometimes a little cottony.

Tournefort calls this one of the moſt handſome plants of the Levant, "and becauſe," ſays he, "Mr. Gundelſcheimer firſt diſcovered it, we agreed that it ought, out of gratitude, to bear his name. Unhappily we had nothing but water to honour this ceremony, but this was the more ſuitable and welcome, as the plant grows only in dry ſtony places. The muſic of the Pacha ſtruck up at the ſame time, which we took for a good omen; nevertheleſs, we had no ſmall trouble to hit upon a Latin name appropriate to that of our worthy friend. It was at length concluded that the plant ſhould be called *Gundelia*." *Tourn. Voy.*

GUNDELL, in *Geography*, a town of Guzerat; 30 miles E.N.E. of Junagur.

GUNDELSHEIM, a town of Germany, in the circle of Swabia, on the Neckar; 30 miles E. of Heidelberg.

GUNDEWA, a town of Hindooſtan, in Bundelcund; 12 miles S.E. of Chatterpour.

GUNDIAW, a town of Hindooſtan, in the country of Tatta; 32 miles S.S.E. of Tatta.

GUNDIGUL, a town of Hindooſtan, in the circar of Ellore; 60 miles N.E. of Ellore.

GUNDILIPALLY, a town of Hindooſtan, in Myſore; 50 miles S. of Seringapatam. N. lat. 11° 44′. E. long. 76° 45′.

GUNDLING, Nicholas Jerom, in *Biography*, was born at a town near Nuremberg, where his father was miniſter. He ſtudied firſt at Aldorf under John Fabricius, and afterwards at Jena and Leipſic. He was intended for theological purſuits, which in 1698 he changed for the ſtudy of the law; in this he graduated at Halle in 1703. He ſucceeded there to the profeſſorſhip of eloquence and natural law, and was made counſellor to the conſiſtory of the duchy of Magdeburg, and afterwards privy counſellor: and laſtly rector of the univerſity of Halle. He died in 1729, leaving behind him many works which were at that time in conſiderable eſtimation: of theſe we may mention his "New Dialogues;" "Plan of a Courſe of Literary Hiſtory;" "Hiſtoria Philoſophiæ Moralis;" "Otia, or a Collection of Diſcourſes on Phyſical, Moral, Political, and Hiſtorical Topics," in three vols. 8vo. &c.

GUNDOOR, in *Geography*, a town of Hindooſtan, in the Carnatic; 18 miles S. of Nellore.—Alſo, a town of Hindooſtan, in the circar of Condapilly; 7 miles N.W. of Maſulipatam.

GUNDOROESKAIA, a town of Ruſſia, in the country of the Coſſacks, on the Donetz; 112 miles N. of Azof.

GUNDUCK, a river of Aſia, in the country of Napaul, which runs into the Ganges, oppoſite to Patna.

GUNGADI, a town of Africa, in Kijaaga, on the Senegal; 15 miles E. of Joa.

GUNGANAGURRY, a town of Hindooſtan, in Myſore; 8 miles S.S.E. of Kiſtngheri.

GUNGANAR, a town of Hindooſtan, in Canara; 25 miles S.S.E. of Onore.

GUNGAVERA, a town of Hindooſtan, in Myſore; 20 miles E. of Rydroog.

GUNJEW, a town of Hindooſtan, in Boggilcund; 20 miles N.E. of Rewah.

GUNJOORYA, a town of Bengal; 13 miles N. of Noony.

GUNKI, a town of Japan, in the iſland of Niphon; 105 miles N.E. of Jeddo.

GUNNA, a town of Sweden, in the province of Helſingland; 40 miles N.W. of Hudwickſwal.—Alſo, one of the ſmaller Scots Hebrides. N. lat. 56° 35′. W. long. 6° 41′.

GUNNARSKEG, a town of Sweden, in the province of Warmeland; 40 miles N.W. of Carlſtadt.

GUNNEL *of a Ship*. See Gun-*wale*.

GUNNELLUS, in *Ichthyology*. See Butter-*fiſh*.

GUNNER, John Ernest, in *Biography*, was born at Chriſtiana, in Norway, in the year 1718. He received the elementary parts of his education under private tutors, and when he was eleven years of age he was ſent to the public ſchool of Chriſtiana. Here he remained till 1737, and then proceeded to Copenhagen, where he purſued his ſtudies with ſo much ſucceſs, as to make a diſtinguiſhed figure among his fellow-ſtudents. In 1742 he repaired to the univerſity of Halle, where he ſtudied theology, philoſophy, and mathematics, under very able profeſſors, then reſident at that ſeminary. In 1754 he was invited to be extraordinary profeſſor of theology at Copenhagen, preacher at Herlufsholm, and lecturer in theology and the Hebrew language in the public ſchool of that place. Shortly after this, he was ordained prieſt at Copenhagen, and in 1758 was appointed by his majeſty Frederic V. biſhop of Drontheim. He was the founder of the royal Norwegian ſociety at Drontheim, of which he was elected vice-preſident, and in the Tranſactions of which he publiſhed ſeveral curious and uſeful papers. He was a zealous ſtudent in botany, and ſo highly eſteemed by Linnæus, that he gave the name of *Gunnera* (which ſee) to a plant in his ſyſtem. He was enrolled among the members of the academies of Stockholm, Copenhagen, and other learned ſocieties. His papers in the firſt three volumes of the Tranſactions of the ſociety of Drontheim, relate chiefly to ſubjects in natural hiſtory. In 1766, he publiſhed "Flora Norvegica," part I. containing 314 ſpecies of plants, with ſome new fuci. To each are added the medical and aſtronomical uſes. See the next article.

GUNNERA, in *Botany*, ſo named by Linnæus in compliment to Dr. John Erneſt Gunner, biſhop of Drontheim, in Norway, the learned and laborious author of the *Flora Norvegica*, in two parts, folio, with twelve plates, publiſhed at Drontheim and Copenhagen, in 1776 and 1772. The number of ſpecies it contains is 1118. The author died in 1773, aged 55.—Linn. Mant. 16. Schreb. 607. Willd. Sp. Pl. v. 4. 148. Vahl. Enum. v. 1. 308. Mart. Mill. Dict. v. 2. Juſſ. 405. Lamarck. Illuſtr. t. 801. (Miſandra; Juſſ. 405.)—Claſs and order, *Gynandria Diandria*, Linn. *Diandria Digynia*, Vahl. Nat. Ord. *Scabridæ*, Linn. *Urticæ*, Juſſ.

Gen. Ch. *Cal.* Catkin whorled, its ſcales of one leaf, ſingle-flowered, briſtle-ſhaped, the length of the flowers, permanent. Perianth none, except the double-toothed cruſt of the ſeed. *Cor.* none. *Stam.* Filaments two, very ſhort, oppoſite, ſtanding on the ſides of the germen, on the outſide of its teeth; anthers oblong. *Piſt.* Germen ovate, with two teeth at the top; ſtyles two, awl-ſhaped, ſhort, hairy, between the teeth of the germen; ſtigmas ſimple. *Peric.* none. *Seed* one, ovate, coated with the perianth-like cruſt. *Linn.*

Eſſ. Ch. Calyx of two teeth, ſuperior. Corolla none. Seed with a fleſhy coat, crowned by the calyx.

Obſ. Linnæus ſubſequently ſuſpected his *G. perpenſa*, the only ſpecies known to him, to be monoecious, which often appears to be the caſe, and *G. plicata*, the *Miſandra* of Juſſieu, is even dioecious. Nevertheleſs, this genus is beſt placed in *Diandria Digynia*, as having both organs generally in the ſame flower. With *Gynandria* it does not ſeem well to accord. We ſhould rather, conſidering its affinities, preſume it to have a real inferior calyx, which in the female flower becomes the pulpy coat of the ſeed, and that there is ſome miſtake as to the ſtamens ſtanding on the outſide of the teeth, when the flowers have both organs together. The flowers of all the ſpecies require to be examined and compared, in a living ſtate, by ſome good theoretical botaniſt. The term catkin ſeems here greatly miſapplied.

1. G. *perpenſa*. Linn. Mant. 121. Thunb. Cap. v. 1. 143. (Perpenſum blitiſpermum; Burm. Prod. Cap. 26. Blitum africanum, calthæ paluſtris folio, caule nudo cubitali, ſpicam pedalem et amplius ſuſtinente; Pluk Phyt. t. 18. f. 2.)—Leaves kidney-ſhaped, waved, toothed, finely downy, ſhorter than the fruit-bearing ſtalk. All the ſtalks unarmed.—Found about the margins of rivers at the Cape of Good Hope, flowering from September to December. *Thunberg*. *Root* perennial, fleſhy, ſomewhat creeping, with long deep fibres. *Leaves* radical, on long downy ſtalks, various in ſize, but uſually a ſpan wide, kidney-ſhaped, waved, toothed, or ſharply crenate, marked with numerous branching radiating ribs, cut away to the two main ſide-ribs at the baſe with a curved ſinus, finely downy on both ſides, paler and rather harſh to the touch beneath. *Flower-ſtalk* radical, compreſſed, naked, but downy in the lower part, a foot or eighteen inches high, bearing a compound bunch of innumerable ſmall greeniſh *flowers*, accompanied by linear *bracteas*.

2. G. *ſcabra*. Ruiz and Pavon. Fl. Peruv. v. 1. 29. t. 44. f. *a*. (G. chilenſis; Lamarck. Dict. v. 3. 61. Illuſtr. t. 801. f. 1. Panke anapodophylli folio; Feuill. Voy. v. 2. 741. t. 30.) Leaves palmate, ſerrated, very harſh, taller than the fruit-bearing ſtalk. All the ſtalks prickly.—Native of watery marſhy places in Chili and Peru, communicated by the late Abbé Cavanilles. Much larger than the preceding, and diſtinguiſhed by its lobed *leaves*, which are extremely rough on the upper ſide with minute callous points, as well as beſprinkled on both ſides with ſhort hairs. The *ſtalks*, both of the *leaves* and *flowers*, are beſet with ſcattered prominent prickles, and the latter are much the loweſt. The *bunch* of flowers is a ſpan long, very denſe and thickly branched. Feuillée ſays this plant is of a cooling quality, and that a decoction of its leaves is taken for that purpoſe in hot weather, and the ſtalks of the leaves are peeled and eaten. He found their flavour ſweetiſh and agreeable. The root is uſed for dyeing black, and for tanning, which proves its aſtringent quality.

3. G. *plicata*. Vahl. Enum. v. 1. 309. Willd. n. 2. (G. magellanica; Lamarck. Dict. v. 3. 61. Illuſtr. t. 801. f. 2. Miſandra; Herb. Commerſ. Juſſ. 405.)—Leaves kidney-ſhaped, crenate, plaited, ſmooth and naked, taller than the fruit-bearing ſtalk. Flowers dioecious.—Gathered by Commerſon in the ſtraits of Magellan. Mr. Menzies brought it from Staten Land, near Cape Horn. Much ſmaller than either of the foregoing. The *root* is creeping, with long, thick, ſimple, downy fibres. *Leaves* an inch or two wide, on hairy ſtalks, bluntly crenate, ſcarcely waved, many-ribbed, plaited, very ſmooth, except a few occaſional tawny briſtles on the ribs beneath. *Male flowers* in a branched looſe bunch, on a ſolitary ſlender hairy ſtalk, taller than the leaves; *female* ones on a ſeparate plant, in a denſe, ovate, nearly ſeſſile *thyrſus*, accompanied by broad membranous bracteas, and much ſhorter than the leaves. *Stigmas* very long, taper, downy, permanent. *Fruit* globoſe, red.

Gunners, officers of the Tower and other garriſons, whoſe buſineſs it is to manage and look after the ordnance mounted on the lines and batteries, which are all fixed and ready with cartouches and ball, for ſervice, on the ſhorteſt warning.

They carry a field-ſtaff, and a large powder horn in a ſtring over the left ſhoulder; in which equipage they march by the guns.

Gunner, in the *Artillery*, is the ſecond rank of private men in the royal regiment of artillery.

Gunner *of a ſhip of war*, is an officer appointed to take charge of the artillery and ammunition aboard; to obſerve that the former are kept in order, and fitted with tackle and other furniture, and to teach the ſailors the exerciſe of the cannon: he is aſſiſted by a mate, &c.

Gunner *of England, Maſter*, is an officer appointed to teach and inſtruct all ſuch as deſire to learn the art of gunnery, and to adminiſter to every ſcholar an oath; which, beſide the duty of allegiance, obliges him not to ſerve any foreign prince or ſtate without leave; nor to teach the art of gunnery to any but ſuch as have taken the ſaid oath:

and to certify to the maſter of the ordnance the ſufficiency of any perſon recommended to be one of his majeſty's gunners.

The gunner, ſir J. Moore obſerves, ſhould know his pieces and their names, which are taken from the height of the bore, the names of the ſeveral parts of a piece of ordnance, how to tertiate his gun, and how to diſpart it, &c.

Gunner's *Level.* See Level.

GUNNERY, the art of ſhooting with guns and mortars, *i. e.* of charging, directing, and exploding thoſe fire-arms to the beſt advantage.

Gunnery is ſometimes conſidered as a part of the military art, and ſometimes as a part of pyrotechny.

To the art of gunnery belongs the knowledge of the force and effect of gunpowder, the dimenſions of pieces, and the proportions of the powder and ball they carry, with the methods of managing, charging, pointing, ſpunging, &c.

Some parts of gunnery are brought under mathematical conſideration, which, among mathematicians, are called abſolutely by the name gunnery; *viz.* the method of elevating or raiſing the piece to any given angle, and of computing its range; or of raiſing or directing it ſo, as it may hit a mark or object propoſed.

The inſtruments chiefly uſed in this part of gunnery are the callipers or gunners' compaſſes, quadrant, and level; the methods of applying which, ſee under thoſe articles; and for the particular principles and laws of gunnery, ſee Projectile.

With regard to the hiſtory of this part of mixed mathematical ſcience we may obſerve, that long before the invention of gunnery, properly ſo called, the art of artillery was in actual practice; for one of the kings of Judah, 800 years before the Chriſtian era, erected, on the towers and bulwarks of Jeruſalem, engines of war, for ſhooting arrows and great ſtones for the defence of that city. 2 Chron. xxvi. 15.

Such machines were afterwards known to the Greeks and Romans under the names *balliſta*, *catapulta*, &c. which produced effects, by means of the action of a ſpring of a ſtrongly twiſted cordage formed of tough and elaſtic animal ſubſtances, no leſs terrible than the cannon and mortars of the moderns. Theſe warlike inſtruments continued in uſe, not only during the time of the Roman empire, but to the twelfth and thirteenth centuries; nor is it probable that they were totally laid aſide, till gunpowder and the modern ordnance ſuperſeded their uſe.

The firſt application of gunpowder to military affairs ſeems to have been ſoon after the year 1300, for which the propoſal of Friar Bacon, about the year 1280, for applying its enormous exploſion to the deſtruction of armies, might give the firſt hint; and Schwartz, to whom the invention of gunpowder has been erroneouſly aſcribed, might have been the firſt who actually applied it in this way; for, it is ſaid, that having pounded the materials of this mixture in a mortar, which he afterwards covered with a ſtone, a ſpark of fire accidentally flew into the mortar, and the exploſion blowed the ſtone to a conſiderable diſtance.

We ſhall here only mention the prohibition of fire-arms in the code of Gentoo laws, printed by the Eaſt India company in 1776, which ſeems to confirm the ſuſpicion ſuggeſted by a paſſage in Quintus Curtius, that Alexander the Great found ſome weapons of that kind in India. Cannon, in the Shanſcrit idiom, is called ſhet-aghnee, or the weapon that kills a hundred men at once. See Cannon.

However, the firſt pieces of artillery, charged with gunpowder and ſtone bullets of a prodigious weight, were of very clumſy and inconvenient ſize and ſtructure. (See Cannon.) Thus, when Mahomet the Second beſieged Conſtantinople in 1453, he battered the walls with ſtones of this kind, and with pieces, ſome of which were of the calibre of 1200 pounds, and which could not be fired more than four times a day. The matter and fabric of theſe unwieldy pieces were changed for others that were lighter and more manageable, and particularly for braſs cannon, about the cloſe of the fourteenth century. The formation of artillery, if we except the ingenious method of boring cannon, not long ſince invented, hath been little improved within the laſt two hundred years; the proportions of the beſt pieces being now much the ſame with thoſe that were made in the time of the emperor Charles V. but their uſe and application have undergone conſiderable changes, the ſame ends being now generally purſued by ſmaller pieces than thoſe which were formerly thought neceſſary; the manner of forming a breach, by firſt cutting off the whole wall as low as poſſible, before its upper part is attempted to be beat down, ſeems alſo to be a conſiderable improvement in the practical part of artillery; as is alſo that diſpoſition of artillery called the *battery à ricochet*, firſt uſed in 1692. But the theory of gunnery has made ſlower advances than the mechanical part. The firſt people who directed their attention to this ſubject were the Italians, about the beginning of the ſixteenth century. N. Tartagalia, the famous mathematician of Breſcia, who invented the method of ſolving cubic equations, generally aſcribed to Cardan, profeſſedly diſcuſſed the theory of projectiles, in his Nova Scientia, printed at Venice in 1537; and in his Quæſiti & Inventioni diverſi, in 1546; and in another work, tranſlated into Engliſh, under the title of Colloquies, concerning the art of ſhooting in great and ſmall pieces of artillery, and publiſhed at London in 1588; he is ſuppoſed to be the firſt who aſſerted, that the greateſt range of projectiles was at an elevation of 45°; and he alſo determined, contrary to the opinion of his contemporaries, that no part of the track deſcribed by a cannon-ball is a right line, though the curvature is in ſome caſes ſo ſmall as not to need attention. To him is likewiſe aſcribed the invention of the gunner's quadrant.

However, nothing deciſive was delivered as to the nature of the curve deſcribed by ſuch bodies till the time of Galileo, who diſcovered the law of acceleration in falling bodies, and publiſhed his celebrated Dialogues on Motion, in 1638. He deſcribed the action and effects of gravity on falling bodies, and on theſe principles determined, that the flight of any projectile would be in the curve of a parabola, unleſs ſo far as it were diverted from that track by the reſiſtance of the air; accordingly he has ſhewn, that a body, ſhot horizontally, would, in its flight, deſcribe half a parabola, and when the piece had an elevation above the horizon, a whole parabola, provided that it fell on the plane of the battery; he alſo proved, that, whatever the ranges of the projected body or the elevations of the piece were, the ball would ſtill trace that curve line, of a greater or leſs amplitude, by the time it deſcended to the level of the place from which it was projected. His diſciple, Torricelli, extended this theory, by ſhewing that, whether the ball fell above or below the plane of its projection, it deſcribed a parabola of a larger or a ſmaller amplitude, according to the angle of elevation of the piece and the ſtrength of the powder. Galileo was not unapprized of the effects of the air's reſiſtance, and he has propoſed the means of examining the inequalities which they would occaſion in the motion of a ball at ſome given diſtance from the piece; yet he expreſsly ſays, that "among theſe projectiles which we make uſe of, if they are of a heavy matter and round form, nay, if they are of a lighter matter, and have a cylindrical form, ſuch as arrows ſhot from bows, their track or path will not ſenſibly decline from the curve of a parabola." (See his fourth Dialogue on Motion.) In this theory his ſucceſſors for a conſiderable time acquieſced, without trying how far the real motions of projectiles deviated from a parabolic track, or deciding, whether the reſiſtance of the air was, or was not, neceſſary to be attended to in the determinations of gunnery. Admitting that no great variation could ariſe from the reſiſtance of the air, in the flight of balls, chiefly on account of the extreme rarity of the air compared with the denſe and ponderous compoſition of thoſe projected bodies, they eſtabliſhed it as a kind of general axiom, that the flight of theſe bodies is nearly in the curve of a parabola. Accordingly, in 1674, our countryman, Mr. Anderſon, publiſhed his treatiſe of the "Genuine Uſe and Effects of the Gun," in which he maintains the Galilean theory, and profeſſes to anſwer all objections that could be urged againſt it; and though he was obliged to infer from ſubſequent experiments, that the whole track of projected bodies was not parabolic, as appears by his treatiſe, entitled "To hit a Mark," publiſhed in 1690, yet, inſtead of aſcribing the deviation of their flight from the parabolic curve to the reſiſtance of the air, he framed an hypotheſis for reconciling his experiments with his doctrine; he ſuppoſed, that the bullet, at its firſt diſcharge, flew for a certain diſtance in a right line, from the end of which line it began to bend into a parabola; this right line, which he calls the *line of the impulſe of fire*, he ſuppoſes to be the ſame in all elevations; and, by aſſigning a proper magnitude to this line of impulſe, he was able to reconcile any two ſhot made at different angles, however oppoſite they might prove to the common principles. But this new modelled theory was not confirmed by his following experiments.

In the year 1683, Monſ. Blondel publiſhed, at Paris, a treatiſe, entitled "L'Art de jetter des Bombes," in which he labours to ſhew, that the retardation ariſing from the reſiſtance of the air is ſo very inconſiderable, as to be of no account in practice. This opinion was ſo generally received both in France and England, that there ſeem to have been none who ſuſpected its fallacy.

Dr. Halley, in a paper communicated to the Royal Society in 1686, expreſsly aſſerts, that in "large ſhot of metal, whoſe weight many times ſurpaſſes that of the air, and whoſe force is very great in proportion to the ſurface wherewith they preſs thereon, this oppoſition (occaſioned by the reſiſtance of the air to the motion of cannon-balls) is ſcarce diſcernible:" and from actual experiments he infers, that "although in ſmall and light ſhot the oppoſition of the air ought and muſt be accounted for, yet in ſhooting of great and weighty bombs, there need be very little or no allowance made." Phil. Tranſ. N 179. p. 19. or Abr. vol. i. p. 484. The practitioners in gunnery, though an erroneous theory had obtained the ſanction of ſo great a name as that of Dr. Halley, might have been led to ſuſpect its truth by the authority of a ſtill greater name, *viz.* that of ſir Iſaac Newton, who, in 1687, publiſhed his "Principia Mathematica Phil. Nat." in which he has demonſtrated, (ſee lib. ii. § 7.) that the curve deſcribed by a projectile, in a ſtrongly reſiſting medium, differed much from a parabola, and that the reſiſtance of the air was great enough to make the difference between the curve of projection of heavy bodies and a parabola far from being inſenſible, and, therefore, too conſiderable to be neglected. The truth of theſe concluſions was farther eſtabliſhed by M. Huygens, in his "Diſcours de la Cauſe de la Peſanteur," Leide, 1690, in which he affirms, from experiments and mathematical inveſtigation, that the track of all projectiles was very different from the line of a parabola. However, the teſtimony of theſe writers produced little change in the general opinion; indeed M. Reſſons, a French officer of artillery, in a memoir preſented to the Royal Academy, in 1716, declares that theory was of very little ſervice in the uſe of mortars; that practice had convinced him there was no theory in the effects of gunpowder; for, having endeavoured, with the greateſt preciſion, to point a mortar agreeably to the calculations of M. Blondel, he had never been able to eſtabliſh any ſolid foundation upon them. One other inſtance occurs in which D. Bernouilli applies the doctrine of ſir Iſaac Newton to the motions of projectiles. Com. Acad. Petrop. tom. ii. p. 338, &c.

In this ſtate of error and unaccountable contradiction between theory and practice did the ſcience of gunnery remain, till the ingenious Mr. Robins, in the year 1742, publiſhed a ſmall treatiſe, entitled "New Principles of Gunnery," containing many curious diſcoveries relating to the force of gunpowder, the velocity of bullets impelled by its exploſion, the difference of the reſiſting power of the air to ſwift and ſlow motions, the deviation of the flight of projected bodies from the parabolic curve in a degree never diſcovered or ſuſpected by any, and the deflection of bullets and other projectiles from the vertical plane in which the ſhot is made, reſulting from a rotatory motion which they accidentally acquire about an axis. Theſe diſcoveries have been confirmed and improved by himſelf in ſubſequent publications, and by others, particularly M. Euler, of Berlin, who publiſhed it with a large commentary, in 1745; and by M. Le Roy of Paris, in the Mem. Acad. Sc. for 1751; and by Dr. Hutton of the Military Academy at Woolwich. The reader will find a more particular account of theſe diſcoveries in the ſequel of this article, and under the articles, Cannon, Gun, Gunpowder, Projectile, Range, Resistance, and Rifle-*gun*.

Mr. Robins, from the experiments related in his "New Principles of Gunnery," having concluded, that the force of fired gunpowder, at the inſtant of its exploſion, is the ſame as that of an elaſtic fluid of a thouſand times the denſity of the common air, and that the elaſticity of this fluid, like that of the air, is proportionable to its denſity, inferred, that this elaſtic fluid, exiſting in the powder in an extremely condenſed ſtate, and being ſuddenly extricated from the powder by the combuſtion, expanded with an aſtoniſhing force, and violently impelled the bullet or whatever elſe oppoſed its expanſion. The intenſity of this force was aſcertained by Mr. Robins in different ways, after the example of Mr. Hawkſbee, for which ſee Phil. Tranſ. N 295 and his "Phyſico-Mechanical Experiments," p. 31. See Gunpowder.

Mr. Robins, having thus determined the force of the gunpowder, as the intenſity of the agent by which the projectile is to be urged, proceeds to determine the effects it will produce, or the velocity with which it will impel a ſhot of a given weight from a piece of ordnance of given dimenſions. Accordingly he propoſed for ſolution the following problem: The dimenſions of any piece of artillery, the denſity of its ball, and the quantity of its charge being given, to determine the velocity which the ball will acquire from the exploſion, ſuppoſing the elaſticity or force of the powder at the firſt inſtant of its firing to be given.

In the ſolution of this problem he aſſumes the two following principles: 1. That the action of the powder on the bullet ceaſes as ſoon as the bullet is got out of the piece. 2. That all the powder of the charge is fired, and converted into an elaſtic fluid, before the bullet is ſenſibly moved from its place.

Theſe aſſumptions, and the concluſions before mentioned, make the action of fired gunpowder to be entirely ſimilar to that of air condenſed a thouſand times; and from thence it will not be difficult to determine the velocity of the ball ariſing from the exploſion: for the force of the fired powder diminiſhing in proportion to its expanſion, and ceaſing when the ball is out of the piece, the total action of the powder may be repreſented by the area of the curve, the baſe of which repreſents the ſpace through which the ball is accelerated; and the ordinates to which, repreſent the force of the powder at every point of that ſpace: and theſe ordinates being in reciprocal proportion to their diſtance from the breech of the gun, becauſe when the ſpaces occupied by the fired powder are as 1, 2, 3, 4, &c. the force of the powder, or the ordinates repreſenting it, will be as 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. it appears that the curve will be a common hyperbola, and that the area intercepted between it, its aſymptote, and the two ordinates repreſenting the force of the powder at the firſt exploſion and at the muzzle of the piece, will repreſent the total action of the powder on the ball; but if the ball were urged through the ſame ſpace, by an uniform force equal to its gravity, the total action of this force would be repreſented by a rectangle, the baſe of which would be the baſe of the curve or intercepted portion of the aſymptote before mentioned, and the height of which would repreſent the uniform force of gravity. Hence the ſquare of the velocity of the ball, reſulting from the action of the gunpowder, will be to the ſquare of the velocity, reſulting from the action of gravity, as the area of the hyperbolic ſpace is to the area of the rectangle: but the velocity of the ball reſulting from gravity is given, being the velocity it would acquire from a height equal to the ſpace through which the powder accelerates it; and the proportion between the hyperbolic ſpace and the rectangle is alſo given, from the analogy of hyperbolic ſpaces and logarithms; therefore the velocity of the ball ariſing from the action of the fired gunpowder will be given. This reaſoning may be illuſtrated by a view of *fig* 3. *Plate* I. *Gunnery*, in which let A B repreſent the axis of any piece of artillery, A the breech, and B the muzzle; D C the diameter of its bore, and D E G C a part of its cavity filled with powder. Suppoſe the ball, that is to be impelled, to lie with its hinder ſurface at the line G E, then the preſſure exerted at the exploſion, on the circle of which G E is the diameter, or, which is the ſame thing, the preſſure exerted in the direction F B, on the ſurface of the ball, is eaſily known from the known dimenſions of that circle; draw any line F H perpendicular to F B, and A I parallel to F H, and through the point H, to the aſymptotes I A and A B, deſcribe the hyperbola K H N Q; then if F H repreſents the force impelling the ball at the point F, the force impelling the ball in any other place, as M, will be repreſented by the line M N, the ordinate to the hyperbola at that point; for when the fluid impelling the body along has dilated itſelf to M, its denſity will be then to its original denſity in the ſpace D E G C reciprocally as the ſpaces through which it is reſpectively extended; that is, as F A to M A, or as M N to F H; but it appears, that the elaſticity or impelling force of this fluid is directly as its denſity; therefore, if F H repreſents that force at the point F, M N will repreſent the like force at the point M.

Since the abſolute quantity of the force impelling the ball at the point F is known, and the weight of the ball is likewiſe known; the proportion between the force the ball is impelled with, and its own gravity, is known. In this proportion take F H to F L, and draw L P parallel to F B; then M N, the ordinate to the hyperbola in any point, will be to its part M R, cut off by the line L P, as the impelling force of the powder, in that point M, to the gravity of the ball; and conſequently, the line L P will determine a line proportional to the uniform force of gravity in every point; whilſt the hyperbola H N Q determines in like manner ſuch ordinates as are proportional to the impelling force of the powder in every point; whence, by the 39th propoſition of lib. i. of ſir Iſaac Newton's Phil. Nat. Prin. Math. the areas F L P B and F H Q B are in the duplicate proportion of the velocities which the ball would acquire, when acted on by its own gravity through the ſpace F B, and when impelled through the ſame ſpace by the force of the powder. But ſince the ratio of A F to A B, and the ratio of F H to F L are known, the ratio of the area F L P B to the area F H Q B is known; and thence its ſubduplicate. And ſince the line F B is given in magnitude, the velocity which a heavy body would acquire when impelled through this line by its own gravity, is known, being no other than the velocity it would acquire by falling through a ſpace equal to that line; find then another velocity, to which this laſt mentioned velocity bears the given ratio of the ſubduplicate of the area F L P B to the area F H Q B, and this velocity, thus found, is the velocity the ball will acquire when impelled through the ſpace F B by the action of the inflamed powder.

To give an example of this, let us ſuppoſe the length of a barrel of a gun, or A B, to be 45 inches, its diameter D C, or rather the diameter of the ball to be $\frac{3}{4}$ of an inch, and the ſpace occupied by the powder, A F, to be $2\frac{5}{8}$ inches; to determine the velocity which will be communicated to a leaden bullet by the exploſion, ſuppoſing the bullet laid at firſt with its ſurface contiguous to the powder.

By the theory here laid down it appears, that at the firſt inſtant of the exploſion the flame will exert, on the ball lying cloſe to it, a force one thouſand times greater than the preſſure of the atmoſphere. But the mean preſſure of the atmoſphere is eſteemed equal to that of a column of water 33 feet high; whence, lead being to water as 11.345 to one, this preſſure will be equal to that of a column of lead 34.9 inches in height; whence, multiplying this by 1000, a column of lead 34900 inches high would produce a preſſure equal to what is exerted on the ball by the powder in the firſt inſtant of the exploſion; and the leaden ball being $\frac{3}{4}$ of an inch in diameter, and conſequently, equal to a cylinder of lead on the ſame baſe $\frac{1}{2}$ an inch in height, the preſſure at firſt acting on it will be equal to 34900 × 2, or 69800 times its weight; whence the force of gravity, F L, is to that of the powder at its firſt exploſion, F H, as 1 to 69800: and F B to F A is as $45 - 2\frac{5}{8}$ (or $42\frac{3}{8}$) to $2\frac{5}{8}$; that is, as 339 to 21; whence the rectangle F L P B, is to the rectangle A F H S, as 339 to 21 × 69800; that is, as 1 to 4324—. And from the known application of the logarithms to the menſuration of the hyperbolic ſpaces, it follows, that the rectangle A F H S, is to the area F H Q B as .43429, &c. is to the tabular logarithm of $\frac{A\,B}{A\,F}$; that is, of $\frac{360}{21}$, which is 1.2340579; whence the ratio of the rectangle F L P B to the hyperbolic area F H Q B is compounded of the ratios of 1 to 4324—, and of .43429, &c. to 1.2340579;

which together make up the ratio of 1 to 12263, the ſubduplicate of which is the ratio of 1 to 110 7; and in this ratio is the velocity, which the bullet would acquire by gravity, in falling through a ſpace equal to F B, to the velocity the bullet will acquire from the action of the powder, impelling it through F B; but the ſpace F B being 42$\frac{3}{4}$ inches, the velocity a heavy body will acquire in falling through ſuch a ſpace is known to be, what would carry it nearly at the rate of 15.07 feet in 1″ of time; whence the velocity, to which this has the ratio of 1 to 110.7 is a velocity, which would carry the ball at the rate of 15.07 × 110.7 feet in 1″ of time; that is, at the rate of 1668 feet in 1″ of time. And this is the velocity, which, according to the theory, the bullet in the preſent circumſtances would acquire from the action of the powder, during the time of its dilatation. And this being once computed for one caſe, is eaſily applied to any other; for if the cavity D E G C left behind the bullet be only in part filled with powder, then the line H F, and conſequently the area F H Q B will be diminiſhed in the proportion of the whole cavity to the part filled; if the diameter of the bore be varied, the lengths A B and A F remaining the ſame, then the quantity of powder and the ſurface of the bullet, which it acts on, will be varied in the duplicate proportion of the diameter; but the weight of the bullet will vary in the triplicate proportion of the diameter; wherefore the line F H, which is directly as the abſolute impelling force of the powder, and reciprocally as the gravity of the bullet, will change in the reciprocal proportion of the diameter of the bullet. If A F, the height of the cavity left behind the bullet, be increaſed or diminiſhed, the rectangle of the hyperbola, and conſequently the area correſponding to ordinates in any given ratio, will be increaſed or diminiſhed in the ſame proportion. From all which it follows, that the area F H Q B, which is in the duplicate proportion of the velocity of the impelled body, will be directly as the logarithm $\frac{AB}{AF}$, (where A B repreſents the length of the barrel, and A F the length of the cavity left behind the bullet,) alſo directly as the part of that cavity filled with powder, and inverſely as the diameter of the bore, or rather of the bullet, likewiſe directly as A F the height of the cavity left behind the bullet. Conſequently the velocity being computed above, for a bullet of a determined diameter, placed in a piece of a given length, and impelled by a given quantity of powder, occupying a given cavity behind that bullet; it follows, that by means of theſe ratios the velocity of any other bullet may be thence deduced, the neceſſary circumſtances of its poſition, quantity of powder, &c. being given. Where note, that in the inſtance of this propoſition we have ſuppoſed the diameter of the ball to be $\frac{3}{4}$ of an inch: whence the diameter of the bore will be ſomething more, and the quantity of powder contained in the ſpace D E G C will amount to exactly 12dwt. a ſmall wad of tow included. If the ſeveral quantities above ſpecified are expreſſed by algebraic ſymbols, we ſhall have the following ſtatement and general reſult: let v be the velocity of the ball, a the length of the charge of powder, b the whole length of the bore, c the ſpecific gravity of the ball, or weight of a cubic foot of the ſame matter in ounces, d the diameter of the bore, and w the weight of the ball in ounces. Then $v = 27130 \sqrt{\frac{10a}{cd} \times \log. \frac{b}{a}}$ or $= 100 \sqrt{\frac{223\,ad^2}{w} \times \log. \frac{b}{a}}$.

E. G. Suppoſe $a = 2\frac{5}{8}$ inches, $b = 45$ inches, $c = 11345$ oz. for a ball of lead, and $d = \frac{3}{4}$ inch: then $v = 27130 \sqrt{\frac{7}{2269} \times \log. \frac{120}{7}} = 1674$ feet, the velocity of the ball, *per* ſecond. Or, if the weight of the bullet be $w = 1\frac{9}{20}$ oz. $= \frac{29}{20}$ oz. Then $v = 100 \sqrt{\frac{1115 \times 189}{29 \times 52} \times \log. \frac{120}{7}} = 1674$ feet, as before.

As to the firſt of the principles here aſſumed, the author has obſerved, (ſee alſo his Mathematical Tracts, vol. i. p. 164, &c.) that it would be found erroneous, if examined with a geometrical rigour; ſince it cannot be queſtioned but the flame acts in ſome degree on the bullet after it is out of the piece: but, in experiments, no ſuch accuracy is attainable; minute irregularities are the neceſſary concomitants of all complicated experiments: in the colliſion of bodies, in the running or ſpouting of water, even in ſmall velocities, irregularities happen not reconcileable to theory or to each other; what may not then be ſuppoſed to happen from the action of ſo furious a power as gunpowder? From experiments it appears, that the velocities of bullets fired from the ſame piece, charged with the ſame powder, and all other circumſtances as nearly as poſſible the ſame, do yet differ from each other by ſometimes more than $\frac{1}{30}$th part of the whole; but this is a ſmall degree of inaccuracy in a caſe of this nature, and if the action of the flame on the bullet, after it is out of the piece, is ſo ſmall as to produce no greater effect than what may be deſtroyed by the inevitable variations of the experiments, the neglecting it entirely is both convenient and a reaſonable procedure. Now, what gives ground to think that this poſtulatum, though not rigorouſly true, may be ſafely aſſumed, is the conſideration of the ſpreading of the flame by its own elaſticity, as ſoon as it eſcapes from the mouth of the piece; for by this it may be conceived that the part of it which impinges on the bullet may be neglected, although the impulſe of the flame be a very remarkable force.

With regard to the ſecond aſſumed principle, that all the powder is fired before the bullet is ſenſibly moved from its place, it is to be obſerved, that this very poſition, having been examined by a committee of the Royal Society, was, after ſeveral experiments, determined in the negative, from whence many may be ready to conclude, that the whole theory muſt be overturned. But this requires a farther diſcuſſion; and it will appear, that though this principle be not rigorouſly true, no more than the former, yet it ſeems alſo that it may be ſafely admitted in inveſtigating the effects of powder, ſince, even in ſhort barrels, where the ſpace the bullet was impelled through was not five inches, and where of courſe the deficiency of velocity was greateſt, it cannot amount to one thirtieth of the whole. This will appear from the experiments made by the committee; for when the barrel was ſo ſhortened, that the bullet, being placed cloſe to the wad, lay with its outer ſurface nearly level with the mouth of the piece, yet, even in this ſhort tranſit of the bullet, but $\frac{1}{7}$ of the whole charge, at a medium, was collected unfired, which $\frac{1}{6}$, properly reduced, amounts to but $\frac{1}{14}$ of the charge. This reduction is founded on theſe conſiderations, that the powder uſed by the committee being unequally grained, when the ſmaller grains, collected by ſifting, were uſed, the quantity remaining unfired was leſs at the medium in the ratio of 5 to 3, than when it was uſed without ſifting. Alſo, by extracting the ſalt-petre from the powder collected unfired, there was leſs ſalt-petre contained in it than in real powder, nearly in the ratio of 9 to 7. Now theſe two proportions compounded, make the proportion of 15 to 7, in which proportion muſt the quantities of powder unfired be reduced, in order to determine the quantity of fine good powder that might be ſuppoſed to remain unfired in the experiments brought to confirm the aforeſaid theory.

Now, it appears, by experiments, that the velocities of bullets placed in the ſame ſituation, are in the ſub-duplicate proportion of the charges; conſequently the deficiency of the velocity ariſing from the loſs of $\frac{1}{12}$ of the charge will be about $\frac{1}{24}$ of the velocity only. And in the experiments made with a barrel $5\frac{1}{7}$ inches in length, where the ball had not three inches to move, the quantity of real powder collected unfired from a charge of 12dwt, would have been no more than 16 grains, at a medium, or $\frac{1}{18}$ of the whole charge, which would produce a deficiency of $\frac{1}{36}$ of the velocity only: a difference leſs than what frequently occurs in the exacteſt repetition of the ſame experiments.

This, it is thought, is fully ſufficient to juſtify the principle in queſtion; eſpecially, as in all caſes of real uſe, the length of the barrel, in proportion to the quantity of the charge, will be much greater than in the inſtances here mentioned. See Phil. Tranſ. N° 469, p. 450, 452, &c. or Martyn's Abr. vol. viii. p. 260. or Robins's Math. Tracts, vol. i. p. 164, &c. and ſee the experiments of the committee in the Tranſactions, N° 465. p. 172, 173, &c. or Martyn's Abr. vol. viii. p. 253, &c.

The greateſt number of thoſe who have written on the manner in which powder takes fire, have ſuppoſed it to be done by regular degrees; the firſt grains firing thoſe contiguous, and they the next ſucceſſively; and it has been generally thought that a conſiderable time was employed in theſe various communications: for Mr. Daniel Bernouilli, in his Hydrodynamica, has concluded, from ſome experiments made at Peterſburgh, that the greateſt part of the charge eſcapes out of the piece unfired, and that the ſmall part which is fired does not take fire till it is near the mouth. Many theories too have been compoſed on the time of the progreſs of the fire amongſt the grains, and the different modifications which the force of powder did thence receive; and it has been generally conceived, that the proper lengths of pieces were determinable from this principle; ſo that they ſhould be long enough to give time for all the powder to fire.

But no ſuch regular and progreſſive ſteps ſeem obſervable in the exploſion, for conſidering that by loading with a greater weight of bullet, and thereby almoſt doubling the time of the continuance of the powder in the barrel, its force receives but an inconſiderable augmentation; and that doubling and trebling the uſual charge, the powder thus added always produces a correſpondent effect in the velocity of the bullet; likewiſe, that in a piece near four feet in length, charged with an uſual charge of powder, the velocity communicated to the bullet, during the firſt three inches of its motion, is full half the velocity acquired in its whole paſſage through the barrel; and conſidering alſo that the elaſticity or force of the powder, in the three firſt inches of its expanſion, is at a medium near eight times greater than in the two laſt feet of the barrel; it may be concluded from all theſe circumſtances, that the time employed by the powder in taking fire was not neceſſary to be attended to in theſe computations; but that the whole maſs might be ſuppoſed to be kindled, before the bullet was ſenſibly moved from its place.

And the experiments reported by the committee of the Royal Society, before-mentioned, are ſtrong proofs that the powder is not fired in the progreſſive manner uſually ſuppoſed; for when the ſhort barrel was charged with twelve penny-weight and ſix penny-weight reſpectively, the quantity of powder which was collected unfired from twelve penny-weight, did not exceed by three grains, at a medium, what was collected from ſix penny-weight, although the bullet was a leſs time in paſſing through the barrel with twelve penny-weight than with ſix, it having a leſs way to move; conſequently the quantity remaining unfired of the ſix penny-weight, did not continue unfired for want of time; ſince when the piece was charged with twelve penny-weight, the additional ſix penny-weight was conſumed in a ſhorter time. See Phil. Tranſ. N° 469. p. 450. or Robins, &c. ubi ſupra.

Mr. Robins has alſo given us an ingenious way of determining, by experiments, the velocity which any ball moves with, at any diſtance from the piece it is diſcharged from.

This may be effected by means of a pendulum made of iron, having a broad part at bottom, covered with a thick piece of wood which is faſtened to the iron by ſcrews. Then having three poles joined together by their tops, and ſpreading at bottom, ſuch as are vulgarly uſed in weighing and lifting heavy bodies, and called by workmen triangles; on two of theſe poles, towards their tops, are ſcrewed on ſockets, on which the pendulum is hung by means of a croſs-piece, which becomes its axis of ſuſpenſion, and on which it ought to vibrate with great freedom. Something lower than the bottom of the pendulum there ſhould be a brace, joining the two poles to which the pendulum is ſuſpended; and to this brace there is faſtened a contrivance made with two edges of ſteel, ſomething in the manner of a drawing pen; the ſtrength with which theſe edges preſs on each other being diminiſhed or increaſed at pleaſure, by means of a ſcrew. To the bottom of the pendulum ſhould be faſtened a narrow ribbon, which paſſing between the ſteel edges, may hang looſely down by means of an opening cut in the lower piece of ſteel.

The inſtrument being thus fitted, if the weight of the pendulum, the reſpective diſtances of its centre of gravity, and of its centre of oſcillation from its axis of ſuſpenſion be known, it may from thence be found what motion will be communicated to this pendulum by the percuſſion of a body of a known weight moving with a known degree of velocity, and ſtriking it in a given point; that is, if the pendulum be ſuppoſed at reſt before the percuſſion, it will be known what vibration it ought to make in conſequence of ſuch a blow; and if the pendulum, being at reſt, is ſtruck by a body of a known weight, and the vibration which the pendulum makes after the blow is known, the velocity of the ſtriking body may from thence be determined.

Now the extent of the vibration, made by the pendulum, may be meaſured by the ribbon. For if the preſſure of the ſteel edges on the ribbon be regulated by the ſcrew, ſo as to be free and eaſy, though with ſome minute reſiſtance to hinder its ſlipping of itſelf, then ſetting the pendulum at reſt, let the part of the ribbon between the pendulum and ſteel edges be drawn ſtraight, but not ſtrained; and fixing a pin in the part of the ribbon contiguous to the edges, the pendulum ſwinging back by the impulſe of the ball, will draw out the ribbon to the juſt extent of its vibration, which will be determined by the interval on the ribbon between the edges and the place of the pin.

The computation by which the velocity of the ball is determined,

termined, from the vibration of the pendulum after the ſtroke, is founded on this principle of mechanics: that if a body in motion ſtrikes on another at reſt, and they are not ſeparated after the ſtroke, but move on with one common motion, then that common motion is equal to the motion with which the firſt body moved before the ſtroke; whence, if that common motion and the maſſes of the two bodies are known, the motion of the firſt body before the ſtroke is thence determined. On this principle it follows, that the velocity of a bullet may be diminiſhed in any given ratio, by its being made to impinge on a body of a weight properly proportioned to it; and hereby the moſt violent motions, which would otherwiſe eſcape our examination, are eaſily determined by the retarded motions which have a given relation to them. See New Princip. of Gunnery, p. 28, 29, &c. See alſo the Phil. Tranſ. N° 469. p. 444. where a ſmall correction, relating to a number in Mr. Robins's 8th propoſition is mentioned: or Math. Tracts, vol. i. p. 83, &c. and p. 163, &c,

It is to be obſerved, that the length to which the ribbon is drawn, is always nearly the chord of the arch deſcribed by the aſcent; it being ſo placed, as to differ inſenſibly from thoſe chords which moſt frequently occur; and theſe chords are known to be in the proportion of the velocities of the pendulum acquired from the ſtroke. Hence it follows, that the proportion between the lengths of ribbon drawn out at different times, will be the ſame with that of the velocities of the impinging bullets.

Now from the computations delivered by Mr. Robins, it appears, that the velocity of a bullet, whoſe weight was $\frac{1}{12}$ of a pound, was 1641 feet in one ſecond of time, when the chord of the arch deſcribed by the aſcent of the pendulum, in conſequence of the blow, was $17\frac{1}{4}$ inches. Therefore, by the proportion of any other lengths of ribbon drawn out, by any percuſſion, to $17\frac{1}{4}$, the proportion of the velocity with which the bullets impinge, to the known velocity of 1641 feet in 1″, will be determined.

As experiments of this kind are often attended with danger and difficulty, thoſe who may be diſpoſed to make any, will find ſeveral uſeful practical cautions, in p. 31, 32, and 33, of the ſaid treatiſe.

Mr. Thompſon (count Rumford) has made many experiments for determining the velocities of bullets by means of a pendulum, according to the method of Mr. Robins; for an account of which ſee Phil. Tranſ. for 1781, vol. lxxi. Dr. Hutton, in his "Tracts," (vol. i. p. 119,) has given a ſimpler rule than that of Mr. Robins, or of M. Euler and Antoni, who followed him in this buſineſs, for computing velocities from experiments with the machine above deſcribed; and the rule is expreſſed by either of the two following formulas: *viz.* $v = 5.6727\, cg \times \frac{p+b}{bir}\sqrt{o} = 614.58\, cg \times \frac{p+b}{birn}$, the velocity, where v denotes the velocity of the ball when it ſtrikes the pendulum, p the weight of the pendulum, b the weight of the ball, c the chord of the arc deſcribed by the vibration to the radius r, g the diſtance below the axis of motion to the centre of gravity, o the diſtance to the centre of oſcillation, i the diſtance to the point of impact, and n the number of oſcillations performed by the pendulum in one minute, when made to oſcillate in ſmall arcs. The latter of theſe two theorems is much the moſt eaſy, both becauſe it is free from radicals, and becauſe the value of the radical $\sqrt{o}$ in the former, is to be firſt computed from the number n, the number of oſcillations which the pendulum is obſerved to make.

By the experiments recited at large, in propoſition IX. of the ſame treatiſe, it appears, that the computations from Mr. Robins's theory, compared with thoſe experiments which were made with barrels of various lengths, from ſeven inches to forty-five, and with different quantities of powder, from ſix penny-weight to thirty-ſix, have a remarkable coincidence, and ſuch as occurs but in a few philoſophical ſubjects of ſo complicated a nature.

Suppoſing, for inſtance, the length of a barrel to be 45 inches, the quantity of powder 12 penny-weight, the cavity containing it $2\frac{5}{8}$ inches, and the ball $\frac{3}{4}$ inches diameter, weighing $1\frac{1}{3}$ ounce, or $\frac{1}{12}$ of a pound avoirdupoiſe, and the windage or exceſs of the diameter of the barrel above that of the bullet about $\frac{1}{40}$ of an inch; the velocity of the bullet will, by theory, be about 1670 feet in one ſecond, and this velocity is found in theſe experiments, to be the mean velocity which the ball really receives in thoſe circumſtances. Hence we may determine the velocities with which muſket and cannon-ſhot are diſcharged from their reſpective pieces, by their uſual allotment of powder.

For as a leaden ball of $\frac{3}{4}$ inch diameter, and weighing nearly $1\frac{1}{3}$ ounce avoirdupoiſe, being fired from a barrel of 45 inches in length, with half its weight of powder, will have a velocity at its iſſuing from the piece, which, if uniformly continued, would carry it near 1700 feet in 1′; ſo if inſtead of a leaden ball an iron one of the ſame diameter was placed in the ſame ſituation in the ſame piece, and was impelled by the ſame quantity of powder, the velocity of ſuch an iron bullet would be greater than that of the leaden one, in the ſubduplicate ratio of the ſpecific gravities of lead and iron; and ſuppoſing that ratio to be as 3 to 2, and computing on the foregoing principles, it will appear, that an iron bullet of 24*lb.* weight, ſhot from a piece of ten feet in length, with 16*lb.* of powder, will acquire from the exploſion a velocity, which, if uniformly continued, would carry it nearly 1650 feet in 1″. But if inſtead of this full charge, weighing two-thirds of the ball, we ſuppoſe the charge to be only half that weight, then its velocity would be no more than at the rate of 1490 feet in 1′; and the ſame would be the velocities of every leſſer bullet, fired with the ſame proportions of powder, if the lengths of all pieces were conſtantly in the ſame ratio with the diameters of their bore; and though this proportion does not always hold, yet the difference is not conſiderable enough to occaſion a very great variation from the velocities here aſſigned. But in theſe determinations, the windage is ſuppoſed to be no more than is juſt neceſſary for the eaſy putting down the bullet; whereas in real ſervice, either through negligence or unſkilfulneſs, it often happens, that the diameter of the bore ſo much exceeds the diameter of the bullet, that great part of the inflamed fluid eſcapes by its ſide; whence the velocity of the ſhot may, in this caſe, be conſiderably leſs than what is here aſſigned: however part of this may poſſibly be compenſated by the greater heat which in all probability attends the firing theſe large quantities of powder.

The theory here eſtabliſhed ſuppoſes what is ſaid under the head GUNPOWDER, that the powder when fired is equally hot with iron at the beginning of its white heat; but in very ſmall quantities of powder the heat is probably leſs, and conſequently the elaſticity leſs than what ariſes from this ſuppoſition. Now this decreaſe of elaſticity in ſmall quantities of powder has been found in many trials actually to take place. For inſtance, according to the theory before laid down, the velocity given the ball by the action of the powder, is in round numbers 1670 feet in 1″; and this, as has been ſaid, is confirmed by the experiments taken at a medium. If now the barrel and poſition of the ball remaining the ſame, there be placed in the ſpace that contained twelve penny-weight of powder there mentioned, only one penny-weight; it follows, that if the elaſticity of the ſmaller charge be the ſame in proportion to its quantity with that of the larger, then the velocity of the bullet, when impelled by the exploſion of the ſmaller charge, will be to the velocity of a bullet impelled by a greater charge in the ſubduplicate ratio of the quantities of the reſpective charges, that is, in the ſubduplicate ratio of 1 to 12. Conſequently the velocity communicated by twelve penny-weight, being known to be that of 1670 feet in 1″, the velocity communicated by one penny-weight would be that of 482 feet in 1″ nearly; but by repeated trials, differing little from each other, it has been found, that the real velocity acquired by the ball in this caſe, from the exploſion of one penny-weight, was rather leſs than that of 400 feet in 1″. Whence it is evident, that the elaſticity of one penny-weight of powder, when fired, is leſs in proportion to its quantity than that of twelve penny-weight, as it ought to be by the theory.

So if three penny-weight of powder be placed in the ſame manner with the one penny-weight laſt-mentioned, the real velocity the ball will acquire from the exploſion will be from 740 to 720 feet in 1″. Whereas, ſuppoſing the elaſticity of three penny-weight, when fired, to be in ſimilar circumſtances the ſame with that of twelve penny-weight, the velocity acquired by the ball ſhould be 825 feet in 1″.

It is farther to be obſerved, that the theory eſtabliſhed under the head Gunpowder, ſuppoſes that in the firing of gunpowder about $\frac{1}{10}$ of its ſubſtance is converted by the ſudden inflammation into a permanent elaſtic fluid, the elaſticity of which in proportion to its heat and denſity, is the ſame with that of the common air in the like circumſtances: it farther ſuppoſes, that all the force exerted by gunpowder in its moſt violent operations, is no more than the action of the elaſticity of the fluid thus generated; and theſe principles enable us to determine the velocities of bullets impelled from fire-arms of all kinds.

From this theory appears the inconcluſiveneſs of what ſome authors have advanced relating to the advantages of particular forms for the chambers of mortars and cannon; for all their laboured ſpeculations on this head are evidently founded on very erroneous opinions about the actions of fired powder. Lib. cit. p. 99.

But it muſt not be diſſembled, that however probable this theory may be from the experiments and reaſons on which it is founded, there ſtill remains a difficulty which ſeems not yet fully accounted for. The doubt ariſes from ſome experiments made before a committee of the Royal Society, who hereupon gave it as their opinion, that the change of the form in the chamber will produce a change of the diſtance to which the bullet is thrown. The experiments upon which this opinion was founded, were as follow:

Three braſs chambers were made, whoſe depths were reſpectively three inches, $1\frac{1}{2}$ inch and $\frac{3}{4}$ inch; ſo turned as to fit the chamber of a braſs mortar exactly; each of theſe chambers contained, when full, one ounce troy of powder. The ball was of braſs, weighing nearly 356 ounces troy: the ball touched the powder of the charge in all theſe experiments. With the firſt chamber of three inches deep, the elevation of the mortar being 45 , the range taken at a medium of three ſhot was 741 feet; and the mean diſtance to which the ball was thrown with the chamber of $\frac{3}{4}$ inch deep, was but 464 feet. As to the chamber of $1\frac{1}{2}$ inch, it not fitting the chamber of the mortar exactly, the ranges were very irregular; but the leaſt range, though fired late in the damp of the evening, exceeded the fartheſt range of the $\frac{3}{4}$ inch chamber, and the fartheſt range extended to 686 feet; ſo that the committee ſeem well warranted in their opinion. The difficulty is to reconcile this with the foregoing theory. Its ingenious author has in general obſerved, in the account of his book given in the Phil. Tranſ. N° 469. p. 455. or Tracts, &c. vol. i. p. 173, that when the charge is much ſmaller than the uſual allotment of powder, there are ſome irregularities, as thoſe ariſing from the different heat of ſmall and large quantities of powder, to which head too perhaps muſt be referred the experiments made by the committee on the effect of different ſmall chambers; but in cuſtomary charges, the velocities of bullets reſulting from all the experiments hitherto made are really ſuch as the theory requires. And it appears, that theſe velocities are much greater than what they have been hitherto accounted; and there are reaſons from the theory to believe, that in cannon-ſhot the velocities may ſtill exceed the foregoing computation. See Phil. Tranſ. N 465. or Martyn's Abr. vol. viii. p. 253, &c.

If a bullet be laid at a conſiderable diſtance from the charge, the principles before laid down cannot then be applied to determine the velocity of the ball; they being only applicable in caſes where the bullet is contiguous to the charge, or nearly ſo. For by what is ſhewn under the article Gunpowder, when the ſurface of fired powder is not confined by a heavy body, which it is obliged to impel before it, the flame dilates itſelf with a velocity, much beyond what it can at any time communicate to a bullet by its continued preſſure; becauſe the powder having acquired a conſiderable degree of velocity of expanſion, the firſt motion of the ball will not be produced by the continual preſſure of the powder, but by the percuſſion of the flame. From whence it follows, that the velocity of a bullet, laid at a conſiderable diſtance before the charge, ought to be greater than what would be communicated to it by the preſſure of the powder acting as before mentioned in this article. And this deduction from theory is confirmed from experience, by which it was found that a ball laid in a barrel, at the diſtance of $11\frac{1}{4}$ inches from the breech, and impelled by twelve penny-weight of powder, acquired in its diſcharge a velocity of about 1400 feet in 1″; whereas if it had been acted on by the preſſure of the flame only, it would not have acquired a velocity of 1200 feet in 1″. The ſame was found to hold true in all other great diſtances (and alſo in leſſer, though not in the ſame degree) and in all quantities of powder. And from hence ariſes a conſideration of conſequence in practice, which is, that no bullet ſhould at any time be placed at any conſiderable diſtance before the charge, unleſs the piece be extremely well fortified; for a moderate charge of powder, when it has expanded itſelf through the vacant ſpace, and reaches the ball, will, by the velocity each part has acquired, accumulate itſelf behind the ball, and be thereby prodigiouſly condenſed; whence if the barrel be not extraordinarily ſtrong, it muſt burſt. This is confirmed by the experience of an exceeding good Tower muſket of very tough iron, which being charged with twelve penny-weight of powder, and the ball being placed ſixteen inches from the breech, upon firing the piece, part of the barrel, juſt behind the bullet, was ſwelled out to double its diameter, and two large pieces burſt out of it. If the powder be not placed together at the breech, but ſcattered uniformly through the whole cavity left behind the bullet, the progreſſive motion of the flame may hence be ſuppoſed to be prevented by the expanſion of the neighbouring parts. And it was found that the ball, being laid as before, $11\frac{1}{4}$ inches from the breech, its velocity, in this caſe, inſtead of 1400 feet in 1″, was only 1100 feet. See New Principles of Gunnery, part i. prop. 12. or Tracts, &c. p. 113, &c.

It appears from experience, that bullets of the ſame diameter and denſity impinging on the ſame ſolid ſubſtance with different velocities, will penetrate that ſubſtance to different depths, which will be in the duplicate ratio of thoſe velocities nearly. Thus a leaden bullet of $\frac{3}{4}$ of an inch in diameter, being fired againſt a ſolid block of elm with different velocities, as of 1700 feet, 730, and 400 feet in 1″, the cavities were found to be as 55, 10, and 3, reſpectively; which are nearly in the duplicate proportion of thoſe velocities: perfect regularity in caſes of this nature cannot be expected, when the unequal texture of the ſame piece of wood, and the change of the form, and the bullet by the ſtroke, are conſidered.

From the penetration being in the duplicate proportion of the velocity of the impinging body, it follows, that the reſiſtance of the wood, like that of gravity, is uniform. See New Princip. of Gunnery, p. 94, 95. or Tracts, &c. p. 152. See GUN.

It appears from the account already given of Mr. Robins's admirable experiments, that the balls he made uſe of, in aſcertaining their initial velocity, were very ſmall, being only muſket balls of about one ounce in weight; but other occupations, and his immature death, prevented his proſecuting his experiments with others of a larger ſize. This defect is now, in a very conſiderable degree, ſupplied by the experiments of Dr. Charles Hutton, conducted in 1775 in conjunction with ſeveral able officers of the Royal Artillery, and other ingenious perſons; in which he has made uſe of ſmall cannon balls, from one pound to near three pounds weight, and formed a variety of concluſions, which may be applied to cannon-ſhot of the largeſt ſize. The machinery uſed by Dr. Hutton is much of the ſame kind with that of Mr. Robins; and the intention of his experiments is to diſcover the initial velocity of military projectiles, or the velocity with which a ball iſſues from a piece.

The gun with which the experiments were made was of braſs; the diameter of the bore at the muzzle was 2.16 inches, and at the breech 2.08 inches; and the greateſt caſt iron ball, which it would admit, was $19\frac{1}{2}$ ounces avoirdupoiſe; but leaden balls weighing $1\frac{1}{4}$ pound, and long cylindrical ſhot weighing near three pounds, were ſometimes uſed; the length of the bore was 42.6 inches, ſo that it was nearly $20\frac{1}{2}$ calibres long. The powder was that commonly made for government, and the charge was 2, 4, or 8 ounces, put into a light flannel bag, and rammed without uſing any wad before it. The diſtance of the gun from the pendulum was 29 or 30 feet; and the depth of the penetration ſeemed to be near three inches in ſolid wood, when two ounces of powder were uſed. The firſt courſe of experiments was performed in May 1775, the day being clear and dry; and it appears from the reſult, that the mean velocity of five ſhot, with two ounces of powder, was 626 feet in 1″, and of two ſhot, with four ounces of powder, 915 feet in 1″, which velocities are in the ratio of 1 to 1.46. But the mean weight of the balls in the former caſe was $17\frac{1}{3}$ ounces, and in the latter $17\frac{1}{8}$ ounces, and the ratio of the quantities of powder was that of 1 to 2. In this inſtance it is evident, the velocities are very nearly as the ſquare roots of the quantities of powder directly, and the ſquare roots of the weights of the balls inverſely. The ſecond courſe of experiments was performed in June, in a clear and dry, but windy day. The mean velocity of the ſecond and third ſhot, in the experiments, was 973 feet in 1″, and of the fourth and fifth, 749 feet in 1″, which numbers are in the ratio of 1.3 to 1; the charges were two ounces, and the balls were $19\frac{1}{3}$ ounces and $46\frac{1}{2}$ ounces reſpectively. In this inſtance, the velocity of the heavier ſhot is a little leſs than what would ariſe from the inverſe ratio of the ſquare roots of the weight of the ſhot. Some of theſe experiments were rendered doubtful by the effect of the wind; but as the mean velocity is 973, and only 626 in the former courſe, with the ſame charge of powder, though the balls were heavier with the greater velocity, in the proportion of 19 to 17 nearly, Dr. Hutton aſcribes this remarkable difference chiefly to the windage in the firſt courſe, and takes occaſion from hence to recommend the uſe of balls approaching in proportion nearer to the diameter of the bore of the gun than what is preſcribed in the preſent eſtabliſhment. The next courſe of experiments was performed on a clear, dry, and calm day, in the ſame month. In ſix ſhot on this occaſion, the common mean weight of the ball was $18\frac{2}{3}$ ounces; the mean velocity with two ounces of powder was 738 feet in 1″, and that with four ounces 1043 feet in 1″; the ratio of which velocities is that of 1 to 1.414; or accurately the ratio of the ſquare roots of the quantities of powder. The fourth courſe was performed with another machine on a fine clear day in July. The machinery for this and the following courſe, ſays Dr. Hutton, was ſo perfect, and every circumſtance attending the experiments ſo carefully obſerved, that the concluſions reſulting from them may be relied on with great ſafety. Thoſe of the firſt day were made with leaden balls, and thoſe of the other with iron ones, which differed greatly in weight; and as every other circumſtance was the ſame, they afford very good means for diſcovering the law of the different weights of ſhot, while the variations in the powder from 2 to 4 and 8 ounces, furniſh us with the rule for the different quantities of it. The mean velocities with 2, 4, and 8 ounces of powder, were 613, 873, and 1162 feet in 1″, which are in the ratio of 1, 1.424 and 1.9; and theſe numbers are nearly in the ratio of the ſquare roots of the quantities of powder, *viz.* 1, 1 414 and 2. The mean weight of the balls uſed with 8 ounces of powder was $28\frac{2}{5}$ ounces; and that with the 2 and 4 ounces $28\frac{1}{3}$; the reciprocal ſubduplicate ratio of theſe is that of 1 to 1.006, in which proportion, increaſing 1.9, the number for the greater velocity, and it becomes 1.91, which falls ſhort of 2 by .09, or about the $\frac{1}{22}$d part too ſmall for the ſubduplicate ratio of the powder. This defect is aſcribed to three cauſes, *viz.* the leſs length of cylinder through which the ball was impelled: the greater quantity of elaſtic fluid which eſcaped in this caſe than in the others by the windage, on account of the greater velocity; and the greater quantity of powder blown out unfired in this caſe than in that of the leſs velocities. Hence we may infer, how ſmall the quantity of powder which is blown out unfired in any of theſe caſes, and the amazing quickneſs with which it fires in all caſes; for although the time in which the ball paſſed through the barrel, when impelled by the eight ounces of powder, was not much different from the half only of the time in which it was impelled by the two ounces, it is evident that in half the time there was nearly four times the quantity of powder fired. In the laſt courſe of experiments, conſiſting of fifteen ſhot, the mean velocities with 2, 4, and 8 ounces of powder, were 701, 993, and 1397 feet in 1″, which are as the numbers 1, 1.416 and 1.993, or nearly in the ſubduplicate ratio of the weights of powder, *viz.* 1, 1.414 and 2. The mean weight of the balls, which were iron, with the 2 and 4 ounces of powder, was $18\frac{3}{4}$ ounces, and with the 8 ounces of powder $18\frac{3}{5}$ ounces; and, therefore, if the number 1.993 be diminiſhed in the reciprocal ſubduplicate ratio of 18, to $18\frac{3}{4}$, it will become 1.985, which falls ſhort of the number 2 by .015, or the 133d part of itſelf; and this defect is to be aſcribed to the cauſes mentioned in the recital of the former courſe.

By comparing the correſponding velocities in theſe two laſt courſes, *viz.* 613 and 701, &c. it will be found that the ratio of the firſt, or of the velocities with two ounces of powder, is that of 1 to 1.1436; of the next two, *viz.* 873 and 993, that of 1 to 1.1375; and the ratio of the laſt, *viz.* 1162 and 1397, that of 1 to 1.2022. But the mean weight of the ſhot for the two and four ounces of powder, was 28$\frac{1}{3}$ ounces, and 18$\frac{3}{4}$ ounces; and for eight ounces of powder, 28$\frac{2}{3}$ ounces, and 18$\frac{3}{4}$ ounces; the reciprocal ſubduplicate ratio of the former will be that of 1 to 1.224, and of the latter that of 1 to 1.241; which are little different from the real ratios above found. The concluſions that may be deduced from theſe experiments are the following; *viz.* that powder fires almoſt inſtantaneouſly, as Mr. Robins had before obſerved; that the velocities communicated to balls of the ſame weight, with different charges, are nearly in the ſubduplicate ratio of theſe charges; and to balls of different weights, with the ſame charge, nearly in the reciprocal ſubduplicate ratio of their weights; and, therefore, when the weights of balls and charges differ, the velocities are directly as the ſquare roots of the charges, and reciprocally as the ſquare roots of the weights, nearly; ſo that it would be a great improvement to make uſe of a ſhot of a long form, or of heavier matter; as it would alſo be to diminiſh the windage; for thus one-third or more of the quantity of powder might be ſaved; and by combining theſe two laſt improvements, half the quantity of powder might be ſaved; and a ſmall gun might be made to produce the effect and execution of one two or three times its ſize, by diſcharging a ſhot of two or three times the weight of its natural ball or round ſhot. In this way a ſmall ſhip might diſcharge ſhot as heavy as thoſe of the greateſt now made uſe of. Experiments of this kind, performed with guns of various lengths, would likewiſe ſerve to determine the juſt length of cannon for ſhooting fartheſt with the ſame charge of powder. By means of ſuch experiments, properly conducted and varied, we may be able to ſolve every queſtion relating to military projectiles, except ſuch as depend on the *reſiſtance* of the air to bodies moving ſwiftly in it. See a farther account of the machinery uſed by Dr. Hutton, and of his experiments, in the Phil. Tranſ. vol. lxviii. for 1778. part i. art. 3. p. 50.

In Dr. Hutton's "Tracts," (vol. i.) publiſhed in 1786, the ingenious author has detailed, at great length, another very extenſive courſe of experiments, carried on at Woolwich in the years 1783, 1784, and 1785, by order of the duke of Richmond, then maſter general of the ordnance. The principal objects of this courſe, which are undoubtedly of great importance in their relation to this ſubject, were the following:—

" 1. The velocities with which balls are projected by equal charges of powder, from pieces of the ſame weight and calibre, but of different lengths.

" 2. The velocities with different charges of powder, the weight and length of the gun being the ſame.

" 3. The greateſt velocity due to the different lengths of guns, to be obtained by increaſing the charge as far as the reſiſtance of the piece is capable of ſuſtaining.

" 4. The effect of varying the weight of the piece, every thing elſe being the ſame.

" 5. The penetration of balls into blocks of wood.

" 6. The ranges and times of flight of balls; to compare them with their initial velocities for determining the reſiſtance of the medium.

" 7. The effect of wads;
of different degrees of ramming;
of different degrees of windage;
of different poſitions of the vent;
of chambers and trunnions, and every other circumſtance neceſſary to be known for the improvement of artillery."

All theſe objects were obtained in a very perfect and accurate manner; excepting only the article of ranges, which were not quite ſo regular and uniform as might be wiſhed. The balls, too, were moſt of them of one pound weight; but the powder was increaſed from one ounce, up till the bore was quite full; and the pendulum was from 600 to 800lb. weight. The concluſions from the whole were as follow:—

" 1. That the former law, between the charge and velocity of ball, is again confirmed, *viz.* that the velocity is directly as the ſquare root of the weight of powder, as far as to about the charge of eight ounces: and ſo it would continue for all charges, were the guns of an indefinite length. But as the length of the charge is increaſed, and bears a more conſiderable proportion to the length of the bore, the velocity falls the more ſhort of that proportion.

" 2. That the velocity of the ball increaſes with the charge to a certain point, which is peculiar to each gun, where it is greateſt; and that by farther increaſing the charge, the velocity gradually diminiſhes, till the bore is quite full of powder. That this charge for the greateſt velocity is greater as the gun is longer, but not greater however in ſo high a proportion as the length of the gun is; ſo that the part of the bore filled with powder bears a leſs proportion to the whole in the long guns, than it does in the ſhort ones; the part of the whole which is filled being indeed nearly in the reciprocal ſubduplicate ratio of the length of the empty part. And the other circumſtances are as in this table.

TABLE of Charges producing the greateſt Velocity.

Gun. Num.	Length of the bore.	Length filled.	Part of the whole.	Wt. of the powder.
	inches.	inches.		oz.
1	28.2	8.2	$\frac{3}{10}$	12
2	38.1	9.5	$\frac{3}{12}$	14
3	57.4	10.7	$\frac{3}{16}$	16
4	79.9	12.1	.3	18

" 3. It appears that the velocity continually increaſes as the gun is longer, though the increaſe in velocity is but very ſmall in reſpect of the increaſe in length, the velocities being in a ratio ſomewhat leſs than that of the ſquare roots of the length of the bore, but ſomewhat greater than that of the cube roots of the length, and is indeed nearly in the middle ratio between the two.

" 4. The range increaſes in a much leſs ratio than the velocity, and indeed is nearly as the ſquare root of the velocity, the gun and elevation being the ſame. And when this is compared with the proportion of the velocity and length of the gun in the foregoing paragraph, we perceive that very little is gained in the range by a great increaſe in the length of the gun, the charge being the ſame. And indeed the range is nearly as the fifth root of the length of the bore; which is ſo ſmall an increaſe, as to amount only to about one-ſeventh part more range for a double length of gun.

" 5. It alſo appears that the time of the ball's flight is nearly as the range; the gun and elevation being the ſame.

" 6. It appears that there is no ſenſible difference cauſed in the velocity or range, by varying the weight of the gun, nor by the uſe of wads, nor by different degrees of ramming, nor by firing the charge of powder in different parts of it.

“ 7. But a great difference in the velocity ariſes from a ſmall degree of windage. Indeed with the uſual eſtabliſhed windage only, namely, about one-twentieth of the calibre, no leſs than between one-third and one-fourth of the powder eſcapes and is loſt. And as the balls are often ſmaller than that ſize, it frequently happens that half the powder is loſt by unneceſſary windage.

“ 8. It appears that the reſiſting force of wood, to balls fired into it, is not conſtant. And that the depths penetrated by different velocities or charges, are nearly as the logarithms of the charges, inſtead of being as the charges themſelves, or, which is the ſame thing, as the ſquare of the velocity.

“ 9. Theſe, and moſt other experiments, ſhew that balls are greatly deflected from the direction they are projected in; and that ſo much as 300 or 400 yards in a range of a mile, or almoſt one-fourth of the range, which is nearly a deflection of an angle of 15 degrees.

“ 10. Finally, theſe experiments furniſh us with the following concomitant data, to a tolerable degree of accuracy, namely, the dimenſions and elevation of the gun, the weight and dimenſions of the powder and ſhot, with the range and time of flight, and the firſt velocity of the ball. From which it is to be hoped that the meaſure of the reſiſtance of the air to projectiles may be determined, and thereby lay the foundation for a true and practical ſyſtem of gunnery, which may be as well uſeful in ſervice as in theory.”

The author has perſevered with a laudable induſtry, and with no inconſiderable ſucceſs in his experiments, keeping his main objects in view, and gradually varying them, and alſo enlarging the guns and machinery, till experiments were made with ſix-pounder guns, and pendulums of 1800 pounds weight. Among the new objects of inveſtigation, a very important one was the reſiſtance of the atmoſphere to military projectiles; for aſcertaining which, the guns were placed at many different diſtances from the pendulum, againſt which they were fired, in order to obtain the velocity loſt in paſſing through thoſe ſpaces of air. By theſe and other means, Dr. Hutton inveſtigated the reſiſtance of the air to given balls moving with all degrees of velocity, from 0 up to 2000 feet per ſecond, as well as the reſiſtance for many degrees of velocity, to planes and figures of other ſhapes, and inclined to their path in all varieties of angles; from which he has deduced general laws and formulas for all ſuch motions. See Resistance.

Mr. Robins made ſeveral experiments ſimilar to thoſe of Dr. Hutton; but as muſket bullets only were employed, their ſmallneſs and change of figure by the exploſion of the gunpowder have rendered them inaccurate, and the reſults different from thoſe of Dr. Hutton, above-mentioned, which were accurately made with pretty conſiderable cannon balls of iron. All theſe experiments ſufficiently evince the very great reſiſtance which the air makes to the ſwift motions of military projectiles, which in ſome caſes amounts to 22 or 30 times the weight of the ball itſelf, and which render the common rules for projectiles, deduced from the parabolic theory, of little or no uſe in real practice.

Mr. Thompſon (count Rumford) inſtituted an extenſive courſe of experiments of the ſame kind as thoſe of Mr. Robins, with muſket barrels, of which we have an account in the Phil. Tranſ. vol. lxxi. for 1781. The reſult confirmed in general the concluſions of Mr. Robins. This ingenious philoſopher, with his accuſtomed aſſiduity, purſued a hint ſuggeſted by Mr. Robins with regard to the velocity of a ball from the recoil of the pendulous gun itſelf. Mr. Robins had remarked that the effect of the exploded powder upon the recoil of the gun is the ſame, whether the gun be charged with a ball, or have no charge; and that the chord, or velocity, of recoil with the powder alone, being ſubtracted from that of the recoil when charged with both powder and ball, leaves the velocity that belongs to the ball alone. The inference, ſays count Rumford, is obvious, *viz.* that the momentum thus communicated to the gun by the ball alone, being equal to the momentum of the ball, this becomes known; and therefore being divided by the known weight of the ball, the quotient will be its velocity. The celebrated M. Euler has added many excellent diſſertations on the ſubject of gunnery, in his tranſlation of Mr. Robins's Gunnery into the German language; and the ſubject has been further improved in Brown's tranſlation of Euler's Diſſertations into Engliſh in the year 1777. See alſo Antoni in his “ Examen de la Poudre;” D'Arcy's “ Eſſai ſur la Théorie de l'Artillerie;” Montalembert on the “ Rotation of Balls,” and on “ Proving Cannon,” Acad. Sc. 1755, 1759; Vandelli on the “ Force of Steam in Gunpowder,” Comment. Bonon. iii. iv.; Saluce on the “ Elaſtic Fluids produced from Gunpowder;” M. Taur. i. ii.; Caſali on the “ Force of Powder,” C. Bonon. v. ii.; Borda on “ Projectiles,” Ac. Sc. 1769; Simpſon in “ Select Exerciſes;” Gray on “ Gunnery;” Glenie's “ Hiſtory of Gunnery;” count Rumford, ubi ſupra, &c. &c. &c.; and, more particularly, Hutton in his “ Tracts,” Phil. Tranſ. for 1778, Edin. Phil. Tranſ. v. ii. &c.

GUNNING, Peter, in *Biography*, an Engliſh prelate, was born at How, in Kent, in the year 1613. He received the early part of his education at the free-ſchool in Canterbury, whence, at the age of fifteen, he was ſent to Clare Hall, in the univerſity of Cambridge. He was elected to a fellowſhip in 1633, and having taken his degree of M.A, he entered orders and was appointed to the cure of Little St. Mary's at Cambridge. He was very popular as a preacher, and diſtinguiſhed himſelf in the civil wars, by his zeal in defence of the king. His conduct excited the indignation of the parliamentary party, who ſubjected him to a ſhort impriſonment, and then ordered him to his college, where he was deſired to ſubſcribe “ the Covenant.” This he refuſed with indignation, and was accordingly ejected from the fellowſhip; when he determined to withdraw to Oxford, where, at that time, the king held his court. He had, however, a mind not eaſily daunted, and before he left Cambridge, in conjunction with Barrow and Ward, afterwards biſhops of St. Aſaph and Saliſbury, he drew up a ſpirited treatiſe againſt “ the Covenant,” which was afterwards publiſhed. On his arrival at Oxford, he was appointed chaplain to the New College; he alſo obtained a curacy at the diſtance of about four miles from Oxford, the duties of which he diſcharged for two years, though not without frequent interruptions and affronts, from parties of the ſoldiers belonging to the parliamentary garriſons. He was ſometimes called on to preach before the king, and for theſe ſervices he was preſented with the degree of bachelor of divinity, in the year 1646. After the ſurrender of Oxford to the parliament, he engaged as private tutor to Chriſtopher, lord Hatton, and then to ſir Francis Compton. Upon taking leave of his laſt pupil he was appointed chaplain to ſir Robert Shirley, who, as a teſtimony of reſpect for his abilities, ſettled on him an annuity of 100*l.* for life. On the death of this patron he officiated, every Sunday, in the chapel at Exeter-houſe, in London, preached and adminiſtered the ſacraments to crowded audiences, without any moleſtation, excepting that he was occaſionally ſent for and reproved by Cromwell. He would alſo, on the week days, look out for ſectaries, and diſpute with them openly in their own congregations. After the reſtoration of king Charles II. he received abundance of preferment of all kinds in the church, and in 1661, upon the ejectment of Dr. Tuckey, he was created regius profeſſor of divinity at Cambridge, and he alſo ſucceeded the ſame gentleman in the maſterſhip of St. John's college. On this occaſion it muſt be recorded to his honour, that he voluntarily ſettled on the ejected maſter a handſome annuity for life. In the year 1669, he was promoted to the ſee of Chicheſter, and in this ſituation he was very zealous in enforcing the laws for conformity; on ſome occaſions he would perſonally break up the meetings of diſſenters, and appear on the bench when non-conformiſts were to be tried for delinquency. He once gave a public challenge to the Preſbyterians, Independents, Baptiſts, and Quakers, and appointed the days for diſputations. The two former ſects he accuſed of ſchiſm and rebellion: the Baptiſts he treated with more civility, but he would ſuffer no reply. The Quakers would not ſo eaſily be put off, they addreſſed him with ſuch freedom, that he was glad to quit the pulpit and the church. Some of them followed him to his own houſe, continuing along the ſtreets obſervations which he was unwilling to hear. One, more bold than the reſt, plucked him by the ſleeve and exclaimed, "The hireling fleeth;—the hireling fleeth." In 1674, biſhop Gunning was tranſlated to the ſee of Ely, of which he proved an active ſuperintendant, and a bountiful benefactor till his death, which happened in 1684, when he was in the ſeventy-firſt year of his age. He was author of many publications which are now ſcarcely remembered. He was a zealous churchman, and was not aſhamed to own and to juſtify his principles when they were objects of perſecution, he therefore merited the honours and preferment which he enjoyed after the reſtoration. He was unweariedly active, and much of his life was ſpent in doing good. His benevolence was exerciſed in the exhibitions which he granted for the ſupport of poor ſcholars at the univerſities, and in endowments for the improvement of his ſees, the relief of the indigent and diſtreſſed; and at his death, he left the bulk of his property for the augmentation of poor vicarages.

GUNNY, a weight, is $\frac{3}{4}$ cwt. or 84lb. of cinnamon; or $1\frac{1}{4}$ cwt. = 140lb. of ſaltpetre.

GUNNISPOUR, in *Geography*, a town of Bengal; 30 miles S. of Currudeck.

GUNOLPS Fiord, a bay on the E. coaſt of Iceland. N. lat. 65° 50′.

GUNONG-TELLU, or Tominy, a large bay on the E. coaſt of the iſland of Celebes, nearly 180 miles long from E. to W. and from 50 to 90 broad. It contains ſeveral ſmall iſlands. Entrance S. lat. 6° 12′. E. long. 124°.

GUNPOWDER, a compoſition of nitre, ſulphur, and charcoal, mixed together, and uſually granulated, which eaſily takes fire, and, when fired, rarefies, or expands, with great vehemence, by means of its elaſtic force.

It is to this powder we owe all the action and effect of guns, ordnance, &c. ſo that the modern military art, fortification, &c. depend almoſt wholly upon it.

It has been eaſily diſcovered, that ſaltpetre or nitre is not indiſpenſibly neceſſary in the compoſition of gunpowder; and that it may be ſupplied by other ſubſtances. New gunpowder was ſome time ago made in France of double the ſtrength of the old, without any nitre; and Dr. Hutton tried ſome of it in 1790 at Woolwich, and found that it was about double the ſtrength of the ordinary ſort. The ſubſtitute for nitre is the like quantity of the marine acid. This, however, is an expenſive article; and it is attended with the inconvenience of taking fire and exploding, from a very ſmall degree of heat, and even without the aid of a ſpark. Some chemiſts have propoſed to ſubſtitute for nitre the oxymuriat of pot-aſh, and it has been found from experiments, ſufficiently deciſive, that gunpowder thus made exceeds with reſpect to energy of exploſion the common powder. But oxymuriats act differently from mixtures with nitre; they exert their power ſuddenly and in a very ſmall ſpace, ſo as to be very deſtructive; but in projectile force they are inferior to gunpowder. Theſe have alſo the dangerous quality of exploding with moderate friction. Some perſons, miſled by an experiment of Dr. Hales, which ſhews that burning ſulphur does not generate elaſtic air, but diminiſhes the quantity of common air, have imagined that ſulphur was an unneceſſary and even injurious ingredient of gunpowder. But M. Beaumé has found by experiments, that the force of gunpowder was nearly doubled by addition of the ſulphur. Sulphur, indeed, is not neceſſary for the exploſion of gunpowder, as the other two ingredients, well mixed, will explode; but it ſerves to diffuſe the fire inſtantaneouſly through the whole maſs of powder. The advantage, however, of uſing ſulphur ſeems, from ſome late experiments in France, applicable for increaſing the force of exploſion only to ſmall charges; but in quantities of ſome ounces, the exploſive, or at leaſt the projecting, force of powder without ſulphur is as conſiderable as it is with it.

The invention of gunpowder is aſcribed, by Polydore Virgil, to a chemiſt; who accidentally put ſome of this compoſition in a mortar, and covered it with a ſtone, when it happened to take fire, and blew up the ſtone.

Thevet ſays, the perſon here ſpoken of, was a monk of Fribourg, named Conſtantine Anclzen; but Belleforet, and other authors, with more probability, ſuppoſe him to be Bartholdus Schwartz, or the Black, who diſcovered it, as ſome ſay, about the year 1320; and the firſt uſe of it is aſcribed to the Venetians in the year 1380, during the war with the Genoeſe; and it is ſaid to have been firſt employed in a place anciently called Foſſa Clodia, now Chioggia, againſt Laurence de Medicis; and that all Italy made complaints againſt it, as a manifeſt contravention of fair warfare.

But what contradicts this account, and ſhews gunpowder to be of an older era, is, that Peter Mexia, in his Various Readings, mentions that the Moors, being beſieged in 1343 by Alphonſus XI. king of Caſtile, diſcharged a ſort of iron mortars upon them, which made a noiſe like thunder; which is ſeconded by what Don Pedro, biſhop of Leon, relates in his chronicle of king Alphonſus, who reduced Toledo, *viz.* that in a ſea-combat between the king of Tunis, and the Mooriſh king of Seville, above four hundred and fifty years ago, thoſe of Tunis had certain iron tubs or barrels, wherewith they threw thunder-bolts of fire.

Du-Cange adds, that there is mention made of gunpowder in the regiſters of the chambers of accounts in France as early as the year 1338.

Farther, it appears that our Roger Bacon knew of gunpowder near a hundred years before Schwartz was born. That excellent friar tells us, in his treatiſe "De Secretis Operibus Artis & Naturæ, & de Nullitate Magiæ," cap. 6. which is ſuppoſed by ſome to have been publiſhed at Oxford in 1216, and which was undoubtedly written before his Opus Majus, in 1267, "that from ſalt-petre, and other ingredients, we are able to make a fire that ſhall burn at what diſtance we pleaſe." Dr. Plott, in his "Hiſtory of Oxfordſhire," p. 236, &c. aſſures us, that theſe "other ingredients were explained in a MS. copy of the ſame treatiſe, in the hands of Dr. G. Langbain, ſeen by Dr. Wallis, to be ſulphur and wood coal." The writer of the life of Friar Bacon, in the Biographia Britannica, vol. i. ſays, that Bacon himſelf has divulged the ſecret of this compoſition in a cypher, by tranſpoſing the letters of the two words in chap. xi. of the above cited treatiſe; where it is thus expreſſed; "ſed tamen ſalis petræ *lura mope can ubre* (*i. e.* Carbonum pulvere) et ſulphuris; et ſic facies tonitrum & corruſcationem, ſi ſcias artificium:" and from hence Bacon's biographer apprehends the words *carbonum pulvere* were transferred to the ſixth chapter of Dr. Langbain's MS. In this ſame chapter Bacon expreſsly ſays, that ſounds like thunder, and corrùſcations, may be formed in the air, much more horrible than thoſe that happen naturally. He adds, that there are many ways of doing this, by which a city or an army might be deſtroyed; and he ſuppoſes that, by an artifice of this kind, Gideon defeated the Midianites with only three hundred men. (Judges, chap. vii.) There is alſo another paſſage to the ſame purpoſe, in the treatiſe "De Scientia Experimentalia." See Dr. Jebb's edition of the Opus Majus, p. 474.

Mr. Robins apprehends (ſee the preface to his Tracts), that Bacon deſcribes gunpowder not as a new compoſition, firſt propoſed by himſelf, but as the application of an old one to military purpoſes, and that it was known long before his time. Marcus Græcus, an ancient author, who probably lived about the time of the Arabian phyſician Meſue, in the beginning of the ninth century, and mentioned by him, in a treatiſe intitled "Liber Ignium," of which Dr. Mead had a MS. copy, and cited by Dr. Jebb in the preface to Bacon's Opus Majus, deſcribes two kinds of fire-works; one for flying, incloſed in a caſe or cartouche, made long and ſlender, and filled with the compoſition cloſely rammed, like our modern rocket; and the other thick and ſhort, ſtrongly tied at both ends, and half filled, reſembling our cracker; and the compoſition which he preſcribes for both is two pounds of charcoal, one pound of ſulphur, and ſix pounds of ſalt-petre, well powdered and mixed together in a ſtone mortar. See CANNON.

Mr. Dutens carries the antiquity of gunpowder much higher; and he refers to the accounts given by Virgil (Æn. lib. vi. ver. 585.), Hyginus (Fabul. 61. and 650.), Euſtathius (ad Odyſſ. λ. 234. p. 1682. l. 1.), Valerius Flaccus (lib. 1. 662.), and others, of Salmoneus' attempt to imitate thunder, preſuming from hence that he uſed a compoſition of the nature of gunpowder. He adds, that Dion Caſſius, in the "Hiſt. Rom. in Caligul." p. 662, and Johannes Antiochenus, in "Chronica," apud Peireſciana Valeſii, Paris, 1604, p. 804, report the ſame thing of Caligula. The Brachmans did the ſame, according to Themiſtius Orat. xxvii. p. 337. and alſo the Indians, whoſe practice is recorded by Philoſtratus, Vita Apol. lib. ii. cap. 33. See likewiſe lib. iii. cap. 13. Dutens's Inquiry into the Origin of the Diſcoveries attributed to the Moderns, p. 262, &c. Eng. ed. 1769.

See the preface to the Code of Gentoo Laws, 1776, where it is aſſerted, that gunpowder was known to the inhabitants of Hindooſtan far beyond all periods of inveſtigation.

GUNPOWDER, *Preparation of.* There are divers compoſitions of gunpowder, with reſpect to the proportions of the three ingredients, to be met with in pyrotechnical treatiſes; but the proceſs of making it up is much the ſame in all.

For ſome time after the invention of artillery, gunpowder was of a much weaker compoſition than that now uſed by us, or that deſcribed by Marcus Græcus; which was chiefly owing to the weakneſs of their firſt pieces. See GUN and CANNON.

Of 23 different compoſitions, uſed at different times, and mentioned by Tartaglia in his Queſ. and Inv. lib. iii. queſ. 5. the firſt, which was the moſt ancient, contained equal parts of nitre, ſulphur, and charcoal. When guns of modern ſtructure were introduced, gunpowder of the ſame compoſition with the preſent came alſo into uſe. The cannon powder, in the time of Tartaglia, was made of four parts of ſalt-petre, one of ſulphur, and one of charcoal; and the muſket powder of 48 parts of ſalt-petre, ſeven parts of ſulphur, and eight parts of charcoal; or of 18 parts of ſalt-petre, two parts of ſulphur, and three parts of charcoal. The cannon powder was in meal, and the muſket powder grained; and it is certain that the invention of graining powder, which is a very conſiderable advantage, is a modern improvement. (See the preface to Robins's Math. Tracts, p. 32, &c.) The modern compoſition of it is ſix parts of nitre to one of each of the other two ingredients: though Mr. Napier ſays (Tranſ. of the Iriſh Acad. vol. ii.) that he finds the ſtrength commonly to be the greateſt with the following proportions, *viz.* 3lb. of nitre, about 9 oz. of charcoal, and about 3 oz. of ſulphur: the proportion of ingredients in the powder of different nations and different manufactories has been very various. With us the government powder is the ſame for cannon and for ſmall arms: the difference conſiſting only in the ſize of the grains: but in France there have been commonly enumerated three kinds of powder, *viz.* cannon-powder, muſket-powder, and piſtol-powdes; of each of theſe again there are two ſorts, a ſtronger and a weaker; all which differences ariſe only from the various proportions.

The proportions are thus: in the ſtronger cannon-powder, to every 100 pounds of ſalt-petre, 25 pounds of ſulphur are generally allowed, with the ſame quantity of charcoal; and in the weaker cannon-powder, to every 100 pounds of ſalt-petre, 20 pounds of ſulphur, and 24 pounds of charcoal. As for the ſtronger muſket-powder, 100 pounds of ſalt-petre require 18 pounds of ſulphur, and 20 of charcoal; and in the weaker, the proportional quantities are 100 pounds of ſalt-petre, 15 of ſulphur, and 18 of charcoal. In the ſtronger piſtol-powder, 100 pounds of ſalt-petre require 12 of ſulphur, and 15 of charcoal; whereas the weaker has to 100 pounds of ſalt-petre only 10 of ſulphur, but 18 of charcoal.

Other authors preſcribe different proportions: Semienowitz, for mortars, directs 100 pounds of ſalt-petre, 25 of ſulphur, and as much of charcoal; for great guns 100 pounds of ſalt-petre, 15 of ſulphur, and 18 of charcoal; for muſkets and piſtols, 100 pounds of ſaltpetre, eight of ſulphur, and ten of charcoal. Macquer, the author of the "Dictionary of Chemiſtry," recommends 75 parts of purified nitre, 15½ parts of charcoal, and 9½ parts of ſulphur.

Miethius extols the proportion of one pound of ſalt-petre to three ounces of charcoal; or two, or two and a quarter, of ſulphur: than which, he affirms, no gunpowder can poſſibly be ſtronger. He adds, that the uſual practice of making the gunpowder weaker for mortars than guns, as in the example above, is without any foundation, and renders the expence needleſsly much greater: for whereas to load a large mortar 24 pounds of common is required, and conſequently to load it ten times, 240 pounds; he ſhews by calculation, that the ſame effect would be had by 180 pounds of the ſtrong powder.

Mr. Napier has analyſed the Chineſe powder, and found the proportions of its ingredients to be nearly 100 of nitre, 18 of charcoal, and 11 of ſulphur. It was large-grained, not very ſtrong, but hard, well coloured, and in good preſervation. The French made many trials in 1756 at the royal manufactory of Eſſone, near Paris, for determining the beſt proportions of the component ingredients of powder. Of powder made with nitre and charcoal alone, 16 of nitre and four of charcoal yielded the ſtrongeſt, and gave a power of 9 in the eprouvette. With all theſe ingredients, 16 of nitre, four of charcoal, and one of ſulphur, raiſed the eprouvette to 15, and both a leſs and a greater quantity of ſulphur produced a ſmaller effect. Then diminiſhing the charcoal, a powder of 16 of nitre, three of charcoal, and one of ſulphur, gave a power of 17 in the eprouvette, which was the higheſt produced by any mixture. This laſt was alſo tried in the mortar eprouvette againſt the common proof powder, and was found to maintain a ſmall ſuperiority. The powder made without ſulphur in the proportions above intimated was alſo tried in the mortar eprouvette, and with the following ſingular reſult: when the charge was only two ounces, it projected a 60lb. copper ball 213 feet, and the ſtrongeſt powder with ſulphur projected it 249 feet; but in a charge of three ounces the former projected the ball 475 feet, and the latter only 472 feet: and on the other hand the great inferiority of force in the ſmaller eprouvette of the powder without ſulphur has been juſt noticed." Aikin's Dict.

When the ſeveral ingredients of gunpowder are properly prepared, mixed, and grained, in the manner already recited, if the leaſt ſpark be ſtruck thereon from a ſteel and flint, the whole will be immediately inflamed, and burſt out with extreme violence.

The effect is not hard to account for: the charcoal part of the grain whereon the ſpark falls, catching fire like tinder, the ſulphur and nitre are readily melted, and the former alſo breaks into flame; and at the ſame time the contiguous grains undergo the ſame fate. Now it is known, that ſaltpetre, when ignited, rarefies to a prodigious degree.

Sir Iſaac Newton reaſons thus on the point: the charcoal and ſulphur in gunpowder eaſily take fire, and kindle the nitre; and the ſpirit of the nitre, being thereby rarefied into vapour, ruſhes out with an exploſion much after the manner that the vapour of water ruſhes out of an æolipile; the ſulphur alſo, being volatile, is converted into vapour, and augments the exploſion: add, that the acid vapour of the ſulphur, namely, that which diſtils under a bell into oil of ſulphur, entering violently into the fixed body of the nitre, lets looſe the ſpirit of the nitre, and excites a greater fermentation, whereby the heat is farther augmented, and the fixed body of the nitre is alſo rarefied into fume; and the exploſion is thereby made more vehement and quick.

For if ſalt of tartar be mixed with gunpowder, and that mixture be warmed till it takes fire, the exploſion will be greatly more violent and quick than that of gunpowder alone, which cannot proceed from any other cauſe than the action of the vapour of gunpowder upon the ſalt of tartar, whereby that ſalt is rarefied. See *Pulvis* FULMINANS.

The exploſion of gunpowder ariſes, therefore, from the violent action whereby all the mixture being quickly and vehemently heated, is rarefied and converted into fume and vapour; which vapour, by the violence of that action, becomes ſo hot as to ſhine, and appear in the form of a flame.

Dr. Ingenhouſz accounts for the effect of gunpowder, by obſerving that nitre yields by heat a ſurpriſing quantity of pure dephlogiſticated air, and charcoal a conſiderable quantity of inflammable air; the fire employed to inflame the powder extricates theſe two airs, and ſets fire to them at the inſtant of their extrication. See this theory largely explained in Phil. Tranſ. vol. lxix. part ii. art. 26.

Count Rumford (ſee Phil. Tranſ. for 1797,) is of opinion that the force of the elaſtic fluid, generated in the combuſtion of gunpowder, may be ſatiſfactorily accounted for upon the ſuppoſition that its force depends ſolely on the elaſticity of watery vapour or ſteam. For this purpoſe he recurs to the experiments of M. Betancour, publiſhed at Paris, under the auſpices of the Royal Academy of Sciences, in the year 1790, which ſhew that the elaſticity of ſteam is doubled by every addition of temperature equal to 30° of Fahrenheit. From the count's reference it appears that the experiments were carried as far as 280° of that ſcale, in which caſe the preſſure was found to be equal to about four atmoſpheres. He affirms, that there ſeems to be no reaſon why the ſame law ſhould not hold in higher temperatures, and he has therefore extended his computations through 13 more terms of the geometrical ſeries, the laſt of which affords an elaſtic force equal to more than 65,000 atmoſpheres. If, indeed, the deductions from M. Betancour's experiments be admitted, the water of cryſtallization in the nitre, and the moiſture, which the charcoal may be conceived to retain, appear to be fully ſufficient to account for the exploſive force by means of ſteam only. The gaſſes produced by the exploſion of gunpowder have not been analyſed with accuracy ſince the diſcovery of all the variety of gaſſes with the baſis of carbon: but they are certainly carbonic acid, ſulphureous acid gas, and carburetted hydrogen. The reſidue is chiefly a ſulphuret of potaſh formed by a part of the ſulphur uniting with ſome of the alkali of the nitre, and hence proceeds the hepatic ſmell of a foul and damp gunbarrel. Aikin's Dict.

M. de la Hire, in the Hiſtory of the French Academy for 1702, aſcribes all the force and effect of gunpowder to the ſpring or elaſticity of the air incloſed in the ſeveral grains thereof, and in the intervals or ſpaces between the grains; the powder being kindled, ſets the ſprings of ſo many little parcels of air a playing, and dilates them all at once, whence the effect; the powder itſelf only ſerving to light a fire which may put the air in action; after which the whole is done by the air alone.

But it will appear from the experiments and obſervations of Mr. Robins, recited in the ſequel of this article, that if this air be in its natural ſtate at the time when the powder is fired, the greateſt addition its elaſticity could acquire from the flame of the exploſion would not amount to five times its uſual quantity, and, therefore, could not ſuffice for the two hundredth part of the effort, which is exerted by fired powder.

In order to underſtand the force of gunpowder, it muſt be conſidered, that whether it be fired in a vacuum or in air, it produces by its exploſion a permanent elaſtic fluid. For if a red-hot iron be included in a receiver, and the receiver be exhauſted, and the gunpowder be then let fall on the iron, the powder will take fire, and the mercurial gage will ſuddenly deſcend upon the exploſion; and though it immediately aſcends again, yet it will never riſe to the height it firſt ſtood at, but will continue depreſſed by a ſpace proportioned to the quantity of gunpowder which was let fall on the iron. By this means (firing ſmall quantities at a time) the mercurial gage may be reduced from $29\frac{1}{2}$ inches to $12\frac{3}{4}$. Now this experiment, which has been often repeated, proves the propoſition with reſpect to the production of a permanent elaſtic fluid in a vacuum; for the deſcent of the gage could only be effected by the preſſure of ſome new generated fluid in the receiver, balancing in part the preſſure of the external air. That this fluid, or ſome part of it at leaſt was permanent, appears from hence, that though in theſe experiments the quickſilver aſcended after the operation, yet, next day it had aſcended no higher than $22\frac{1}{2}$, at which place it ſeemed to continue fixed. And that this fluid is elaſtic, is proved from the deſcent of the mercurial gage; ſince the quantity of matter contained in this fluid could not by its gravity alone have ſunk the quickſilver by the leaſt ſenſible quantity; alſo from its extending itſelf through any ſpace, however great, the experiment ſucceeding in either a large or ſmall receiver, only the larger the receiver the leſs will be the deſcent of the mercurial gage to the ſame quantity of powder; the preſſure of the generated fluid diminiſhing as its denſity diminiſhes. See Phil. Tranſ. No. 295.

The ſame production likewiſe takes place, when gunpowder is fired in the air; for if a ſmall quantity of powder be placed in the upper part of a glaſs tube, and the lower part of the tube be immerged in water, and the water be made to riſe ſo near the top, that only a ſmall portion of air is left in that part where the gunpowder is placed; if in this ſituation the communication of the upper part of the tube with the external air be cloſed, and the gunpowder be fired (which may eaſily be done by a burning-glaſs) the water will, in this experiment, deſcend on the exploſion, as the quickſilver did in the laſt, and will always continue depreſſed below the place at which it ſtood before the exploſion; and the quantity of this depreſſion will be greater, if the quantity of powder be increaſed, or the diameter of the tube be diminiſhed. From whence it is proved, that as well in air as in vacuum, the exploſion of fired powder produces a permanent elaſtic fluid. (Haukſbee, Phyſ. Mechan. Exp. p. 11.) This releaſe of real and elaſtic air from various ſubſtances, in certain circumſtances, is now a well known and inconteſtible fact. See Air.

It alſo appears from experiment, that the elaſticity or preſſure of the fluid produced by the firing of gunpowder, is, *cæteris paribus*, directly as its denſity. This follows from hence, that if in the ſame receiver a double quantity of powder be let fall, the mercury will ſubſide twice as much as in the firing of a ſingle quantity. For the vapour produced from the double quantity, being contained in the ſame receiver, will be of double the denſity of that produced from the ſingle quantity; whence the elaſticity or preſſure, eſtimated by the deſcent of the mercury, being likewiſe double, the preſſure is directly as its denſity. Alſo the deſcents of the mercury, when equal quantities of powder are fired in different receivers, are reciprocally as the capacities of thoſe receivers; and, conſequently, as the denſity of the produced fluid in each.

To determine the elaſticity and quantity of this elaſtic fluid, produced from the exploſion of a given quantity of gunpowder, Mr. Robins premiſes, that the elaſticity of this fluid increaſes by heat, and diminiſhes by cold, in the ſame manner as that of the air (a fact confirmed by ſome later experiments of Mr. Dalton); and that the denſity of this fluid, and conſequently its weight, is the ſame with the weight of an equal bulk of air, having the ſame elaſticity and the ſame temperature. From theſe principles, and from the experiments by which they are eſtabliſhed, for a detail of which we muſt refer to the book itſelf, ſo often cited in theſe articles, he concludes that the fluid produced by the firing of gunpowder will be nearly $\frac{3}{10}$ of the weight of the generating gunpowder; and the ratio of the reſpective bulks of the powder, and the fluid produced from it, will be in round numbers, 1 to 244.

Count Saluce, in his Miſcell. Phil. Mathem. Soc. priv. Taurin. p. 125, makes the proportion as 1 to 222, which, he ſays, agrees with the computation of Meſſrs. Haukſbee, Amontons, and Belidor.

Hence we are certain, that any quantity of powder fired in any confined ſpace, which it adequately fills, exerts at the inſtant of its exploſion againſt the ſides of the veſſel containing it, and the bodies it impels before it, a force at leaſt 244 times greater than the elaſticity of common air, or, which is the ſame thing, than the preſſure of the atmoſphere; and this without conſidering the great addition which this force will receive from the violent degree of heat with which it is endued at that time; the quantity of which augmentation is the next head of Mr. Robins's enquiry. He determines that the elaſticity of the air is augmented, when heated to the extremeſt heat of red-hot iron, in the proportion of 796 to $194\frac{1}{3}$ nearly; and ſuppoſing that the flame of fired gunpowder is not leſs hot than red-hot iron, and the elaſticity of the air, and conſequently of the fluid generated by the exploſion, being augmented by the extremity of this heat in the ratio of $194\frac{1}{3}$ to 796, it follows, that if 244 be augmented in this ratio, the reſulting number, which is $999\frac{1}{3}$, will determine how many times the elaſticity of the flame of fired powder exceeds the elaſticity of common air, ſuppoſing it to be confined in the ſame ſpace which the powder filled before it was fired.

Hence then the abſolute quantity of the preſſure exerted by gunpowder at the moment of its exploſion, may be aſſigned; for ſince the fluid then generated has an elaſticity $999\frac{1}{3}$, or, in round numbers, 1000 times greater than common air; and ſince common air, by its elaſticity, exerts a preſſure on any given ſurface equal to the weight of the incumbent atmoſphere, with which it is in equilibrio; the preſſure exerted by fired powder, before it has dilated itſelf, is 1000 times greater than the preſſure of the atmoſphere, and, conſequently, the quantity of this force on a ſurface of an inch ſquare, amounts to above ſix tun weight; which force, however, diminiſhes, as the fluid dilates itſelf.

Though it has here been ſuppoſed, that the heat of gunpowder, when fired in any conſiderable quantity, is the ſame with iron heated to the extremity of a red heat, or to the beginning of a white heat, yet it cannot be doubted but that the fire produced in the exploſion is ſomewhat varied (like all other fires) by a greater or leſs quantity of fuel; and it may be preſumed, that according to the quantity of powder fired together, the flame may have all the different degrees from that of a languid red heat to the heat ſufficient for the vitrification of metals; but as the quantity of powder requiſite for the production of this laſt mentioned heat is certainly greater than what is ever fired together for any military purpoſe, we ſhall not be far from our ſcope, if we ſuppoſe the heat of ſuch quantities as come more frequently in uſe to be, when fired, nearly the ſame with the ſtrongeſt heat of red-hot iron; allowing a gradual augmentation to this heat in larger quantities, and diminiſhing it when the quantities are very ſmall. Prin. of Gunnery, in Robins's Math. Tracts, vol. i. p. 59, &c.

Gunpowder is ſuppoſed to explode at about 600° Fahr. but if heated to a degree juſt below that of faint redneſs, the ſulphur will moſtly burn off, leaving the nitre and charcoal unaltered.

We may obſerve, that the variations of the denſity of the atmoſphere do not any way alter the action of powder. By comparing ſeveral trials made at noon in the hotteſt ſummer ſun, with thoſe made in the freſhneſs of the morning and the evening, no certain difference could be perceived ; and it was the ſame with thoſe made in the night and in winter. Indeed, conſidering that the ſame quantity of that elaſtic fluid in which the force of powder conſiſts, is generated in a vacuum and in common air, it is difficult to conceive how this force can be affected by the greater or leſs denſity of the atmoſphere.

But the moiſture of the air has a very great influence on the force of powder ; for that quantity which in a dry ſeaſon would communicate to a bullet the velocity of 1700 feet in one ſecond, will not in damp weather communicate a velocity of more than 12 or 1300 feet in a ſecond, or even leſs, if the powder be bad and negligently kept. Robins's Math. Tracts, vol. i. p. 101, &c.

This agrees with an experiment made before a committee of the Royal Society, where powder having been dried by being put into a phial placed in boiling water, threw a ball out of a mortar twice as far as the ſame quantity of powder taken out of the ſame barrel before it was dried.

Now the ranges under the ſame circumſtances of charge, elevation, &c. being as the ſquares of the velocities of the ball, theſe velocities, in this experiment, will be to each other nearly as 17 to 12, which give ranges as 289 to 144. Phil. Tranſ. N° 465. p. 182, 183.

If powder be damp, ſhot made with equal quantities of it out of the ſame parcel, will differ conſiderably from each other, perhaps ten times more than if the powder was in good order. A ſmall charge ſeems to loſe a greater part of its force than a larger, each being equally damp. Another circumſtance attending damp powder is, a remarkable foulneſs in the piece, after firing, much beyond what ariſes from an equal quantity of dry powder.

That powder will imbibe moiſture from the air, and thereby increaſe in weight, is certain. A parcel of very good powder being placed on a white paper, pierced with a great number of fine holes, and held over the ſteam of hot water, the powder in half a minute was increaſed about $\frac{1}{35}$ in weight. Another parcel, continuing longer in the ſteam, was increaſed by $\frac{1}{74}$ part. That the moiſture of the atmoſphere has a like effect, appears from this, that an ounce of powder kept for ſome time in a room having a fire in it every day, being dried before the fire, loſt above $\frac{1}{100}$ part of its weight ; one third of which it regained in leſs than two hours by being removed to a part of the room diſtant from the fire. And as the air is often much moiſter than when this experiment was tried, and the open air is more moiſt than a room with a fire, it cannot be doubted but that the twentieth or thirtieth part of the ſubſtance of the beſt powder is water. Now as a certain quantity of water mixed with powder will prevent its firing at all, it cannot be doubted but every degree of moiſture muſt abate the violence of the exploſion ; and hence the effects of damp powder are not hard to account for.

It is to be obſerved, that the moiſture imbibed by powder does not render it leſs active when dried again. Indeed, if powder be expoſed to the greateſt damps, without any caution, or if common ſalts abound in it, as often happens through negligence in refining the nitre, the moiſture it imbibes may, in ſuch caſes, be perhaps ſufficient to diſſolve ſome part of the nitre, which is a laſting damage that no drying can retrieve. But when tolerable care is taken in preſerving powder, and the nitre it is compoſed of has been well purged from common ſalt, it will retain its force much longer than is uſually ſuppoſed ; and it is ſaid that powder has been known to have been preſerved for fifty years, without any apparent damage from its age.

Some care is neceſſary in the drying of damp gunpowder ; for there is a degree of heat, which, though not ſufficient to fire the powder, will yet melt the brimſtone, and deſtroy the texture of the grains. Nay, more, there is a heat with which the brimſtone will flame and burn away gradually, and yet the powder will not explode ; of this any one may ſatisfy himſelf by heating a piece of iron red-hot, and then throwing a few grains of powder on it at different intervals, during the time of its cooling ; for by this means he will find, that at a certain time the ſeparate grains that fall on the iron will not explode, but will burn with a ſmall blue flame for ſome ſpace of time, the grain ſtill remaining unconſumed. Indeed, when it has begun to burn in this manner, it ſometimes ends with exploding ; but this more commonly happens when a number of grains lie near together ; for then, though each ſeparate flame is not ſufficient to explode its reſpective grain, yet the whole fire made by them altogether grows ſtrong enough at laſt to end in a general exploſion ; however, by attending to the proper temperature of the iron, and ſpreading the grain, two or three inches ſquare may be covered with a blue lambent flame, which will laſt a conſiderable time without any exploſion, and the grains afterwards will not apparently have loſt either their colour or their ſhape. Now ſince theſe grains, when the brimſtone is thus burnt or even melted out of them, will no longer act as powder ; it is evident that powder may be ſpoiled by being dried with too violent a heat. Robins, ubi ſupra, p. 104, &c.

The velocity of expanſion of the flame of gunpowder, when fired in a piece of artillery, without either bullet or other body before it, is prodigious. By the experiments of the author ſo often quoted, it ſeems this velocity cannot be much leſs than 7000 feet in a ſecond. But M. Bernouilli and M. Euler ſuſpect that it is much greater ; and Dr. Hutton imagines that it cannot be leſs at the moment of exploſion than four times as much. This, however, muſt be underſtood of the moſt active part of the flame. For, as was obſerved before, the elaſtic fluid, in which the activity of gunpowder conſiſts, is only $\frac{3}{10}$ of the ſubſtance of the powder, the remaining $\frac{7}{10}$ will, in the exploſion, be mixed with the elaſtic part, and will by its weight retard the activity of the exploſion ; and yet they will be ſo completely united, as to move with one common motion ; but the unelaſtic part will be leſs accelerated than the reſt, and ſome of it will not be carried out of the barrel, as appears by the conſiderable quantity of unctuous matter, which adheres to the inſide of all fire arms after they have been uſed. Theſe inequalities in the expanſive motion of the flame, render it impracticable to determine its velocity otherwiſe than from experiments The foundation of which determination is, that a barrel being fixed in a proper ſituation on a pendulum, ſuch as is deſcribed under the head GUNNERY, and being charged with twelve penny-weight of powder, without either ball or wad, the powder being only put together by the rammer ; on the diſcharge the pendulum aſcended through an arch whoſe chord was 10 or $10_{,}^{1}$ inches.

Now if the piece be again loaded with the ſame quantity of powder rammed down by a wad of tow, weighing one penny-weight, it may be ſuppoſed that this wad, being very light, will preſently acquire that velocity, with which the elaſtic part of the fluid will expand itſelf when uncompreſſed ; and it was accordingly found, that the chord of the aſcending arch was by this means augmented to twelve inches ; ſo that by the additional weight of one penny-weight of matter moving with the velocity, of the ſwifteſt part of the vapour, the pendulum aſcended through an arch whoſe chord was two inches longer than before. And by calculating upon theſe facts, and the principles laid down in his book, Mr. Robins determines that the velocity with which this one penny-weight of matter moved, muſt be about

7000.

7000 feet in one ſecond. It is this prodigious celerity of expanſion of the flame of fired gunpowder, which is its peculiar excellence, and the circumſtance in which it ſo eminently ſurpaſſes all other inventions, either ancient or modern, for the purpoſe of military projections: for as to the quantity of motion of theſe projectiles only, many of the warlike machines of the ancients produced this in a degree far ſurpaſſing that of our heavieſt cannon-ſhot or ſhells; but the great celerity given to theſe bodies cannot be in the leaſt approached by any other means than by the flame of powder. The reaſon of this difference is, that the ancients could by weights, or the elaſticity of ſprings and ſtretched chords, augment their powers to any degree deſired; but then each addition of power brought with it a proportional addition of matter to be moved; ſo that as the power increaſed, thoſe parts of the machine which were to communicate motion to the projectile, and were conſequently to move with it, were likewiſe increaſed; and thence it neceſſarily happened, that the action of the power was not ſolely employed in giving motion to the impelled body, but much the greateſt part of it was ſpent in accelerating thoſe parts of the machine in which the power reſided, to enable them to purſue the body to be projected with perpetual impulſe, during its whole paſſage through the extent of their activity. Hence then it came to paſs, that, though theſe ancient machines could throw enormous weights, they could project them but with ſmall degrees of celerity, compared with what we can communicate to our cannon and muſket-ſhot; whence in all operations, where theſe great velocities are uſeful, our machines are infinitely ſuperior to thoſe of antiquity; although, in more confined and ſhorter projections, theſe laſt have ſome advantage, which may yet render them worthy of the attention of thoſe military geniuſes, who have capacity enough to conſider each part of the profeſſion according to its true and genuine value, independent of the partial eſtimation of the times they live in. Ibid. p. 112.

There are ſeveral ways of proving the goodneſs of gunpowder. 1. By ſight; for if it be too black, it is too moiſt, or has too much charcoal in it; ſo alſo if rubbed upon white paper, it blackens it more than good powder does: but if it be of a kind of azure colour, ſomewhat inclining to red, it is a ſign of good powder. 2. By touching; for if in cruſhing it with your fingers' ends, the grains break eaſily, and turn into duſt, without feeling hard, it has too much charcoal in it; or if in preſſing under your fingers upon a ſmooth hard board, ſome grains feel harder than the reſt, or, as it were, dent your fingers' ends, the ſulphur is not well mixed with the nitre, and the powder is bad. And alſo by thruſting the hand into a parcel of powder, and graſping it, as if you were about to take a handful of it, you may feel if it be dry and equally grained, by its evading the graſp, and running moſtly out of the hand. 3. By burning, in which method little heaps of powder are laid on white paper three inches or more aſunder, and one of them fired; which, if it only fires all away, and that ſuddenly, and almoſt imperceptibly, without firing the reſt, and makes a ſmall thundering noiſe, and a white ſmoke ariſes in the air almoſt like a circle, the powder is good; if it leaves black marks, it has too much charcoal, or is not well burnt: if it leaves a greaſineſs, the ſulphur or nitre are not well cleanſed or ordered. Again, if two or three corns be laid on paper an inch diſtant, and fire be put to one of them, and they all fire at once, leaving no ſign behind, but a white ſmoky colour in the place, and the paper not touched, the powder is good. So alſo if fired in a man's hand, and it burns not; but if black knots appear, which burn downwards in the place where proof was made, after firing, it is not ſtrong enough, but wants nitre. The method moſt commonly followed for this purpoſe with us, ſays Mr. Robins, is to fire a ſmall heap of it on a clean board, and to attend nicely to the flame and ſmoke it produces, as likewiſe to the marks it leaves behind on the table; from all which inſtructive particulars the merit of the powder is aſcertained with great accuracy, as is pretended: but beſides this uncertain method, which how much ſoever it may be practiſed, none will undertake ſeriouſly to defend, there are, on particular occaſions, other contrivances made uſe of, all which bear ſome analogy to the common powder-triers, ſold at the ſhops: only they are more artfully fabricated, and inſtead of a ſpring they move a weight, which is a more certain and equal power.

Another method of proving gunpowder, is to take out of ſeveral barrels a meaſure, of about the ſize of a thimble, which is ſpread upon a ſheet of fine writing paper, and then fired; if the inflammation is very rapid, the ſmoke riſes perpendicularly, and the paper is neither burnt nor ſpotted, the powder is judged to be good: then two drams of the ſame powder, being exactly weighed, are put into a machine, called *eprouvette* or gunpowder prover, which, if it raiſes a weight of 24lb. to the height of 3½ inches, it is allowed to be good.

But theſe machines, ſays Mr. Robins, though more perfect than the common powder-triers, are yet liable to great irregularities; for as they are all moved by the inſtantaneous ſtroke of the flame, and not by its continued preſſure, they do not determine the force of the fired powder with that certainty and uniformity which were to be deſired in theſe kinds of trials: and therefore, the method followed by the French, in the receiving of powders from the makers, ſeems to be much better. Their practice is thus:

They have, in each magazine, a ſmall mortar caſt with its bed, according to a determined pattern, which is the ſame throughout the kingdom: this mortar is always pointed at 45°, and it contains juſt three ounces of powder; and it is a ſtanding maxim, that no powder can be received into their ſtores, unleſs three ounces of it, placed in the chamber of this mortar, throw a ſolid ball of 7½ inches diameter to the diſtance of at leaſt 55 French fathom. But if each barrel of powder was to be proved in this manner, the trouble of changing the mortar, &c. would be intolerable, and the delay ſo great, that no buſineſs of this kind could ever be finiſhed. The method by firing againſt a pendulum, in the manner mentioned under the head GUNNERY, ſeems a readier way; but ſtill it requires ſome nicety and time, which it were to be wiſhed could be obviated. (Robins's Mathemat. Tracts, vol. i. p. 121.) Dr. Hutton has contrived a machine for this purpoſe, which has ſeveral advantages peculiar to itſelf. It is a ſmall cannon, the bore of which is about one inch in diameter, and it is uſually charged with two ounces of powder, and with powder only, as a ball is not neceſſary, and the ſtrength of the powder is accurately ſhewn by the arc of the gun's recoil. The whole machine is ſo ſimple, eaſy, and expeditious in its uſe, that the weighing of the powder is the chief part of the trouble; and it is alſo ſo accurate and uniform, that the ſucceſſive repetitions or firings with the ſame quantity of the ſame ſort of powder, hardly ever yield a difference in the recoil of the 100dth part of itſelf.

Count Rumford (ſee Phil. Tranſ. vol. lxxi.), having pointed out the inſufficiency and the defects of the eprouvettes, or powder triers, in common uſe, recommends for proving the goodneſs and ſtrength of powder, the following method: A quantity of powder being provided, which, from any previous examination or trial, is known to be of a proper degree of ſtrength to ſerve as a ſtandard for the proof of other powder, a given charge of it is to be fired, with a fit bullet, in a barrel ſuſpended by two pendulous rods, (according to the method which the author had previouſly deſcribed in the ſame paper,) and the recoil is to be carefully meaſured upon the ribbon. When this experiment has been ſufficiently repeated, the mean and the extremes of the chords may be marked upon the ribbon by black lines drawn acroſs it, and the word *proof* may be written upon the middle line; or if the recoil is uniform, then the *proof mark* is to be made in that part of the ribbon to which it was conſtantly drawn out by the recoil in the different trials. The recoil, with a known charge of ſtandard powder, being thus aſcertained, and marked upon the ribbon, let an equal quantity of any other powder, (that is to be proved,) be fired in the ſame barrel, with a bullet of the ſame weight; every other circumſtance being alike; and if the ribbon is drawn out as far, or farther than the proof-mark, the powder is as good, or better than the ſtandard; but if it falls ſhort of that diſtance, it is worſe than the ſtandard, and to be rejected. For the greater the velocity is with which the bullet is impelled, the greater will be the recoil; and when the recoil is the ſame, the velocities of the bullets are equal, and the powder is of the ſame degree of ſtrength, if the quantity of the charge is the ſame. And if care is taken in proportioning the charge to the weight of the bullet, to come as near as poſſible to the medium proportion that obtains in practice, the determination of the goodneſs of gun-powder from the reſult of this experiment cannot fail to hold good in actual ſervice. The author has deſcribed his apparatus, and illuſtrated the conſtruction and uſe of it by appropriate figures. Since the charges with the ſame kind of powder are as the ſquares of the velocities of diſcharged bullets, the charge of the weaker powder muſt be to that of the ſtronger, when the velocities are equal, as VV to vv; V denoting the velocity of the bullet with the ſtronger powder, and v the velocity with the weaker, when the charges are equal, and the weight and dimenſions of the bullet are the ſame, and when they are diſcharged from the ſame piece. The weaker powder therefore is as much worſe than the ſtronger as VV is greater than vv; or the comparative goodneſs of powder, of different degrees of ſtrength, is as the ſquares of the velocities of the bullets when the charges are equal. The author, eſtimating the comparative goodneſs of government powder with that of double proof battle powder (ſee Battle), found, by the medium of ſeveral trials, that double proof battle powder is better than government powder in the proportion of 1.2036 to 1, or nearly of 6 to 5. But if inſtead of weighing the powder, we eſtimate the quantity of the charge by meaſurement, or the ſpace it occupies in the bore of the piece, the comparative ſtrength of battle powder will appear to be conſiderably greater, or its ſtrength will be to that of government powder nearly as 4 is to 3; for the grains of this better kind of powder being more compact and nearly of a ſpherical form, a greater weight of it will lie in any given ſpace than of government powder, which is formed more looſely, and of various and very irregular figures. Now the common price of double proof battle powder, as it is ſold by the wholeſale dealers in that commodity, is at the rate of 10*l.* *per cwt.* net, which is juſt two ſhillings *per* pound; while government powder is ſold at 5*l.* 5*s.* *per cwt.*, or 1*s.* and $\frac{9}{10}$ of a penny *per* pound; but battle powder is better than government powder only in the proportion of 1.2036 to 1, or of 1*s.* 2*d.* to 1*s.* $\frac{6}{12}$*d.*; battle powder is therefore ſold at the rate of 10*d.* per lb., or $41\frac{2}{3}$ *per cent.* dearer than it ought to be; or thoſe who make uſe of it in preference to government powder, do it at a certain loſs of $41\frac{2}{3}$ *per cent.* of the money that the powder coſts them.

Gunpowder is a commodity of ſuch conſequence, both in reſpect of ſpeculation, of war, and of commerce (the conſumption thereof being incredible), that it will deſerve a more particular detail. To make gunpowder duly then, regard is to be had, that the ſalt-petre be pure, and in fine large cryſtals or ſhootings; otherwiſe, it is to be purified, by taking away its fixed or common ſalt, and earthy part, thus: diſſolve ten pounds of nitre in a ſufficient quantity of fair water; ſettle, filtrate, and evaporate it in a glazed veſſel, to the diminution of half, or till a pellicle appear on it; the veſſel may then be taken off from the fire, and ſet in a cellar: in twenty-four hours the cryſtals will ſhoot, which ſeparate from the liquor; and after the like manner may the liquor be cryſtallized ſeveral times, till all the ſalt be drawn forth; this done, put it into a kettle, and that on a furnace with a moderate fire, which gradually increaſe till it begins to ſmoke, evaporate, loſe its humidity, and grow very white: it muſt be kept continually ſtirring with a ladle, for fear it ſhould return to its former figure, whereby its greaſineſs will be taken away; after that, ſo much water is to be poured into the kettle as will cover the nitre; and when it is diſſolved, and reduced to the conſiſtency of a thick liquor, it muſt be ſtirred with a ladle without intermiſſion, till all the moiſture is again evaporated, and it be reduced to a dry and white meal. See the ſequel of this article, and Nitrat *of Potaſh*.

The like regard is to be had to the ſulphur, chooſing that which is in large lumps, clear and perfectly yellow; not very hard, nor compact, but porous; nor yet too much ſhining; and if, when ſet on fire, it freely burns away all, leaving little or no reſident matter, it is a ſign of its goodneſs; ſo likewiſe, if it be preſſed between two iron plates that are hot enough to make it run, and in the running appear yellow, and that which remains of a reddiſh colour, it may be concluded to be fit for the purpoſe. But in caſe the ſame be foul and impure, it may be purified in this manner: melt the ſulphur in a large iron ladle, or pot, over a very gentle coal fire, well kindled, but not flaming; then ſcum off all that riſes on the top, and ſwims upon the ſulphur; take it preſently after from the fire, and ſtrain it through a double linen cloth, letting it paſs at leiſure; ſo will it be pure, the groſs filthy matter remaining behind in the cloth. See Sulphur, and ſequel of the article.

For the charcoal, the third ingredient, ſuch ſhould be choſen as is large, clear, and free from knots, well burnt and cleaving. See Charcoal.

The charcoal of light woods has been generally employed; but M. Beaumé affirms, from experience, that the charcoals of heavy and hard woods, if they have been well made, are as fit for the purpoſe. The charcoal not only concurs with the ſulphur in ſupplying the inflammable matter, which cauſes the detonation of the nitre, but alſo conſiderably adds to the exploſive power of the detonating nitre, by the quantity of elaſtic vapour expelled during its combuſtion.

Gunpowder being a mixture of ſulphur and charcoal, which are very inflammable ſubſtances, with ſalt-petre, which in itſelf is not, if the ſalt-petre be too much in quantity, when compared with the other two, their burning may not be ſufficient to conſume the whole of the ſalt-petre; whence the fire may be leſs violent, and conſequently the powder leſs vigorous, than if ſome of the ſalt-petre was taken away, and a like quantity of the other materials were added in its ſtead. On the other hand, if the ſalt-petre in the compoſition be leſs than what the burning of the other two ſubſtances

ſtances can eaſily conſume, the fire will be leſs active than it ought to be, becauſe it is not augmented ſo much as it would be if a larger quantity of ſalt-petre had been added to the compoſition.

Hence it appears, that the goodneſs of powder is not to be eſtimated only from the quantity of ſalt-petre contained in it, although that ſubſtance ſeems to be the baſis of the elaſtic fluid, in which its force conſiſts: for ſince the converting of the ſalt-petre into that fluid, and the elaſticity of the fluid, afterwards, depend in ſome meaſure on the violence of the fire produced at the exploſion, it is plain that there is a certain proportion in the mixture of the materials, which will beſt contribute to this purpoſe, and conſequently to the perfection of the powder.

What this proportion is, has been aſcertained by experience; and it ſeems to be generally agreed, that in any quantity of powder, three-fourths of it ſhould be ſalt-petre, the remaining one-fourth conſiſting of equal quantities of ſulphur and charcoal. This is the proportion followed by the French, and by moſt nations in Europe: we, indeed, pretend to a greater degree of nicety in our proportions; though, it is ſaid, they do not greatly differ from what is here mentioned; nor is it certain that they are preferable: this, however, may be depended on, that no methods of proving powder, hitherto generally practiſed in England, could at all aſcertain the difference; and other powders made with the uſual proportion, are nothing inferior to our's.

But it is not the due proportion of the materials only which is neceſſary to the making of good powder; another circumſtance, not leſs eſſential, is the mixing of them well together; if this be not effectually done, ſome parts of the compoſition will have too much ſalt-petre in them, and others too little; and in either caſe there will be a loſs of ſtrength in the powder. Robins, ubi ſupra, p. 119, &c.

The actual mode of making gunpowder has been deſcribed in a very ſatisfactory manner by Mr. Coleman, of the royal powder mills of Waltham Abbey, in the 9th volume of the Philoſophical Magazine, and cited in Aikin's dictionary. The ingredients are taken in the proportions of 75 of ſalt-petre, 15 of charcoal, and 10 of ſulphur. The ſalt-petre is almoſt wholly that which is brought from the Eaſt Indies, and is refined by ſolution, evaporation, and cryſtallization. (See NITRAT *of Potaſh*.) It is then fuſed in a moderate heat, ſo as to expel the water, but none of the acid. By refining, the ſalt-petre is freed from thoſe deliqueſcent ſalts, which would render it damp by keeping, and thus materially deteriorate it. The ſulphur is ſuch as is imported from Italy and Sicily, which is refined by melting and ſkimming, and if it be impure, by ſublimation. The Engliſh ſulphur requires expenſive proceſſes for purification, which exclude it from our manufactures of gunpowder. The charcoal formerly uſed in this manufacture near London, and which is ſtill uſed in many parts of the world, was prepared in the uſual mode of charring wood, by forming piles of it, covering it with ſods or fern, and allowing it to burn with a ſlow ſmothering flame. But an improvement has been introduced, which ſerves, in a great degree, to conſtitute the ſuperior excellence of Engliſh powder. The wood is cut into billets, about nine inches long and incloſed in iron cylinders, placed horizontally; and thus burnt gradually to a red heat, the fire being continued till the volatile parts are completely expelled, and the wood is thus completely charred. The pyroligneous acid is, however, preſerved for uſe, by collecting it in pipes, that paſs out of the iron cylinder and dip into caſks, in which the acid liquor condenſes. This acid is uſed in calico-printing, chiefly as the baſis of ſome of the iron liquors, and mordants for dark-coloured patterns. The wood, which, previouſly to charring, is barked, is generally either alder or willow, or dog-wood: but the difference of wood is ſaid to be of no eſſential importance, provided that it be perfectly charred. The three ingredients above deſcribed, being duly prepared, are firſt ſeparately ground into fine powder, then mixed in the requiſite proportions, and afterwards committed to the mill for the thorough incorporation of their component parts. The powder-mill is a ſlight wooden building, with a boarded roof, ſo that in caſe of a moderate exploſion, the roof may fly off without difficulty, and in the leaſt injurious direction. Stamping-mills, which were formerly uſed, have been moſtly ſet aſide in our preſent manufactures, on account of the danger of over-heating, and the accidents attending it; and the buſineſs is now performed by two ſtones placed vertically, and running on a bed-ſtone, or trough. About 40 or 50 pounds of the mixed maſs are laid upon this bed-ſtone, and moiſtened with water ſufficient to reduce it, in the proceſs of grinding, to a conſiſtence conſiderably ſtiffer than paſte, which experience aſcertains to be the moſt eligible. The mills are worked either by water or horſes. The compoſition, thus formed, is worked for about ſeven or eight hours, at leaſt, in order to thoroughly incorporate and intermix the ſeveral ingredients, on which the quality of the powder very materially depends. The fine powder manufactured at Battle, in Suſſex, is ſtill worked in large mortars, or ſtamping-mills, with heavy peſtles of lignum vitæ; but only a few pounds of the maſs are wrought at a time. The next operation is that of "Corning," or graining; for which purpoſe it is ſent to the "Corning-houſe." In this operation, which, however, is not eſſential to the manufacture of perfect gunpowder, and is only performed on account of the convenience of uſing it in grains rather than fine duſt, the ſtiff paſte is firſt preſſed into hard lumps, and theſe are put into circular ſieves with parchment bottoms, perforated with holes of different ſizes, and fixed in a frame connected with a horizontal wheel. Each of theſe ſieves is alſo furniſhed with a "runner," or oblate ſpheroid of lignum vitæ, which, being ſet in motion by the action of the wheel, ſqueezes the paſte through the holes of the parchment bottom, forming grains of different ſizes. The grains are then ſorted, and ſeparated from the duſt by ſieves of progreſſive dimenſions. The grains are next "glazed," or hardened, and their rough edges taken off, by putting them into caſks ſomewhat more than half full, which are fixed to the axis of a water-wheel, and by rapidly revolving, they are ſhaken againſt each other and rounded, and at the ſame time they receive a ſlight gloſs or glazing. In this proceſs much duſt is ſeparated from the grains.

The glazing is found to leſſen the force of the powder from a fifth to a fourth (ſee Iriſh Tranſ. ubi ſupra); but it ſerves to preſerve the powder from being injured by damp. When the powder has been corned, duſted, and glazed, it is dried in the "ſtove-houſe," where great care ſhould be taken to avoid exploſion. The ſtove-houſe is a ſquare apartment, three ſides of which are furniſhed with ſhelves or caſes, on proper ſupports, arranged round the room, and the fourth contains a large caſt-iron veſſel, called a "gloom," which projects into the room, and is heated from the outſide, ſo that no part of the fuel may touch the powder. For greater ſecurity againſt ſparks by accidental friction, the glooms are covered with ſheet copper, and are always cool when the powder is put in or taken out of the room. Here the grains are thoroughly dried, loſing in the proceſs what remains of the water added to the mixture in the mill, for bringing it to a working ſtiffneſs. This loſs Mr. Coleman finds to be from three to five parts on 100 of the compoſition. The manufacture of the powder, when it is dry, is completed. The government powder for all ſorts of ordnance, as well as for ſmall arms, is uſually made at the ſame time, and always of the ſame compoſition; the difference conſiſting only in the ſize of the grains, as they are ſeparated by the reſpective ſieves. A method of drying powder by ſteam-pipes, running round and croſſing the apartment, has been ſucceſsfully tried; and thus the poſſibility of any injurious accident from over-heating is prevented. The temperature of the room, when heated in the common way by a gloom-ſtove, is always regulated by a thermometer hung in the door of the ſtoves.

The powder ſhould not be dried too haſtily, or with too great heat; for in this caſe ſome of the ſulphur ſublimes out, (which it will do at a leſs heat than that which will inflame the powder,) and then the intimate mixture of the ingredients will be deſtroyed: and beſides, the ſurface of the grain is hardened whilſt the inner part is left damp.

Mr. Coleman deduces from experiment the following inferences: *viz.* "that the ingredients of gun-powder only pulverized and mixed have but a very ſmall exploſive force: that gunpowder granulated after having been only a ſhort time in the mill, has acquired only a very ſmall portion of its ſtrength, ſo that its perfection abſolutely depends on very long continued and accurate mixture, and incorporation of the ingredients:—that the ſtrength of gunpowder does not depend on granulation, the duſt that ſeparates during this proceſs being as ſtrong as the clean grains:—that powder undried is weaker in evey ſtep of the manufacture than when dried:—and laſtly, that charcoal made in iron-cylinders, in the way already mentioned, makes much ſtronger powder than common charcoal. This laſt circumſtance is of ſo much conſequence, and is ſo fully confirmed by experience, that the charges of powder now uſed for cannon of all kinds, have been reduced one-third in quantity, when this kind of powder is employed." The barrelling of powder is uſually reſerved for dry weather, as it is of great importance to avoid moiſture.

Count Rumford (ſee Phil. Tranſ. vol. lxxi. pt. 2.) purſued the following method for determining the ſpecific gravity of gunpowder. A large glaſs bucket, with a narrow mouth, being ſuſpended to one of the arms of a very nice balance, and exactly counterpoiſed by weights put in the oppoſite ſcale, was filled firſt with government powder poured in lightly, then with the ſame powder ſhaken well together, afterwards with powder and water together, and laſtly with water alone, and in each caſe the contents of the bucket were very exactly weighed. The ſpecific gravity of gunpowder determined by theſe experiments is as follows:

Specific gravity of rain-water - -	1.000
Government powder, as it lies light in a heap, mixed with air - - -	0.836
Government powder, well ſhaken together -	0.937
The ſolid ſubſtance of the powder - -	1.745

Hence it appears, that a cubic inch of government powder ſhaken well together weighs juſt 243 grains; that a cubic inch of ſolid powder would weigh 442 grains; and conſequently, that the interſtices between the particles of the powder, as it is grained for uſe, are nearly as great as the ſpaces which theſe particles occupy. In his "Eſſays" the ſame ingenious philoſopher eſtimates the ſpecific gravity of gunpowder to be about 1.868.

To recover damaged powder, the method of the powder merchants is this; they put part of the powder on a ſail-cloth, to which they add an equal weight of what is really good; and with a ſhovel mingle it well together, dry it in the ſun, and barrel it up, keeping it in a dry and proper place.

Others again, if it be very bad, reſtore it by moiſtening it with vinegar, water, urine, or brandy; then they beat it fine, ſearce it, and to every pound of powder add an ounce, an ounce and an half, or two ounces (according as it is decayed) of melted ſalt-petre; and afterwards theſe ingredients are to be moiſtened and mixed well, ſo that nothing may be diſcerned in the compoſition; which may be known by cutting the maſs, and then they granulate it as aforeſaid.

In caſe the powder be in a manner quite ſpoiled, the only way is to extract the ſalt-petre with water, according to the uſual manner, by boiling, filtrating, evaporating, and cryſtallizing; and then, with freſh ſulphur and charcoal, to make it up anew again.

Gunpowder, *Laws relating to.* By an act made in the 16 C. I. c. 21, all ſubjects may make and ſell gunpowder, and bring into the kingdom ſalt-petre, brimſtone, or any other material for the making of it. The erection of powder-mills, or the keeping of powder-magazines near a town, is a nuiſance by the common law; for which an indictment or information will lie. By 12 G. III. c. 61, which reduces into one all former acts relating to the making, keeping, and carrying of gunpowder, no perſon ſhall uſe any mill or other engine for the making of gunpowder, in any place except in mills and other places where the manufacturing of gunpowder ſhall be actually carrying on at the time of the commencement of this act, or where it ſhall afterwards become lawful to carry on ſuch manufacture by licence for that purpoſe; on pain of forfeiting all gunpowder otherwiſe manufactured; and 2*s.* for each pound. Nor under the ſame penalty ſhall any perſon, for the making of gunpowder, uſe any mill or engine worked with a peſtle, commonly called a "Peſtle-mill;" nor in any mill or engine make at any one time, under any ſingle pair of mill-ſtones, any quantity of gunpowder, or materials to be made into gunpowder, exceeding 40*lb*; on pain of forfeiting all above 40*lb.*, and alſo 2*s.* for each pound. This act does not extend to the powder-mills then erected in the pariſhes of Battle, Crowhurſt, Seddlecombe, and Brede, in the county of Suſſex, ſo far as relates to the making of ſuch fine fowling gunpowder only, as is known by the name of "Battle powder." No perſon ſhall dry at any one time, in any one ſtove, &c. any quantity exceeding 40 *cwt.* on pain of forfeiting all above that weight, and 2*s. per* pound. No perſon ſhall keep in any corning-houſe, drying-houſe, duſting-houſe, or other place uſed in the making of gunpowder, or in any adjoining building, (except magazines or ſtore-houſes conſtructed with ſtone or brick, and ſituated, at leaſt, 50 yards from the gunpowder mill,) any greater quantity of gunpowder than ſhall be neceſſary for the work then carrying on in ſuch houſe or other place; on pain of forfeiting all the gunpowder above ſuch neceſſary quantity, and 2*s.* for each pound. Manufacturers of gunpowder are to provide, beſides the magazines and ſtore-houſes near their mills, a good and ſufficient magazine remote from their reſpective mills, for the purpoſe of receiving and keeping all the gunpowder made at ſuch mills, which magazine ſhall be built with brick or ſtone, near the river Thames, and below Blackwall, or in ſome other convenient place to be licenſed by the juſtices; on pain of forfeiture of 25*l.* for every month, during which gunpowder ſhall be made without ſuch magazine, and 5*l.* for every day during which they ſhall neglect to remove, with due diligence, the gunpowder made at ſuch mill or adjoining magazine to the magazine ſo ſituated remote from the mill. Every maker of gunpowder, who ſhall keep any charcoal within 20 yards of any mill or engine for the making of gunpowder, or of any drying, corning, or duſting-houſe, or any adjoining magazine or ſtore-houſe belonging to it, ſhall forfeit 5*l.* for every week during which ſuch charcoal ſhall be ſo kept. No perſon, being a dealer in gunpowder, ſhall keep at any one time more than 200*lb.* of gunpowder, and, not being a dealer, more than 50*lb.* in any houſe, &c., within the cities of London or Weſtminſter, or within three miles of either of them; or within any other city, borough, or market town, or one mile thereof; or within two miles of any of the king's palaces, or any of the king's magazines; or half a mile of any pariſh church; or in any other part of Great Britain, except in mills or other places which, at the commencement of this act, ſhall be uſed for the making of gunpowder; on pain of forfeiting all the gunpowder above the quantity allowed to be kept, and the barrels, and alſo 2*s* for every pound beyond the allowed quantity: provided that it ſhall be lawful for any perſon to keep, for the uſe of any mine or colliery, any quantity, not exceeding 300*lbs.* in any magazine or warehouſe within 200 yards of ſuch mine or colliery. However, it ſhall be lawful for the juſtices in ſeſſions, from time to time, to licenſe the erecting or having ſuch mills and offices, or ſuch magazines for keeping unlimited quantities of gunpowder in places, not being within London or Weſtminſter, or any limits before deſcribed; and the juſtices, upon due application, and by due proceſs of law, which the act ſtates, may be ordered by the court of king's bench to grant ſuch licenſe. No perſon ſhall carry at any one time more than 25 barrels of gunpowder in any waggon, cart, or other carriage by land; or more than 200 barrels in any boat, barge, or veſſel by water, except in veſſels for importation or exportation; and the barrels ſhall be ſo ſecured that no part of the gunpowder ſhall be ſcattered in the paſſage; and each barrel ſhall contain no more than 100*lb.* of gunpowder; and when conveyed by land ſhall be entirely cloſed in a leathern bag, or bags commonly called ſaltpetre bag; and every carriage ſhall be covered with a complete covering of wood, painted cloth, tarpaulin, &c.; and no gunpowder ſhall be carried in any boat, &c. that hath not a cloſe deck, which ſhall be covered with raw hides or tarpaulins; on pain of forfeiture of the gunpowder and barrels, &c. which any perſon may ſeize for his own uſe on conviction of the offender. Juſtices are empowered to iſſue warrants for ſearching, in the day time, any houſe, mill, magazine, &c. or any carriage, ſhip, boat, &c. in which gunpowder is ſuſpected to be made, kept, or carried, contrary to this act; and the ſearcher may ſeize ſuch gunpowder and barrels. For ſecurity of ſhips on the river Thames, no maſter of any outward bound veſſel ſhall receive on board more than 25*lb.* of gunpowder (except for the king's ſervice) before the arrival of ſuch veſſel at or below Blackwall; and the maſter of every veſſel coming into the river Thames ſhall (except in caſe of the king's ſervice) put on ſhore in proper places all the gunpowder on board above 25*lb.*, either before the arrival of ſuch veſſel at Blackwall, or within 24 hours; on pain of forfeiting all the gunpowder above 25 pounds and barrels, and 2*s* for every pound. The proviſions of this act ſhall not extend to any mills or other buildings erected for making gunpowder in any lands belonging to his majeſty, or to the keeping of gunpowder in any of his majeſty's ſtore-houſes or magazines; or to hinder the trial of gunpowder by his majeſty's officers; or to the carriage of gunpowder to or from the king's magazines; under a ſpecial order from the board of ordnance; or to the carriage of gunpowder with forces on their march, or with the militia during their annual exerciſe, or which ſhall be ſent for the uſe of ſuch forces and militia.

Gunpowder, in *Agriculture*, a material employed by the farmer for the purpoſe of blaſting ſtones, &c. It has been lately found that the expence of this ſubſtance may be greatly leſſened by the mixing of a portion of quick lime with it. See Blasting.

Gunpowder, in *Geography*, a river on the weſtern ſhore of Maryland, the chief branches of which unite above Joppa, and diſcharges themſelves into Cheſapeak bay, about 12 miles above Patapſco river. Its falls prevent its being navigable for more than a few miles.

Gunpowder *Neck*, a peninſula near the head of Cheſapeak bay, formed by Gunpowder river and Buſh river.

GUNSHOT Wounds receive their name from the manner in which they are produced. In *Surgery*, they are caſes which cannot be ſtudied with too great attention, the modern mode of warfare, and the martial times in which we live, making theſe injuries numerous beyond conception. As the invention (as ſome have ſaid) of gunpowder did not happen till the fourteenth century, and this ſubſtance was not applied to the projection of bodies from fire-arms till a later period, gunſhot wounds, compared with the generality of other diſeaſes and accidents, may be conſidered as forming rather a new branch of ſurgery. The ancient writers, who have left us valuable remarks on many ſurgical ſubjects, are totally ſilent on that which engages our preſent notice, and we muſt turn to the pages of very modern authors for what is to be looked upon as the beſt and moſt accurate information.

Gunſhot wounds, ſays Mr. Hunter, are made by the projection of hard obtuſe bodies, the greateſt number of which are muſket-balls; for cannon-balls, pieces of ſhells, and ſtones from ramparts in ſieges, or ſplinters of wood, &c. in ſea engagements, can hardly have their effects ranked with ſuch wounds as are made with bullets and muſket-balls. The latter caſes are thoſe which will generally demand whatever peculiarity of treatment may be required by gunſhot wounds. However, ſince cuſtom has claſſed all theſe various kinds of injury together, and the place is convenient, the neceſſary information concerning every ſort of miſchief occaſioned by bullets, cannon-balls, ſplinters, &c. will be introduced in the enſuing columns.

Mr. Hunter obſerves, that all gunſhot wounds will come within the definition of accidents. They are a recent violence committed on the body; but they often become the cauſe of, or degenerate into a thouſand complaints, which are the objects of ſurgery or phyſic, and many of which are common to accidents in general, and to many other diſeaſes. Of this kind are abſceſſes, ulcerating bones, and fiſtulæ; but ſome are peculiar to gunſhot wounds, as calculi in the bladder from the ball entering and lodging in that viſcus, and conſumption from wounds of the lungs, which, however, is a very rare occurrence.

Gunſhot wounds vary from one another according to circumſtances, the differences chiefly depending on the kind of body projected, the velocity of the body, and the nature and peculiarities of the injured parts. It has been ſtated, that the kind of body projected is principally muſket balls, and ſometimes cannon balls, and that pieces of broken ſhells and ſplinters of wood, eſpecially on board of ſhip, are the occaſion of the miſchief in other inſtances. Indeed, the effects of cannon-balls on different parts of the ſhip, either on the containing parts, as the hull, or the contained, are the principal cauſes of wounds in the ſailor; for, a cannon-ball muſt go through the timbers of the ſhip before it can do more execution than ſimply as a ball. It then becomes a ſpent ball, which ſplinters the inſide of the ſhip very conſiderably, and moves other bodies in the ſhip, neither of which conſequences it would produce if it were moving with ſufficient velocity. Comparatively ſpeaking, muſket, or cannon balls ſeldom do immediate injury to the ſailor. The wounds occaſioned by cannon-balls, pieces of ſhells, and ſplinters of wood, are more like many common violent accidents, which are attended with much contuſion and laceration of parts.

Mr. Hunter next obſerves, that gunſhot wounds, from whatever cauſe, whether from muſket-ball, cannon-ball, or ſhell, are in general contuſed wounds, from which contuſion there is moſt commonly a part of the ſolids ſurrounding the wound deadened, as the projected body forced its way through the ſubſtance of the part. This deadened portion is afterwards thrown off in the form of a ſlough, and is the cauſe which keeps the generality of gunſhot wounds from healing by the firſt intention, or by means of the adheſive inflammation, and which, for the moſt part, obliges the practitioner to let them ſuppurate. Suppuration does not always happen equally in every gunſhot wound, nor in every part of the ſame wound; and the difference commonly ariſes from the variety of the body projected; for, we find in many caſes, where the ball has paſſed with little velocity, (which is often the caſe with balls even at their entrance, but more common at their exit), that the wound will admit of being healed by the firſt intention.

In conſequence of gunſhot wounds commonly having a part killed, they do not in general ſo readily inflame as wounds from other accidents. This backwardneſs to inflame, ſays Mr. Hunter, will be in proportion to the quantity of deadened parts in relation to the ſize of the wound. It is on this account that the inflammation is late in coming on when a ball has paſſed through a fleſhy part with great velocity. There is, in that caſe, a great deal of ſubſtance killed, in proportion to the ſize of the wound. Therefore, the inflammation in gunſhot wounds, is leſs than that which accompanies wounds in general, attended with the ſame quantity of miſchief. The inflammation is alſo in an inverſe proportion to the quantity of the parts deadened, and, in Mr. Hunter's words, it is leſs where the parts are to ſlough than where parts have been deſtroyed by other means.

On the other hand, where the ball has fractured ſome bone, which fracture in the bone has done conſiderable miſchief to the ſoft parts, independently of the ball, then there will be nearly as quick inflammation as in a compound fracture of the ſame bone, becauſe the deadened part bears no proportion to the laceration, or wound in general.

It is on account of ſome part of a gunſhot wound being frequently killed, that the injury is often at firſt not completely underſtood; for, as Mr. Hunter accurately obſerves, it is in many caſes impoſſible to know at firſt what parts are killed. We often cannot know whether bone, tendon, or ſoft part be killed, till the deadened part has ſeparated. When this event has taken place, the wound is frequently rendered much more complicated than was at firſt known or imagined; for it very often happens that ſome viſcus, or a part of ſome viſcus, or a part of a large artery, or even a bone, has been killed by the blow, and the miſchief cannot be diſcovered till the ſlough comes away. If, for inſtance, it is a part of an inteſtine that has received a contuſion, ſo as to kill it and make it ſlough, a new ſymptom will moſt probably appear as ſoon as the dead ſubſtance is thrown off, as the contents of the bowel will then begin to come through the wound. The ſame thing is likely to happen when any other containing viſcus is the part deadened. Such caſes, however, are not ſo dangerous as if the ſame loſs had been produced at firſt, for, after a certain ſpace of time has elapſed, all communication is cut off between the containing and contained parts. Nor is this kind of caſe ſo dangerous as when a conſiderable blood-veſſel is deadened; for, in the latter event, immediate death is apt to take place when the ſlough is detached, by reaſon of the blood having a ready paſſage into and out of the wound. When an artery thus injured is internally ſituated, nothing can be done; but if it be in an extremity, either the veſſel muſt be taken up and tied, or elſe, in all probability, amputation will be neceſſary to ſave the patients' life. Hence, Mr. Hunter recommends paying early attention to caſes in which a part of a blood-veſſel is likely to ſlough. When a portion of a bone is deadened an exfoliation will follow.

Gunſhot wounds frequently do conſiderable miſchief to vital parts, occaſioning various effects according to the nature of the parts wounded, and the violence of the wound. Mr. Hunter likewiſe obſerves, that theſe accidents ſometimes injure parts, the ſoundneſs of which is either eſſential to the health of the whole body, or to the uſes of the parts wounded. Such are wounds of any viſcera, whoſe contents are voided through the opening, and injuries of joints, which are not prone to heal, and when healed, have their functions impaired.

Gunſhot wounds frequently admit of being claſſed with ſmall deep wounds, which always require particular treatment.

Strange and vague were ſome of the opinions entertained, not many years ago, concerning the nature of gunſhot wounds. It was once ſuppoſed that a ball might injure parts of the body in two ways, namely, by actually ſtriking them, and by merely paſſing very near them, without touching them at all. The latter caſe was thought to be occaſioned by the violent commotion produced in the air by the rapid motion of the ball; and conſiſted of a contuſed, and even cruſhed ſtate of the ſoft and hard parts ſituated under the ſkin, which itſelf remained free from any kind of wound.

Theſe wind-contuſions, as they have been erroneouſly called, can never be occaſioned in the foregoing manner. The air does not move with the ſame rapidity as the ball; but its motion muſt be ſlower, in proportion as it is a more ſubtile matter, and its impulſe muſt be too feeble to account for ſo violent a degree of injury. The air to which the ball muſt really communicate the greateſt motion, is that which is directly before it, but which is never found to bruiſe ſuch parts as are untouched by the ball itſelf. It is only the air, ſituated laterally to the ſhot, that is imagined to do the injury, and it cannot be greatly agitated. The violent conſequences of ſudden exploſions, and the effects produced on the organ of hearing, by ſtrong commotions of the air, prove nothing relative to the point in queſtion. Laſtly, it may be remarked, that experience does not confirm the reality of ſuch wind-contuſions; for cannon-balls often tear off whole limbs, without the adjacent parts being in the leaſt injured. (Le Vacher, in Mem. de l'Acad. Royale de Chirurgie, tom. 4. p. 22.)

Nor is the idea more true, that this kind of accident is owing to an electrical ſhock on the parts, in conſequence of the ball being rendered electrical by friction in the calibre of the gun, and giving off the electrical matter as it paſſes by; for metals can never acquire this property from friction. See Plenk's Sammlungen. 1. Theil. p. 99.

Richter rightly contends, that the miſchief which has been aſcribed to the air is produced by the ball itſelf. Its producing a violent contuſion, without tearing the ſkin, and entering the limb, is to be aſcribed to the oblique direction in which it ſtrikes the part. Daily experience ſhews, that balls which ſtrike a ſurface obliquely do not penetrate, but are reflected; notwithſtanding they may be impelled with the greateſt force, and the body ſtruck may be as ſoft and yielding as water. This alteration, in the courſe of the ball, not only happens on the ſurface of the human body, but alſo in the veiny ſubſtance of any part or limb which it has entered. A bone, a tendon, &c. may change the direction of a ball, when it ſtrikes them at all obliquely. Hence we may diſcern the reaſon why the track of a gunſhot wound is not always ſtraight, and why balls ſometimes run under the integuments nearly all round the body or limb which is wounded. Anfangſgrunde der Wandarzneykunſt. Band 1.

The terrible miſchief, which was frequently ſeen to ariſe from gunſhot wounds, formerly created a ſuſpicion in the minds of ſome ſurgical practitioners, that the injured parts were either dreadfully burnt by the heat of the projected body, or were irritated by the preſence of poiſon as well as by mechanical violence. At preſent, however, no opinions of this kind prevail, and the moderns, who are better acquainted with the component ingredients of gunpowder, more accurately impute the ill conſequences of gunſhot wounds to the violence, contuſion, and laceration inflicted on the wounded parts. The miſchief which is in general done by ſo obtuſe a body as a muſket ball, and often with immenſe force and velocity, muſt often be productive of conſiderable inflammation, extenſive ſloughing, and abſceſſes. Theſe evils ſeem ſufficiently accounted for, without ſuppoſing the immediate action of fire, or any poiſonous matter. Large bodies of irregular figures, it is obvious, muſt occaſion a greater quantity of miſchief, than ſuch as are externally ſmooth, of a round form, and of moderate ſize.

Mr. Hunter remarks, that many of the varieties between one gunſhot wound and another, ariſe from the difference in the velocity of the body projected. When the velocity of the ball is inconſiderable, the miſchief is always leſs. There is not ſo great a chance of the accident being complicated with fractures of the bones, &c. However, if this degree of velocity be ſufficient to break the bone which is hit, ſuch bone will be much more ſplintered than it would have been, had the velocity been very conſiderable; for when the ball moves with great rapidity, a piece of the bone is, as it were, taken out. But the circumſtances will alſo vary according to the hardneſs of the bone, the ſplinters being moſt numerous and frequent when it is hard.

When the velocity is not great, the direction of the wound will generally not be ſo ſtraight, nor ſo eaſily aſcertained, in conſequence of the eaſe with which the ball is turned in its courſe.

When the velocity is inconſiderable, the deadened part or ſlough is always leſs; for a ball which moves with little rapidity ſeems only to divide parts; while the contrary muſt happen when the ſwiftneſs is great. It is on this account that the ſlough is larger at the orifice, where the ball has entered, than at that from which it has made its eſcape; and if the ball ſhould have met with a great deal of reſiſtance in its paſſage through the wounded part, there will very probably be no ſlough at all at its exit, where the injury will be only a lacerated wound.

The greater the velocity of the ball, ſays Mr. Hunter, the more cleanly the parts are wounded. This is ſo much the caſe, that the injury is almoſt ſimilar to a cut made with a ſharp inſtrument, from which circumſtance it might be ſuppoſed that there ought to be a ſmaller ſlough. However, Mr. Hunter ſuſpected, that a certain velocity given to the beſt cutting inſtrument would produce a ſlough on the cut edges of the divided parts; for theſe, not giving way equally to the velocity of the divided body, muſt of courſe be proportionably bruiſed.

Gunſhot wounds are attended with leſs bleeding than moſt others. However, ſome caſes will be accompanied with this ſymptom more than others, even in the ſame part. This circumſtance is owing to the manner in which the wound is produced. Bleeding ariſes from a veſſel being cut or broken; but the freedom with which the blood flows depends upon the manner in which this is done. If the artery is cut directly acroſs, and it is done by a ball paſſing with conſiderable velocity, the veſſel will bleed rather freely; if bruiſed, and in ſome degree torn, the hemorrhage from it will then be leſs. When the ball moves ſlowly, the veſſels will be principally torn; for they will have time to ſtretch before the continuity of their parts gives way. If the velocity is great, they will bleed more freely, becauſe, ſays Mr. Hunter, the velocity will make up for the want of ſharpneſs.

According to the velocity of the ball, ſo is the direction. When the velocity is great, the direction of the ball will generally be more in a ſtraight line than when it is inconſiderable; for in the firſt caſe, the ball more eaſily overcomes obſtructions, and, therefore, paſſes on in its firſt direction.

The rapidity of a ball renders parts leſs capable of healing than when the motion has been ſlower. Hence gunſhot wounds in parts which are ſomwhat thick, are generally later in healing at the orifice, where the ball enters, than at the opening from which it comes out. The reaſon is, that it becomes in ſome meaſure a ſpent-ball, the part having leſs ſlough, and being only torn, ſo as often to admit of being healed by the firſt intention.

M. Hunter alſo acquaints us, that when a ball paſſes through a part, in ſuch a direction as to have one orifice more depending than the other, he always found that the depending orifice healed ſooneſt, and more certainly ſo, if the ball came out that way, and had been nearly ſpent in its paſſage. Therefore, it is thought advantageous to keep ſuch opening from cloſing; ſome ſkill will be required to do ſo. The ball, however, will not always be ſpent, becauſe if the perſon is near the gun, when fired, the velocity of the bullet will be very little diminiſhed in its progreſs through the ſoft parts, and therefore will paſs with nearly the ſame velocity on both ſides of the injured part. See Hunter on Gunſhot Wounds, chap. 1.

It is noticed by M. Chevalier, that the cauſes of ſeveral peculiarities attending gunſhot wounds, are to be ſought among the laws by which moving bodies are governed; and by which the mechanical effect of a ball, propelled againſt any part of the body, muſt therefore be determined. The form, the momentum, and the direction of the ſhot that is received; the poſition, and the variety of ſtructure, or, in other words, the variety of denſity and powers of reſiſtance, in the part receiving it, muſt always be conſidered in order to account ſatisfactorily for the effects which it produces.

The firſt law to which this gentleman begs the attention of his reader, is that a body in motion, ſtriking againſt any ſubſtance, will communicate a part of its momentum to the ſubſtance againſt which it ſtrikes, and that this communication will be in a direct ratio to the powers of reſiſtance which that ſubſtance poſſeſſes at the time; whether ſuch power of reſiſtance be derived from its own denſity or bulk, or force of coheſion, or momentum acting in a different direction. So that if the reſiſtance be equal or ſuperior to the momentum, the motion will be ſtopped; the momentum in this caſe being equally divided between the body impelled and the body reſiſting. If the reſiſtance be inferior, the motion will only be leſſened; and if, beſides being inferior, and therefore incapable of ſtopping the moving body, it alſo operates in a different direction, the future line of motion will likewiſe be changed, and fly off from the point at which it meets with the reſiſtance, in a line which will form an angle with that of the original direction in which it moved.

M. Chevalier next reminds his reader, that the reſiſtance made by any ſubſtance to the motion of another will be greater or leſs, *cæteris paribus*, as the angle of incidence approaches to, or recedes from a right angle; and if it be reflected, and the motion be continued in the ſame medium, the angle of reflection will always be equal to the angle of incidence.

The reſiſtance made to a moving body, by the denſity of any medium in which it moves, will be, *cæteris paribus*, as the ſurface of the moving body preſented to that medium.

A denſe medium forms a continued reſiſtance to a body propelled with any given velocity; and, therefore, the more denſe the medium, the greater the reſiſtance, and the ſooner the original momentum will be overcome by it.

A ſhot, moving through any medium of uniform denſity, will alſo be acted on by the attraction of gravitation, ſo as to be continually changing the direction in which it moves; and (continues M. Chevalier), if it move in vacuo, or in air, it will deſcribe the curve called a parabola. The commencement of this curve does not take place at the point at which the gunpowder explodes; for, within the barrel, and to ſome diſtance beyond it, the ſhot moves forward in a right line, called *the line of the impulſe of fire*, (ſee Helſham's Lect. ii. p. 187.), which line will extend fartheſt horizontally, the leſs the angle of elevation of the piece recedes from an horizontal line. (See on this ſubject the article GUNNERY.)

The leſs of the original impulſe is left in a ſhot ſtill moving, the more liable will it be to be ſtopped, or turned out of its courſe by any given reſiſtance.

Every new reſiſtance (ſays M. Chevalier), which a ſhot in motion meets with, will operate ſo as to produce not only a diminution of its momentum but alſo a change in its direction; every freſh reſiſtance being in fact equivalent to a freſh power acting in a different line from that in which the ſhot was previouſly moving.

As a body acted on at once by two powers will not move in the direction of either, but in the diagonal of a parallelogram, of which two ſides are formed by the direction and momentum, given by each of thoſe powers reſpectively, ſo every change of impulſe, or reſiſtance, will cauſe the body to move in ſo many changes of direction, till at length its momentum is overcome and it becomes quieſcent.

A continued reſiſtance from a denſe medium will be a continued application of a power, the uniform and equable operation of which will cauſe the motion to be curvilinear, the reaſon of which is ſufficiently explained by writers on projectiles.

M. Chevalier afterwards obſerves, that a ſhot or other hard body, falling upon a ſoft one, as, for example, on adipoſe membrane, or muſcle, and ſtopping there, or lodging in it, ſtill acts in conformity to the ſame general laws, and ſtops only from the reſiſtance it meets with. If this reſiſtance be afforded only by the force of coheſion in the adipoſe membrane, or muſcle, ſo much of that coheſion is overcome as was equal to the momentum of the ſhot when it impinged againſt it; and, therefore, ſo far, and only ſo far, is its ſubſtance broken through or deſtroyed.

It is only on ſuch principles that we can explain the intricate and varied courſe and effect of balls in parts of diverſified ſtructure, conſiſting of ſubſtances differing in denſity and powers of reſiſtance. And though (continues the foregoing author) a mathematical explication of the courſe of a ball cannot be given in many caſes, this ariſes entirely from the want of data, the laws of matter being fixed and immutable. But when the data are known, as, for inſtance, the velocity and direction of the ſhot, the poſition of the patient, or of the wounded part at the time of the accident, and the ſtructure of the parts penetrated, a much more probable conjecture of the courſe of the ball may generally be formed, than if theſe circumſtances had not been regarded.

From the foregoing account, ſays M. Chevalier, we may ſee the reaſon of the concuſſion, or ſhock which is given, in many inſtances, to the whole ſyſtem by gunſhot wounds, and which is repreſented by the beſt writers on this ſubject to be often attended with grave and even alarming effects, extending not only over the injured part, but affecting the ſyſtem at large. For, ſays the preceding writer, as the reſiſtance to the ſhot is afforded, not only by the texture of the injured part, but alſo in ſome degree by the connection which this has with other parts, and with the whole body, theſe latter will likewiſe participate in the violence; and they will do it ſo much the more, in proportion as the part immediately wounded has, from its attachments, its texture, elaſticity, or importance to life, a greater connection with the ſtability, or with the functions of the reſt. Hence, a ſhot ſtriking againſt a tendon, or a bone, in one of the extremities, will produce a greater concuſſion than if it ſtruck only againſt ſofter parts. A ſhot ſtriking againſt a muſcle in action will produce more concuſſion than if it ſtruck againſt the ſame part of the ſame muſcle at reſt. And, a ſhot ſtriking the head, or wounding the liver, lungs, or inteſtinal canal, will generally bring on an inſtantaneous derangement of the whole ſyſtem, with which the functions of theſe parts are ſo cloſely connected. To all this muſt be added an alarm, which takes ſudden poſſeſſion of the mind, and is increaſed by the uncertainty of the patient about his real ſtate. Such apprehenſion the moſt determined courage is not always able to withſtand. See a Treatiſe on Gunſhot Wounds, by Thomas Chevalier, F. L. S. &c. edit. 3, part i. ſect. 7.

Gunſhot wounds are remarkably liable to be accompanied with the lodgment of foreign bodies, which are uſually of three kinds; firſt, pieces of the clothes or other things which the ball has forced before it into the wound; ſecondly, the ball itſelf; and, thirdly, looſe ſplinters of bone. The wound cannot be certainly free from extraneous bodies, unleſs the ball have ſtruck a naked part, touched no bone, and gone completely through the limb. Foreign bodies in gunſhot wounds are a common cauſe of numerous unfavourable ſymptoms, eſpecially of ſuch as violent inflammation, large abſceſſes, hemorrhages, and ſpaſmodic affections. Theſe bad conſequences are the more likely to be produced, the harder and more uneven and pointed the extraneous ſubſtances are.

When a ball ſtrikes a bone, writers in general ſtate, that the concuſſion may produce ill effects, not only in the contiguous parts, but even in thoſe which are at ſome diſtance from the wound. The inflammation and ſuppuration of the neareſt joint are in particular made mention of; and, in the Mémoires de l'Academie de Chirurgie, are ſome curious accounts of inflammations of parts very diſtant from that which was injured by the ſhot. The lungs and liver are deſcribed by authors as frequently becoming thus affected in conſequence of gunſhot wounds in a remote part of the body.

Certain kinds of gunſhot miſchief may occaſion, as ſoon as the injury has happened, undeſcribable diſturbance of the conſtitution, together with loſs of the ſenſes, and derangement of all the functions of life. However, it is worthy of notice, that ſome exceedingly violent gunſhot wounds happen, without the leaſt ſuſpenſion of the mental faculties. We remember a ſailor, about one and twenty years of age, who had his whole arm, and a conſiderable part of his ſhoulder, carried away by a cannon-ſhot from a French fort in the Weſt Indies. The ſcapula had been ſo dreadfully ſhattered, that a ſurgeon of Antigua had deemed it adviſable to remove the whole of the ſplintered bone. We were informed by the ſailor, that his limb was torn from his body ſo inſtantaneouſly, that he not only retained his ſenſes, but was even for a time unconſcious of the dreadful injury which he had ſuſtained. He was preſented about a year and a half ago to the ſurgeons of St. Bartholomew's hoſpital, the caſe being remarkable on account of the total loſs of the ſcapula. Cheſelden and ſome other writers have related ſtriking examples of whole limbs being torn off, and of very large blood-veſſels being thus ſuddenly lacerated without any conſiderable hemorrhage taking place. Here we have another proof of the ſame remarkable circumſtance.

Gunſhot wounds in general do not bleed much; for torn and contuſed veſſels do not uſually pour forth much blood. It is highly deſerving of every practitioner's earneſt attention, however, that, although the peril of hemorrhage is in common caſes not conſiderable in the firſt inſtance, there is often a vaſt deal of danger on the ſcore of bleeding, at the period when the ſloughs are becoming looſe. Many and many a patient has at this time been deſtroyed by ſudden effuſion of blood, in conſequence of no meaſures having been prepared for its ſuppreſſion. Surgeons cannot be too much on their guard againſt bleeding, from the ſixth to the tenth, or twelfth day, whenever the nature of the wound renders it poſſible, or probable, that the ſide of any large blood-veſſel has been killed by the paſſage of the ball. Notwithſtanding not a drop of blood may iſſue from the aperture of the injury, on the firſt occurrence of the accident, ſome internal ſlough may in a few days ſeparate, and give riſe to ſuch bleeding, as muſt prove fatal, unleſs immediately ſtopped. Hence nothing can be more judicious, when there is reaſon to apprehend this dangerous event, than to leave ſome vigilant and intelligent attendant continually with the patient, and when circumſtances will permit, to have a ſlack tourniquet put round the limb, ready to be tightened in an inſtant. The patient, or nurſe, may be directed how to tighten the band, in caſe of neceſſity.

The moderns no longer conſider gunſhot wounds as being either injuries of a ſpecific nature, or caſes complicated with the lodgment of any poiſonous matter in the part. Nor is it now ſuppoſed, that, in ordinary inſtances, the heat of the ball is the occaſion of any of the extenſive miſchief which is ſo frequently obſerved. The ſeverity of many of theſe caſes is more rationally imputed to the violent manner in which the ball contuſes and lacerates the fibres among which it paſſes. The parts immediately ſurrounding the courſe of the ball are, in fact, very frequently killed, and muſt be thrown off in the form of a ſlough before the wound can heal. Thus ſuppuration is often rendered unavoidable. The violence inflicted is alſo frequently a cauſe of extenſive inflammations, abſceſſes, and fever, and, in too many inſtances, of gangrene and death. Gunſhot wounds of the head, cheſt, and abdomen are in general highly dangerous, on account of the important organs and viſcera contained in thoſe parts of the body. However, the degree of danger will always greatly depend on the violence, depth, and direction of the ball; for, when the ſhot only grazes the ſkin in any ſituation, or only runs ſuperficially under it, the peril is very different from what it is when the ſkull is fractured, the brain injured, the ſternum broken, and lungs wounded; or the bowels ſhot through.

We ſhall next proceed to ſpeak of the treatment of gunſhot wounds.

Before the period when Mr. Hunter wrote on the preſent ſubject, it was always the cuſtom to open the orifice of every wound made by a muſket-ball immediately, or as ſoon after the accident as poſſible. So much was this practice recommended, that no diſcrimination was made between one gunſhot wound and another. Mr. Hunter obſerves that this appears to have ariſen and been continued from an opinion that gunſhot wounds had ſomething peculiar in them, of courſe were different from all other wounds, and that their peculiarity was removed by the opening. That great ſurgeon, however, could not diſcern any ſuch peculiarity. He thought that the moſt probable way of accounting for the firſt introduction of this practice, is from the wound in general being ſmall, and nearly of a ſize from one end to the other. Alſo the frequency of extraneous bodies being forced into theſe wounds by the ball, and the common circumſtance of the ball itſelf being lodged in the part, might have had a ſhare in giving riſe to the method. For the way in which theſe wounds are made is by the introduction of an extraneous body, which is left in the part if it has not made its way through, and which makes a lodgment for itſelf, often carrying before it clothes, and even ſome of the ſubſtance of the wounded part, ſuch as the ſkin, &c. Theſe things muſt at firſt have ſuggeſted the immediate neceſſity of ſearching after the extraneous bodies; while, in general, the impoſſibility of finding them, and even of extracting them when found, without dilatation, firſt led practitioners to think of enlarging the mouths of the wounds by an inciſion. Experience, however, gradually occaſioned a partial alteration in this practice, and ſurgeons loſt a great deal of their anxiety to ſearch after the extraneous bodies; for they found that it was more frequently impoſſible to find them than was at firſt imagined; that when found, it was not poſſible to extract them; that they were afterwards brought to the ſkin by the parts themſelves; and that ſuch as could not be brought to the external ſurface in this way occaſioned little or no future trouble, as balls, &c. Yet it is ſomewhat ſurpriſing that the practice was only altered inaſmuch as related to the attempt to extract the extraneous bodies: for, after experience had ſhewn the general impoſſibility of extracting theſe in the firſt inſtance, the unneceſſary cuſtom of dilating the mouth of the wound was not diſcontinued, though the endeavour to extract the ball had been abandoned.

The circumſtance of gunſhot wounds being contuſed, obliges moſt of them to ſuppurate, becauſe there is more or leſs ſlough to be thrown off, eſpecially at the orifice made by the entrance of the ball. For this reaſon there muſt be a freer paſſage for the matter, or any other extraneous ſubſtance, than in another wound of equal ſize, made with a clean cutting inſtrument, even if not allowed to heal by the firſt intention.

There being no peculiarity in gunſhot wounds, Mr. Hunter was of opinion that the plan of dilating them, as a general one, ought to be rejected, were it only for this reaſon, that few gunſhot wounds are alike, and therefore the ſame practice cannot apply to all. Among other remarks againſt this method of treatment, it is repreſented by this celebrated ſurgeon, that to enlarge wounds, ſimply as wounds, is contrary to all the rules of ſurgery, founded on our knowledge of the animal economy. No wound, let it be ever ſo ſmall, ſhould be made larger, excepting when preparatory to ſomething elſe, and when the caſe muſt be of a complicated kind, and require particular treatment accordingly. It ſhould not be opened, becauſe it is a wound; but becauſe there is ſomething neceſſary to be done, which cannot be executed unleſs the wound is enlarged.

This, ſays Mr. Hunter, is common ſurgery, and ought alſo to be military ſurgery, reſpecting gunſhot wounds. He owns that it would be abſurd for any one to ſuppoſe that there is never occaſion to dilate gunſhot wounds at all; but, at the ſame time, he contends, that there are very few inſtances in which ſuch proceeding is neceſſary. He explains that it will be impoſſible to determine, by any general deſcription, what caſes ought to be opened and what ought not. When once the ſurgeon is maſter of the arguments on both ſides, this part of the treatment muſt be in a great meaſure regulated by his own diſcretion. Some general rules may be given, with regard to the more ſimple caſes; but with regard to the more complicated, the particular circumſtances of each caſe are the only guide, and the treatment muſt be adapted to the received principles of ſurgery.

Mr. Hunter firſt endeavours to give an idea of the wound, which would receive no benefit from being dilated. He notices, that if a ball paſſes through a fleſhy part, ſuch as the thick portion of the thigh, where no bone has been hurt, he can perceive no reaſon for dilating the wound, becauſe no purpoſe can be anſwered by it. If the ball does not paſs through, and cannot be found, the dilatation can alſo be of no ſervice.

Suppoſing it ſhould be objected that the opening in the ſkin is too ſmall to allow the ſloughs, &c. to eſcape, Mr. Hunter believes that this objection is in general deſtitute of foundation. He obſerves, that, in all caſes of wounds, the ſkin is kept open by its own elaſticity, a property which muſcles and many other parts do not poſſeſs. The opening made by the ball is uſually much larger than what is occaſioned by pointed inſtruments; for beſides the circular ſlough, there is often a piece of ſkin carried in before the ball, eſpecially when the latter has moved with conſiderable velocity, ſo that, in ſuch caſes, there is really a greater loſs of ſubſtance. Therefore, whatever matter or extraneous body may be preſent, will find a free paſſage out as ſoon as it arrives at the ſkin. Nor does the wound in the ſkin in general heal ſooner than the bottom; and, indeed, adds Mr. Hunter, in many caſes it does not heal ſo ſoon, becauſe the ſkin is generally the part that has ſuffered moſt.

Mr. Hunter acknowledges that the ſkin ſometimes heals firſt, but he found this to happen as often when openings had been made as when they had not. This he refers to circumſtances or peculiarities; ſuch as the bottom of the wound being at a conſiderable diſtance, containing extraneous bodies, having no diſpoſition to heal, and tending to a fiſtula. He noticed in practice, that in ſuch caſes the wound or opening, made by the ſurgeon, generally ſkinned to a ſmall hole before the bottom of the wound was cloſed, which brought things into the ſame ſtate as they would have been in had no dilatation at all been made, eſpecially ſuppoſing ſome extraneous bodies ſtill to remain. An extraneous body cauſes and keeps up the ſecretion of matter, or rather keeps up the diſeaſe at the bottom of the wound, by which means the healing diſpoſition of its mouth is in ſome degree deſtroyed. Mr. Hunter calls the attention of his reader to a caſe of the latter deſcription. Suppoſe a wound made with a ball, and incapable of healing in ſix months, becauſe the extraneous bodies, &c. cannot be extracted or work out ſooner, or ſome other circumſtance prevents a more ſpeedy cure. Open that wound as freely as may be thought neceſſary; yet Mr. Hunter maintains that in a month's time it will be in the ſame ſtate as a ſimilar wound that has not been opened; ſo that the whole advantage, if there is any at all, muſt be previouſly to this ſtate. It is very ſeldom, however, that any thing of conſequence can be done in that time, becauſe the extraneous bodies do not come out ſo readily at firſt as they do at laſt, for the inflammation and tumefaction, which extend beyond the opening, generally confine ſuch foreign ſubſtances. Hence, if the wound is opened on their account at firſt, it ought to be kept open till the very laſt. Upon the ſame principle this excellent ſurgeon contends, that opening a gunſhot wound at firſt, on account of extraneous bodies, cannot be of ſo much ſervice as the performance of the ſame operation ſome time afterwards; for the ſuppuration, with its leading cauſes, *viz.* inflammation and ſloughing all along the paſſage of the ball, makes the paſſage itſelf much more determined and more eaſily followed; and the courſe of the wound not being ſo at the beginning, is the reaſon why few extraneous bodies can ever be extracted at that time, except what are ſuperficial, ſmall, and looſe.

When the extraneous bodies are broken bones, they are ſeldom entirely detached, and therefore muſt become looſe before they can come away. In many caſes, alſo, the bones are rendered dead, either by the blow or by being expoſed. Such bones muſt exfoliate, and this requires time.

Mr. Hunter next proceeds to remark, that a reaſon given for opening gunſhot wounds, is, that it takes off the tenſion ariſing from the inflammation, and gives the part liberty. This, ſays he, would be very good practice, if tenſion or inflammation were not a conſequence of wounds; or if it could be proved that the effects of dilating a part already wounded are very different, if not quite the reverſe of thoſe of the firſt wound. But ſince enlarging the wound muſt always be conſidered as an extenſion of the firſt miſchief, we muſt infer that it produces an increaſe of the effects ariſing from ſuch miſchief. Therefore this practice is contradictory to common ſenſe and common obſervation.

They are principally compound wounds, obſerves Mr. Hunter, which require ſurgical operations, and the following precautions are laid down as neceſſary in theſe caſes.

As the dilatation of gunſhot wounds is a violence, it will be proper to conſider well what relief can be given by ſuch an operation, whether without it more miſchief would enſue, and what is the beſt time for putting the proceeding into execution.

To make this ſtep adviſable, we muſt have ſome other views than ſuch as have been objected to; we muſt ſee plainly ſomething to be done for the relief of the patient by making the opening; we muſt know that the benefit cannot be procured without it, and if not procured, that the part cannot heal, and the patient is likely to loſe his life.

Firſt, if the wound ſhould be a ſlight one, and require opening, the operation will be beſt at the beginning before inflammation comes on. The inflammation, in conſequence both of the accident and dilatation, will then only be ſlight. However, in theſe leſs ſerious caſes, dilatation will never be neceſſary, except to allow of the extraction of ſome extraneous body which is near. But if the wound is a conſiderable one, and it ſhould appear upon conſideration that you cannot relieve immediately any particular part, or the conſtitution, then you gain nothing by opening immediately, but only increaſe the inflammation; and, in ſome caſes, the inflammation ariſing from the accident and opening together may be too much for the patient. Under this laſt circumſtance, it will be more adviſable to wait till the firſt inflammation ceaſes, by which means, the patient will ſtand a much better chance of a cure, the inflammations being divided. It is poſſible, however, that the inflammation may ariſe from ſome cauſe which could be removed by opening the wound. For inſtance, a ball, or broken bone, preſſing upon ſome part, whoſe actions are eſſential to the life of the part, or of the whole body, or ſome large artery, nerve, or vital part.

Secondly, when an artery is wounded, and the patient is likely to become too weak, or die from loſs of blood, the veſſel ought undoubtedly to be tied, and, moſt probably, this cannot be done without previouſly opening the external parts, and often freely.

Thirdly, in a wound of the head, when there is reaſon to ſuſpect a fracture of the ſkull, it may be neceſſary to open the ſcalp.

Fourthly, when there are in any part of the body fractured bones, which can be immediately extracted with advantage, and which would do much miſchief if left, the caſe is to be regarded as a compound fracture wherever it is. It makes no difference in the treatment, whether the wound in the ſkin was made by a ball or the bone itſelf, at leaſt where the compound fracture is allowed to ſuppurate; for there is often a poſſibility of treating a compound fracture as a ſimple one, a thing which gun-ſhot fractures will ſeldom admit of. The caſes, however, are very ſimilar, when ſuppuration cannot be avoided. Inſtances, indeed, ſays Mr. Hunter, have been known, in which a fracture of the thigh bone, occaſioned by a ball, has healed in the ſame way as a compound ſimple fracture, by which term, we conceive, is implied a compound fracture, which admits of being cured like a ſimple one, without ſuppuration.

Fifthly, where there is ſome extraneous body which can eaſily be extracted, and the miſchief from delay is likely to exceed that reſulting from the dilatation, the operation is indicated.

Sixthly, when ſome internal part is miſplaced, and can be put at once into its natural poſition again, it may be proper to dilate the wound, as in wounds of the belly, attended with a protruſion of ſome of the viſcera, where it is neceſſary to perform gaſtroraphe. In this caſe, the operation is to be done in the ſame manner as if the accident aroſe from any other cauſe; but Mr. Hunter obſerves, that the treatment ſhould be different; for gunſhot caſes cannot heal by the firſt intention, on account of the ſlough which is to enſue. See Gastroraphe.

Seventhly, when ſome vital part is preſſed, ſo that its functions are loſt, or much impaired, as will often happen in caſes of fractured ſkull, fractures of the ribs, ſternum, &c. an enlargement of the wound may be neceſſary. In ſhort, the operation is proper, ſays Mr. Hunter, when any thing can be done to the part for the preſent, or future relief of the patient by making the opening.

When none of the foregoing circumſtances exiſt, this great ſurgeon thinks, that the practitioner ought to be quiet. He ſtates, that when balls enter the cavity of the abdomen, or thorax, the wounds need not be dilated, except ſomething elſe is neceſſary to be done to the contained parts; for it is impoſſible to follow the ball.

When balls enter any part where they cannot be followed, as into the bones of the face, no dilatation of the wound in the ſkin is requiſite, ſince the operation can do no good to the reſt of the wound, which is a bony canal.

At preſent, ſurgeons do not give themſelves ſo much trouble about the balls, nor often dilate the wound on their account. When the wound is dilated, they do not ſearch much after them, which ſhews that the opening is not neceſſary, or at leaſt, that it is not made on account of extraneous bodies.

Such practice, obſerves Mr. Hunter, has ariſen from experience; for it has been found, that balls, when obliged to be left, have ſeldom or never done any harm when at reſt, and not ſituated in a vital part. Balls have been known to lie in the body for years, and are frequently never found at all, and yet the perſon experiences no inconvenience.

The difficulty of finding balls, and of extracting them when found, led to the information that balls were not very apt to promote inflammation.

The ball cannot readily be found at firſt, becauſe the parts are only torn and divided, without any loſs of ſubſtance before the ſlough comes away. Hence the parts collapſe and fall into their places again, ſo as to make it difficult to paſs any thing in the direction of the ball, or even to know its direction. This difficulty is increaſed by the winding courſe which a ball takes, in conſequence of being turned aſide by ſome reſiſting body.

The courſe of a ball, however, may eaſily be traced when it is not perpendicular, but runs obliquely, and not more deeply than an inch or ſo; for the ſkin over the paſſage of the ſhot is generally marked by a reddiſh line. See Hunter on Gunſhot Wounds.

After what has been ſaid, it muſt be manifeſt to every impartial reader, that the advantage of dilating gunſhot wounds has been immenſely exaggerated. The abſurdity of dilating all of them muſt ſtrike every man of moderate underſtanding, on reflecting that many of theſe caſes are widely different from others, and conſequently cannot require the ſame ſort of treatment. When the courſe of a ball lies in ſoft parts, and has neither injured a bone, nor a conſiderable blood-veſſel, whether the wound has one or two openings, the plan of dilating it can generally be productive of no good. We have ſtated, that in gunſhot wounds, the opening in the ſkin is larger than that of a ſtab, becauſe there is an actual loſs of ſubſtance in the integuments, the part of which, firſt ſtruck by the ball, is uſually driven into the wound. By the ſeparation of the ſloughs, the canal of the wound is rendered ſtill larger, ſo that not only matter, but any extraneous ſubſtances, can find a ready eſcape outward. Inciſions alſo generally ſoon cloſe again, and the wound becomes, in a few days, in the ſame condition, as if no dilatation had been made.

However, there can be no doubt, that it is proper to extract at firſt every foreign body, which can be taken away without too much irritation; for the lodgment of extraneous ſubſtances frequently exaſperates the inflammatory ſymptoms, brings on pain and conſtitutional diſturbance, and produces large abſceſſes. At the ſame time, the practitioner ought to remember, that ſearching after foreign bodies often occaſions immenſe irritation of the wounded part, and that very frequently they cannot be extracted when felt, owing to the firm and deep manner in which they are lodged. When the wound becomes widened by the ſeparation of the ſloughs, the foreign bodies commonly grow looſe, and therefore admit of being removed with more eaſe. Alſo, after the wound has ſeparated, ſuch extraneous ſubſtances as happen to be deeply lodged, generally come nearer to the opening in the ſkin, and can be taken out with greater facility. It ſhould likewiſe be recollected, that foreign bodies, of ſmooth figure, have often been known to remain, without the leaſt inconvenience, in parts from which there was no poſſibility of extracting them. The ſurgeon, therefore will, for the moſt part, act wiſely, who endeavours at firſt to extract only ſuch extraneous bodies as happen to be ſituated near the external opening, and are looſe and removeable without much irritation. In ſhort, it may be laid down as a maxim, in the treatment of gunſhot wounds, that if the dilatation of them, for the purpoſe of extracting foreign bodies, is leſs likely to aggravate the inflammation, than the preſence of thoſe bodies, then it is highly judicious to put it into execution; or, in other words, when the united inflammation, from the injury itſelf, and the irritation of dilating it and removing the extraneous ſubſtances, is likely to be leſs than what would ariſe from the injury and lodgment of the foreign bodies, inciſions are warrantable for the removal of the latter.

In a foregoing column of this article, ſome notice has been taken of the laws which govern bodies in motion, and ſerve as an explanation of the ſtrange courſes which balls frequently take, after entering the ſubſtance of the human body. It may be proper to add a few more obſervations on this ſubject. The regularity of the paſſage of a ball will, in general, be in proportion to its velocity, and the want of reſiſtance; for, ſays Mr. Hunter, balls are turned aſide in an inverſe proportion to the force with which they move. Hence they ſeldom take a ſtraight courſe; for if they are ſpent balls, the ſoft parts alone are capable of turning them; and if they move with conſiderable velocity, they are likely to hit ſome bone obliquely, by which they will alſo be turned aſide. Any thing which preſents the leaſt oblique reſiſtance to a ball, throws it out of its direct courſe. We have a proof of the eaſe with which balls are obliquely thrown off, in thoſe frequent caſes, in which a ball, entering the ſkin of the breaſt obliquely, afterwards paſſes almoſt round the whole body under the integuments. Here the ſkin is ſtrong enough to hinder the ball from coming out again, which therefore turns inward; but meeting with the ribs, it is again turned out to the integuments, and ſo on alternately, as long as it has force enough to go on.

Sometimes, however, the ball goes a little way after piercing the ſkin, and then meets with ſome hard ſubſtance, ſuch as a rib, on the ſide next the centre of the body, by which new reſiſtance its courſe is directed outward, and it pierces the ſkin a ſecond time. But here the velocity of the ball muſt be conſiderable.

Mr. Hunter notices his having ſeen a ball paſs in at one ſide of the ſhin-bone, and run acroſs it under the ſkin, without either cutting the ſkin acroſs or hurting the bone. The velocity in this inſtance could not have been great, for there is not ſufficient room between theſe two parts in a natural ſtate for a ball to paſs; but the ball, after it had got under the ſkin, where there was room for it to cover itſelf, then came againſt the tibia which threw it outwards. The integuments counteracting were next only raiſed from the tibia, ſo that the ball paſſed on between the fleſh and the bone. Had the ball been moving with ſufficient velocity, it would either have cut the ſkin acroſs, or taken a piece out of the bone, and perhaps effected both kinds of injury.

The direction of a ſhot is alſo rendered uncertain by the wounded parts not continuing in the poſture in which they were at the time of the accident. For inſtance, in conſequence of the patients arm having been ſtretched out in a horizontal poſition, when he was ſhot, the ball may have entered on one ſide of the biceps muſcle, gone ſtraight on, and come out cloſe to the ſpinous proceſſes of the vertebræ between the ſcapulæ. This happened in a caſe which Mr. Hunter has made mention of in his treatiſe on gunſhot wounds.

There are two or three more circumſtances, relating to the dilatation of gunſhot wounds, deſerving attention. When the ball paſſes a conſiderable way under the ſkin, and near to it, Mr. Hunter is an advocate for making an opening midway between the two orifices occaſioned by the ball, eſpecially when they are at a great diſtance from each other. The object of this practice is to facilitate the preſent, or future extraction of ſplinters of bone, and other extraneous ſubſtances. When an opening is not made, an abſceſs frequently forms between the two apertures made by the ball, and though it ſometimes anſwers the purpoſe as well, it is not always proper to wait for ſuch an event to take place.

When the ball runs a little way along under the ſkin and comes out again, it may be beſt to lay open the wound as far as it extends. The reaſon which Mr. Hunter aſſigns for this advice, is that the ſkin does not ſo readily unite with the parts underneath, as muſcles do with one another.

In certain caſes the ball enters and paſſes on, till it comes into contact with the integuments of another part, where it may eaſily be felt. Ought ſuch a ball to be cut out? Mr. Hunter thought, that if the ſkin was bruiſed by the ball coming againſt it, and likely to ſlough, there was no reaſon againſt making an opening, becauſe the part is to be looked upon as dead, and not more inflammation will ariſe from the opening made with a knife, than from one made by the ſlough. However, he does not impute much utility to making an inciſion, as the ſlough will come away, and the ball eſcape of itſelf.

When the ball is only to be felt, and the ſkin quite ſound, Mr. Hunter adviſes us to let the extraneous body alone, till the wound, made by its entrance, has inflamed and ſuppurated. His chief reaſons for this plan are: firſt, becauſe moſt wounds get well when the ball is left in, excepting it has done other miſchief, beſides ſimply paſſing through the ſoft parts, and very little inflammation attends that portion of the wound where the ball lodges, but a great deal where it made its entrance. Secondly, when a ball paſſes through and through, two inflammations ariſe, one at the entrance, another at the exit of the ball. When the velocity indeed has been very great, the inflammation is continued through and through. When the ball makes its exit, the inflammation extends further along the canal, than when the wound in another caſe is healed up to the ball, which is afterwards cut out. When the ball is extracted in the firſt inſtance by a counter-opening, the ſame kind of inflammation attacks the place of the inciſion, as makes its appearance about the entrance of the ball.

With regard to the moſt eligible ſort of inſtrument, for the extraction of balls and other extraneous ſubſtances from gunſhot wounds, the fingers are better than any thing in a great number of inſtances. When forceps are employed, they ought not to be of a large, clumſy conſtruction, and occaſionally both ſtraight and curved ones will be found moſt advantageous. Mr. Chevalier has given in his treatiſe, an engraving of ſome different bullet forceps, which ſeem to obtain approbation among military ſurgeons, and are now put in all the army inſtrument cheſts.

Beſides the indiſcriminate plan of dilating every gunſhot wound without exception, there is another common cuſtom, which appears equally deſerving of cenſure, and this is to poke probes, and other inſtruments into the wound, without having any thing in view, except the mere gratification of curioſity. We do not mean to ſay, that the introduction of a probe into the wound is always wrong; if there is reaſon to ſuſpect that any extraneous ſubſtance lies in the part, and that it can be extracted without too much irritation, the ſurgeon is undoubtedly juſtified in probing the wound, in order to obtain the requiſite information concerning the nature and ſituation of the foreign body. Learning the direction and depth of a gunſhot wound, by means of a probe, may alſo be frequently right, though in general the knowledge thus acquired does not produce the ſmalleſt difference in the mode of treatment. However, it muſt be confeſſed, that there is always ſome advantage in being aware of the direction and depth of the wound; becauſe, when we have cauſe to apprehend that the ball has paſſed near any large artery, or injured any particular viſcus, or that it has penetrated to a conſiderable depth, we can be more upon our guard againſt the conſequences. We may prevent a fatal hemorrhage by our vigilance and precautions during the firſt ten days, or we may be ſo careful in having recourſe to every thing that is antiphlogiſtic, without loſs of time, as to prevent ſuch a degree of inflammation in the injured parts, as would be the deſtruction of the patient. Upon theſe principles alone is the probing of a gunſhot wound juſtifiable and proper.

Gunſhot wounds, as we have remarked, ſeldom admit of being healed by the firſt intention; they muſt firſt throw off their ſloughs, and ſuppuration is to be followed by the production of granulations. There is little danger of the external opening healing up too ſoon, that is to ſay, while matter is forming within, and before ſloughs and looſe extraneous ſubſtances, more deeply ſituated, are diſcharged. The parts ſurrounding the entrance of the ball are always more injured, and conſequently leſs capable of healing than the deeper part of the wound. Therefore, the method of cramming the mouth of the injury with tents, and doſſils of lint, with a view of keeping it from cloſing, is for the moſt part totally unneceſſary, and being productive of a vaſt deal of irritation, exceedingly hurtful. The dreſſings for gunſhot wounds ſhould generally be ſuch as are unirritating, light, and ſuperficial. A pledget of ſome ſimple ſalve, covered by an emollient poultice, is commonly more eligible than ſtuffing the wound with dry lint, or applying any ſtimulating balſam or lotion. The poultice and dreſſing ſhould be changed three or four times a day, in caſe the diſcharge is large; and the former application ought never to be allowed to remain on the part till it has become ſtiff and hard, whatever may be the ſtate of the caſe. There can be no allowable excuſe for irritating a gunſhot wound, by pretending, that certain applications are neceſſary to ſtop the bleeding. Gunſhot wounds will not bleed in the firſt inſtance, unleſs very large veſſels, ſuch as ought to be tied, are injured, and there is not invariably an hemorrhage in this circumſtance, torn and contuſed veſſels not having much diſpoſition to pour out any conſiderable quantity of blood.

In all caſes of gunſhot wounds, the violence committed on the living parts muſt give birth to inflammation. When this can be kept within moderate bounds, the patient will generally do well; but, when it riſes too high, becomes too extenſive, and occaſions large abſceſſes and gangrenous miſchief, the event of the caſe muſt be regarded as extremely doubtful. Hence, one indication invariably preſents itſelf, which is to keep down inflammation by thoſe means which experience has aſcertained to be the beſt calculated for the purpoſe, and which conſiſt of general and topical bleeding, purging, low diet, and quietude.

The following extract from Mr. Hunter's treatiſe on gunſhot wounds, relative to the ſubject of bleeding, we regard as truly practical, and worthy of its great and immortal author. “Bleeding,” ſays he, “is recommended in gunſhot wounds, and in ſuch a manner as if of more ſervice in them than wounds in general; but, I do not ſee this neceſſity more than in other wounds, that have done the ſame miſchief, and where the ſame inflammation and other conſequences are expected.

“Bleeding is certainly to be uſed here as in all wounds, where there is a ſtrong and full habit, and where we expect conſiderable inflammation and ſymptomatic fever; but if it is ſuch a gunſhot wound as not to produce conſiderable effects, either local or conſtitutional, I would not bleed merely becauſe it is a gunſhot wound; and, from what I have ſeen, I think, that inflammation, &c. does not run ſo high in theſe wounds as I ſhould have at firſt expected. I believe this is the caſe with all contuſed wounds, where death in the part is a conſequence; a contuſed wound is ſomewhat ſimilar to the effects of a cauſtic; for while the ſeparation of the dead part is forming, the ſuppurative inflammation is retarded, and therefore not ſo violent. But this can only be ſaid of thoſe wounds which are not complicated with any other injury, except what was produced by the balls paſſing through ſoft part; for if a bone is broken, it will inflame like any other compound fracture.

“It is often of ſervice, in the time of inflammation, to bleed in the part with leeches, or by punctures with a lancet. This helps to empty the veſſels of the part, to leſſen the inflammation ſooner, and of courſe to promote ſuppuration. But I muſt own that bleeding muſt be uſed with great caution, where inflammation and fever run very high; for, to reduce the patient equal to the action at the time, (which, whether an increaſed action, or an acquired one, is only temporary,) will be reducing him often too much for the conſtitution to ſupport life when this action ceaſes; for the very worſt thing that can happen is the patient being reduced too low. We often afterwards find more difficulty in keeping up with cordials, bark, &c. than we find in lowering; and we may avail ourſelves of obſerving thoſe who have loſt conſiderable quantities of blood from the accident, which is always immediate; and we find, too, that a ſecond bleeding, by ſome other accident, although very ſmall in quantity, often deſtroys our patient very quickly. But this will in a great meaſure depend upon the ſeat of the injury; for in caſes of great violence, done to ſome parts of our body, bleeding anſwers better than in others, becauſe the ſymptoms of diſſolution, and diſſolution itſelf, come on ſooner from miſchief done to ſome parts, than when it is done to others.

“A man will bear bleeding better after an amputation of the arm than leg; better after a compound fracture of the arm than leg; he will bear bleeding better after an injury done to the head, cheſt, lungs, &c. than to either the arm or leg.

“We find, that injuries done to inactive parts, ſuch as joints, do worſe, and are more ſuſceptible of irritation, than thoſe in fleſhy parts of the ſame ſituation.

“It would appear, upon the whole, that the decay of animal life is ſooner brought on when the inflammation is in a part whoſe circulation is not ſo ſtrong, and where the nervous influence on the force of the circulation is far removed.”

Our author next notices that “bark is greatly recommended in gunſhot wounds, and with good reaſon; but it is ordered indiſcriminately to all patients that have received ſuch wounds, whatever the ſymptoms or conſtitution of the patient may be. That there is no better medicine for wounds in general, not only when the inflammation is gone off, but in the time of inflammation, *if the patient is rather low*, and indeed before it comes on, experience daily ſhews. Bark is to be looked upon as a ſtrengthener or regulator of the ſyſtem, and an antiſpaſmodic, both of which deſtroy irritation. The bark and gentle bleedings, when the pulſe begins to riſe, are the beſt treatment that I know of in inflammations that ariſe either from accidents or operations. One leſſens the volume of the blood and the increaſed animal powers at the time, which makes the circulation more free, ſo that the heart labours leſs, and ſimple circulation goes on more freely; the other gives to the blood that which makes it leſs irritating, makes the blood-veſſels do their proper office, and gives to the nerves their proper ſenſations, which takes off the fever." Hunter on the Inflammation, &c. p. 563.

To many, as well as ourſelves, this eulogium on bark may appear to extend beyond the limits of truth. We have never ſeen the propriety of denominating bark a *ſtrengthener*, ſince it can only communicate ſtrength by putting the digeſtive organs into a better ſtate for conveying nouriſhment into the ſyſtem; and it requires a little credulity to put entire belief in ſome other qualities aſcribed to this renowned medicine by Mr. Hunter. However, we agree that bark is beneficial in many caſes of inflammation, attended with debility; and that it is particularly ſerviceable in numerous gunſhot wounds, where the object is to ſupport the conſtitution, and improve the tone of the ſtomach. Some criticiſms on the abſurd way in which bark is very commonly employed are to be found in the article GANGRENE.

In the inflammatory ſtage of gunſhot wounds, the ſeverity of the pain will often demand the exhibition of opium; but it is now pretty generally acknowledged that this medicine is not effectual in relieving pain in caſes of inflammation until the veſſels have been ſomewhat emptied by bleeding. When it is given immediately after accidents, or great operations, a large doſe muſt be given or elſe none at all; ſince a ſmall one only increaſes the fever and reſtleſſneſs of the patient. M. Chevalier adviſes us to give the firſt or ſecond opiate in an opening draught. P. 137. edit. 3.

When the patient is troubled with vomitings and ſpaſms, relief muſt be ſought for in the adminiſtration of ſuch medicines as ſaline draughts, camphor, caſtor, muſk, opium, and volatile alkali.

In gunſhot wounds, attended with true phlegmonous inflammation, M. Chevalier, after delivering his ſentiments on bleeding, recommends the exhibition of neutral ſalts and antimonials, eſpecially antimonial powder; or, he ſays, we may preſcribe a mixture of antimonials and ſaline medicines together. As long as the inflammation puts on the truly phlegmonous character ſuch means are to be continued, together with occaſional purges, and a regimen ſtrictly antiphlogiſtic.

"To the part itſelf muſt be applied poultices of bread and water, or bread and milk, or of water and linſeed meal, or of bread or linſeed meal, mixed with the aqua lithargyri acetati compoſita. Such applications will conduct off the exceſſive heat of the part; will relax the ſurface, and keep it perſpirable; will moderate the action of the veſſels, and promote the formation of matter. In hot countries, poultices made of the pulp of the water-melon, and other plants of that genus (Cucurbita), have been found exceedingly uſeful in diminiſhing the inflammation of wounds.

"But," continues M. Chevalier, "where mixed circumſtances occur, and violent action appears accompanied with diminiſhed powers, either in the part, or the conſtitution, or both, a mixed plan of treatment muſt be adopted accordingly; and where the powers are failing altogether, every effort muſt be directed to ſupport them, as the only door of hope through which the patient has any chance of eſcaping.

"The former caſe will generally be marked by the tumefaction and redneſs of the part becoming irregularly or extenſively diffuſed, and the pulſe becoming more frequent, but leſs full and ſtrong. There will be much thin diſcharge from the ſore if the orifice allows of its exit; and the pain of which the patient complains, is generally a violent aching and inexpreſſible heavineſs in the part, with leſs throbbing than takes place in phlegmon.

"Here a ſaline mixture, joined with camphor or aromatic confection, or a mixture of antimonial wine and tincture of opium, or, in other caſes, the decoction of bark with aqua ammoniæ acetatæ, or other medicines of a ſimilar kind, guarding againſt an exceſs of action on the one hand, and direct debility on the other, will be moſt beneficial.

"Applications of a ſimilar tendency muſt alſo be made to the part; fomentations, not exceeding 120° of heat, conſiſting of a decoction of white poppy heads, or a poultice made with the ſame, or, in other inſtances, the uſe of diluted ſpirit, or the embrocation (compoſed of equal parts of ſpirit of wine, aqua ammoniæ acetatæ, and water) will be moſt eligible. When theſe cannot be obtained, other remedies, keeping the ſame principle in view, muſt be employed.

"But," ſays M. Chevalier, "where the powers of nature are flagging; the pulſe becoming ſmall, frequent or irregular; the tongue dry and brown, or the bowels lax; the part inflamed veſicating, or becoming livid; whether this be more attended with the characters of eryſipelas only, or of gangrene alſo, there bark, wine, brandy, ſpices, and cordials muſt be liberally given; and opium alſo, according to the degree of pain and irritability. The part injured muſt be covered with cloths moiſtened with ſpirituous embrocations, or poultices made with yeaſt, or antiſeptic vegetables, ſuch as bark, or chamomile flowers in powder, ſhould be applied.

"If the ſtomach, in this caſe, rejects ordinary food and medicine, advantage will frequently be obtained from the warmer ſpices; ſuch, for example, as the pulvis aromaticus, a ſcruple of which may be given every three, four, or ſix hours. A pill, with three or four grains of camphor and one of opium, at the ſame, or longer intervals, will often have the happieſt effects, and will neither nauſeate nor overcharge the ſtomach." Chevalier on Gunſhot Wounds, ſect. 7. edit. 3.

Such is the kind of treatment which this gentleman recommends in the inflamed and gangrenous ſtate of a gunſhot wound; and perhaps his plan is not materially different from the ordinary courſe of practice. To us the application of ſpirituous embrocations to the part ſeems improper; but as we have ſtated our ſentiments elſewhere concerning the treatment of caſes of mortification, it only ſeems neceſſary to mention, that we have, in the ſame place, freely animadverted, both on the cuſtom of uſing topical ſtimulants, and on the irrational and pernicious way in which bark is ſometimes given, in certain inſtances, when it can do no good, and ſometimes preſcribed immoderately, ſo as to be oppreſſive and hurtful, when more reaſonable doſes might be productive of infinite benefit. See GANGRENE.

We ſhall now introduce a few remarks on the treatment of gunſhot wounds in the ſtate of ſuppuration. For the firſt few days the matter ſeldom aſſumes a healthy appearance; but as ſoon as the ſloughs ſeparate it then becomes of a proper quality, and the part is to be treated as a ſimple ſore, or abſceſs. Nothing is required but mild unirritating dreſſings or poultices, taking care to preſerve cleanlineſs, ſupport the patient's ſtrength by eligible food and medicines,

cines, and attend to any particular ſymptoms which may ariſe. While there are any ſloughs undetached, and the diſcharge is profuſe, emollient poultices are always the beſt local applications; but when the wound is ſmall, covered with healthy granulations, and unattended with a great diſcharge, ſome ſoft lint, over which is to be put a pledget of ſome mild ointment, is as good a mode of treating the ſore as any which can be purſued. In this ſtate, it is evident, that the leſs the granulations are diſturbed the better.

In caſes of gunſhot wounds, the inflammation ſometimes laſts very long, and there is no appearance of ſuppuration. In other inſtances freſh inflammation comes on ſuddenly, during the ſuppurative ſtage, without any viſible cauſe, and puts a ſtop to the ſecretion of matter. Sometimes, alſo, without any manifeſt reaſon, the wound ſuppurates in an extraordinary degree. According to Richter, ſuch circumſtances very frequently depend on the lodgment of ſplinters of bone, which ſhould be extracted, if they can be felt, and taken away without creating too much irritation.

We have already noticed the riſk of hemorrhage in many gunſhot wounds, when the ſloughs become looſe. Writers mention another particularly dangerous kind of bleeding, which is apt to ariſe from certain gunſhot wounds which have long continued in a ſtate of profuſe ſuppuration. The blood does not iſſue from one individual veſſel, but from the whole ſurface of the wound as from a ſponge, and is ſo thin as to reſemble blood and water. This hemorrhage is exceſſively dangerous, becauſe it is likely to exhauſt the patient, who is already exceedingly debilitated, and its cauſes are difficult of removal. The caſe demands the exhibition of bark, alum, and diluted ſulphuric acid. At the ſame time, the decoction of bark and muriatic acid may be applied to the wound.

As ſoon as ſuppuration commences, it is common for the inflammatory ſymptoms to go off, and the ſwelling to abate. However, it is obſerved by M. Chevalier, that the ſwelling, inſtead of diſappearing entirely on a ſudden, ought only to undergo a gradual diminution, together with the other ſymptoms. For if at any period the ſwelling ſuddenly ſubſides, while the frequency of the pulſe, debility, want of appetite, and reſtleſſneſs, continue or increaſe, the death of the patient is at no great diſtance. The moſt powerful cordials and aromatics are then indicated, although unfortunately, they generally have but little effect.

The ſame gentleman alſo ſpeaks of the maggots which ſometimes infeſt gunſhot wounds in hot countries, and are only of importance inaſmuch as they produce irritation. It was remarked by Le-Dran, that they are only ſeen in healthy ſores, or caſes in which a ſlough is undergoing a ſeparation, as they cannot live in the matter of an unhealthy wound. M. Chevalier adviſes a frequent removal of them, and killing them by waſhing the part with a ſtrong infuſion of wormwood in water or ſpirit, or by applying camphorated ſpirit. See Treatiſe on Gunſhot Wounds, edit. 3. p. 148—149.

It too frequently happens in the ſuppurative ſtage of bad gunſhot wounds, that the large quantity and long duration of the diſcharge, and the irritation of the diſeaſe on the conſtitution, reduce the patient to a ſtate of alarming weakneſs, attended with bad hectical ſymptoms, and the danger of diſſolution. If an immediate change of circumſtances cannot now be effected, the patient will almoſt certainly loſe his life, in ſpite of the virtues of bark and every kind of cordial and aromatic medicines. Such is often the lamentable end of thoſe caſes in which the bones or joints have been conſiderably ſhattered, as well as of other inſtances in which only a large maſs of fleſh has been torn off, or has ſloughed away in conſequence of the firſt or repeated attack of inflammation.

Whenever ſuch ſymptoms and miſchief prevail, and the wound is ſo ſituated on a limb that the diſeaſed part can be entirely taken away, and a healthy wound and good ſtump made, amputation ſhould not be delayed, as the opportunity of ſaving life is ſhort, and ought not to be loſt. No humane practitioner, however, would urge the performance of a ſevere operation, and mutilate his patient while the patient's ſtrength ſeems capable of bearing a longer attempt to preſerve the limb, or while the effects of a generous diet, bark, cordials, wine, porter, &c. had not been ſufficiently tried.

"Profuſe diſcharges," ſays M. Chevalier, "are often kept up from the wound by the continuance of extraneous ſubſtances, which may now be ſearched after with more freedom when the parts have got into a quiet ſtate. Splinters of bone will alſo have the ſame effect; and where either the former or the latter have not been, or cannot be readily removed, or ſloughs have not been completely diſcharged, abſceſſes will form, which ſhould always be freely opened as ſoon as they point externally. A free expoſure of their cavities will not only facilitate the exit of any thing which is to come away, but will generally be followed by a more ſpeedy and perfect amendment in the part. Indeed, the confinement of matter any where will always do harm, and ſhould as much as poſſible be prevented by a ſuitable poſition, and proper openings." P. 153.

Where a ſhot injures and penetrates ſome part where there is an extenſive aponeuroſis or faſcia, the inflammation excited is exceedingly apt to terminate in large collections of matter under the tendinous expanſion. In ſuch caſes the pus is greatly prevented from making its way to the ſurface of the body by the intervention of the faſcia, and, conſequently, the abſceſs ſpreads widely between the aponeuroſis and ſubjacent muſcles, and between the muſcles themſelves, ſo as to create a conſiderable augmentation of the miſchief. We have ſeen ſuch abſceſſes ariſe, when the original wound had healed up to a very ſmall fiſtulous opening, and could afford no effectual eſcape for the matter. In every caſe of this deſcription, it is the duty of the practitioner to make proper depending openings of due ſize, and not to delay doing ſo till the abſceſs has acquired a formidable magnitude.

In order to bring a patient ſafely through the tedious and weakening ſtage of a ſuppurating gunſhot wound, the ſurgeon muſt be careful to ſupport the ſtrength by nouriſhing kinds of food, adminiſter bark and tonic medicines, and allay irritation and procure ſleep by opium. Wine, porter, and ſometimes even brandy, will alſo prove of ſingular ſervice.

When the circumſtances of the caſe will permit, a change of air, and going to the ſea-ſide, will often diſpoſe ſuch abſceſſes to heal as remain ſtationary, notwithſtanding the moſt ſkilful treatment.

Fiſtulous ſinuſes are very frequent after many kinds of gunſhot wounds, and ſome of them heal up ſpontaneouſly as ſoon as the patient experiences the benefit of a change of air, and regains a certain degree of ſtrength. In other inſtances the ſinus will not heal before it is laid open with a curved biſtoury and director, and dreſſed to the bottom. When a fiſtulous opening continues a long while, it is often kept up by the preſence of ſome extraneous ſubſtance, a bit of wood, a piece of cloth, a ſplinter or ſcale of bone, an exfoliation, &c. Here no cure can take place till the foreign body admits of being extracted.

Of Caſes in which Amputation is proper.—It is exceedingly difficult to determine by written rules what caſes require the immediate performance of amputation, and what caſes admit of an attempt being made to preſerve a limb badly injured by gunſhot violence. A habit of forming a correct judgment can only be derived from the valuable leſſons of experience, and even with this opportunity of gaining knowledge, it is not every man that can imbibe the requiſite information; want of abilities in the difficult and delicate parts of practice being, in effect, the ſame as having not the poſſibility of learning. We have known old grey-headed ſurgeons, of whom it has often been ſaid that they had ſeen more ſurgery than any of their brethren, and of courſe that their opinions were highly valuable. There is, however, an eſſential difference between merely having things before our eyes and really ſeeing them. Suppoſe a man to have ten thouſand venereal patients under his care, what avails the greatneſs of the number if nature has made his brains of ſo ſaturnine a compoſition that they are incapable of diſcriminating right from wrong, or of diſcerning the important truths which are to be gathered in the wide field of experience. One traveller may paſs over a large portion of the globe, and, comparatively ſpeaking, obſerve nothing that he ought to notice, while another ſhall make the ſame journey, and both ſee and remember every thing which is curious, uſeful, or in any way intereſting. In ſurgery we muſt not ſet down a man as a conſummate practitioner, becauſe he has had opportunities of ſeeing a good deal, not even though he be an hoſpital ſurgeon; beſides the opportunity, we muſt conſider whether he poſſeſſes the diſpoſition and ability to reap the fruits of experience. No one can doubt that bright talents and great attention are neceſſary as well as ſufficient experience in the part of ſurgery before us, when it is recollected that Mr. Hunter himſelf has ſcarcely afforded a decided opinion reſpecting the caſes in which amputation ought to be performed.

Many gunſhot wounds are, at the very firſt, evidently incurable, and when ſo ſituated that the injured part can be removed, the operation ought to be done under certain reſtrictions. Perhaps, as Mr. Hunter remarks, it ſhould not be done immediately after the reception of the injury, except when a conſiderable blood-veſſel is wounded, ſo as to endanger life, and ſuch veſſel abſolutely cannot be taken up; or when it is ſuſpected that the inflammation, in conſequence of the accident, will kill. By means of the operation, the patient is only left to encounter the inflammation in conſequence of the amputation. But this celebrated ſurgeon repreſents the operation as a bad reſource, eſpecially when it is a lower extremity to be amputated, which is perhaps the only removeable part, the inflammation of which will kill.

It is a very different caſe, however, when the gunſhot wound is ſo ſituated, that it is not likely to produce death, though in all probability it cannot be cured. Here there is not the ſame urgency, and the ſurgeon may chooſe whatever time may be conſidered as moſt favourable for removing the part. This time is ſeldom juſt after the accident, for few people in full health, and ſtill fewer of thoſe who meet with gunſhot wounds, are in a ſtate to bear the ſudden performance of a capital operation well. The agitation in which they are juſt after being hurt, makes operating then the very worſt practice. Therefore, ſays Mr. Hunter, it will generally be much better to wait till the inflammation, and the effects both of that and the irritation have gone off. When the practitioner overlooks theſe conſiderations, and, by deferring the operation, allows an inflammation to go on, which is likely to prove mortal; or ſhould he, on the other hand, immediately proceed to amputation, when the firſt inflammation is ſuch as is likely to go off, and ought to be allowed to go off, before the operation; in either caſe his conduct is wrong. For, with regard to the firſt inſtance, it is now univerſally admitted by all well informed ſurgeons, that there are not many perſons who can bear the loſs of a lower extremity when in full health and vigour. A violent inflammation will, in a few hours, alter the healthy diſpoſition, and give a turn to the conſtitution, eſpecially if a conſiderable quantity of blood has been loſt, which will probably be the caſe, where both accident and operation immediately ſucceed one another. Under ſuch circumſtances the patient becomes low, ſimply by animal life loſing its powers, and he hardly ever recovers afterwards. Hunter on Gunſhot Wounds, p. 560.

A ſtrong argument againſt immediately performing amputation in caſes of gunſhot wounds, when it is probable that the patient will get over the firſt inflammation, is, that it is generally impoſſible, juſt after the confuſion of a battle, to pay the neceſſary care, and procure the requiſite degree of quietude. Beſides, the ſurgeon himſelf is frequently ſo ſituated, during, or juſt after an engagement, as to be incapable of making himſelf ſufficiently maſter of the caſe, to perform ſo capital an operation with propriety.

In ſome caſes, however, it may be urged in favour of amputation on the field of battle, that the patient can be moved with more eaſe without a limb, than with a ſhattered one. But, as Mr. Hunter acknowledges, experience is the beſt guide, and men who have had the beſt opportunities of making comparative obſervations, ſeem to agree that few do well, who have their limbs cut off on the field of battle, while a much greater proportion recover, in ſimilar caſes, who are left till the firſt inflammation is over, and afterwards undergo amputation.

Mr. Hunter makes mention of exceptions to the preceding remarks; firſt, he ſtates that it is of leſs conſequence what practice is adopted, when the queſtion is concerning the upper extremity, though there will generally be little occaſion to cut off an arm on the field, becauſe the patient admits of being moved. Secondly, if the parts are very much torn, ſo that the limb only hangs by a ſlender connection, the loſs of ſo much ſubſtance cannot make an objection, as it takes place from the accident. In many caſes it may be neceſſary to perform the operation in order to get at blood-veſſels, which may bleed profuſely, and cannot be got at in any other way, without doing too much miſchief.

Though gunſhot wounds are not ſo apt to bleed as wounds made with ſharp inſtruments, a dangerous degree of bleeding ſometimes attends them, and renders it abſolutely neceſſary to take up the bleeding veſſels.

Alſo, when portions of the bowels or lungs are protruded, an immediate reduction of them is indiſpenſably requiſite.

Large pieces of ſhells driven into the fleſh, ſhould be extracted without delay.

For theſe purpoſes, the ſurgeon is called upon to make ſuch inciſions as will enable him to accompliſh the object in view.

Gunſhot Wounds of the Abdomen.—Theſe caſes may be divided into two kinds, one only penetrates the parietes of the belly without hurting the contained parts, the other does miſchief alſo to the viſcera. The event of theſe two kinds of wounds is very different. In the firſt, little danger is to be expected, if properly treated; but in the ſecond, the ſucceſs will be very uncertain, for very often nothing can be done for the patient, and very often a good deal of art may be employed with advantage.

Mr. Hunter obſerves, that ſuch wounds of the abdomen as do not intereſt a viſcus, like the ſtomach, bowels, bladder, ureters, gall-bladder, blood-veſſels, &c. which contain ſome kind of matter, will generally do well. But he ſays that there will be a great difference when the ball has paſſed with immenſe velocity, as a ſlough will be produced, whereas when the ball has moved with leſs impetus, there will not be ſo much ſloughing, and the parts will in ſome degree heal by the firſt intention. Even when the ball occaſions a ſlough, the wound frequently ends well, the adheſive inflammation taking place on the peritoneum all round the wound, ſo as to exclude the general cavity of the abdomen from taking part in the inflammation. Such is often the favourable event, when the ball, beſides entering the abdomen, has wounded ſuch parts as the epiploon, meſentery, &c. and gone quite through the body; p. 543. In the article EXTRAVASATION, we have endeavoured to give ſome account of the way in which fluids are prevented, in caſes of wounds of the belly, from eſcaping out of the viſcera, and becoming widely diffuſed among the convolutions of the bowels in the cavity of the peritoneum; to that part of the Cyclopædia a reference may now be properly made. It ſeems only neceſſary to obſerve here on the ſubject, that in conſequence of the adheſions, one continued canal is generally ſoon produced, wherever a ball or inſtrument has paſſed, all extraneous ſubſtances, ſuch as bits of cloaths, and any ſloughs which may ariſe, being circumſcribed and ſurrounded by thoſe adheſions.

In gunſhot wounds of the belly, an extravaſation is apt to take place on the ſeparation of ſloughs, about eight, ten, twelve, or fourteen days after the accident; but although this new ſymptom is in general very diſagreeable, it is not to be regarded as dangerous, all the danger being uſually over before it can appear. Suppoſing the extravaſation to be inteſtinal matter or urine, the ſurgeon ſhould endeavour to prevent the continuance of an artificial anus, or urinary fiſtula. Superficial dreſſings being applied, the opening ſometimes heals up, when the contents of the wounded viſcus become ſmaller in quantity. Some remarks, connected with this part of ſurgery, will be found in the article HERNIA.

The general ſymptoms of different wounds of the belly will be explained in another place, ſee WOUNDS, ſo that we need not dwell upon them here; and the ſame may be ſaid with regard to the proper practice to be purſued in theſe caſes.

Gunſhot Wounds of the Cheſt.—Wounds of the lungs abſtracted from other miſchief, are now well known not to be always fatal. Mr. Hunter had ſome reaſon to believe that wounds of the lungs made with balls were leſs dangerous than ſuch as were made with ſharp pointed inſtruments; for he had ſeen ſeveral patients recover after being ſhot through the lungs, while other perſons died of very ſmall wounds of thoſe organs done with ſwords and bayonets. One cauſe of this fact is perhaps owing to the circumſtance of gunſhot wounds bleeding leſs than any other wounds, ſo that there was leſs danger of blood being effuſed either in the thorax or cells of the lungs. The indiſpoſition of the orifice of a gunſhot wound to heal up too ſoon, is alſo another circumſtance leſſening the hazard, as whatever matter happens to be extravaſated has thereby an opportunity of eſcaping.

It cannot be ſuppoſed that adheſions take place round the opening of a gunſhot wound in the cheſt, becauſe the lungs collapſe and become conſiderably diſtant from the pleura, whenever a free communication is eſtabliſhed between the atmoſpheric air and the cavity of the thorax. However it is known that adheſions are very common between the outer ſurface of the lungs, and inner ſurface of the pleura coſtalis, and conſequently they muſt, in numerous inſtances, exiſt before the receipt of a wound, ſo as to hinder the uſual collapſe of the lungs.

The general ſymptoms of wounds of the thorax, and alſo the treatment, will be detailed hereafter; ſee WOUNDS. We ſhall here only juſt remark, that when a patient has been ſhot in the cheſt, the moſt important indication is to prevent and ſubdue inflammation of the lungs and pleura. In hardly any other caſe can large and repeated bleedings be practiſed with equal advantage. The patient is likewiſe to be kept on low diet, and have the ſpermaceti mixture and opium adminiſtered to him, in caſe he ſhould be diſturbed with much coughing. Here there will not be ſo much danger of an extravaſation of blood, as in ſtabs, and even if an effuſion of that fluid were to happen, the opening would generally be ſufficient for its eſcape, and it would not be ſo frequently found neceſſary either to dilate the wound, or make a new opening into the cheſt, as when the injury has been inflicted with a ſharp pointed weapon.

When matter forms in the thorax in conſequence of gunſhot wounds, the opening will generally ſuffice for its eſcape; but ſhould the collection of pus be confined and occaſion dangerous ſymptoms, a depending opening ought to be made. The manner of practiſing that operation, and the ſymptoms requiring it, have been elſewhere explained. See EMPYEMA.

GUNTA, in *Geography*, a town of Peru, and capital of a juriſdiction, in the dioceſe of Guamanga; 20 miles N. of Guamanga.

GUNTER, EDMUND, in *Biography*, the deſcendant of a reſpectable family in Brecknockſhire, South-Wales, was born in the county of Hertford in 1581; and having been educated on the royal foundation in Weſtminſter ſchool, he was elected to Chriſt-church college, Oxford, in 1599, where he was graduated B. A. in 1603, and M. A. in 1606. About this time he entered into holy orders, and in 1615 took the degree of B. D. From his youth he was much devoted to mathematical ſtudies, and as he advanced in life his reputation in this department of ſcience increaſed. Accordingly, when a vacancy occurred in the profeſſorſhip of aſtronomy in Greſham college, London, by the reſignation of Mr. Williams, Mr. Gunter was choſen to ſucceed him, March 6th, 1619: and in this ſituation he continued till the world was deprived of his life and labours, in the year 1626, at the age of 45 years, which, conſidering the extent and variety of his diſcoveries and writings, may be reckoned an early period. He was buried in the church of St. Peter the Poor, Broad-ſtreet, without any monument or inſcription; but his inventions and publications furniſh a ſufficient record of his talents and labours. About the year 1606, he diſtinguiſhed himſelf by the new projection of his ſector, of which he wrote a Latin deſcription, circulated in MS. among his friends, but not printed till ſome time afterwards. It appears that before the year 1618 he had invented a portable quadrant, which ſerved for more eaſily finding the hour and azimuth, as well as for other uſeful purpoſes in aſtronomy. Soon after his election into Greſham college, *viz.* in the year 1620, he publiſhed his "Canon Triangulorum ſive Tabulæ ſinuum et Tangentium Artificialium, ad Radium 10,000,000, et ad Scrupula prima Quadrantis," Londin. 8vo.; to which were annexed the firſt 1000 of Briggs's logarithms, of common numbers. A ſecond edition of this work was publiſhed in Engliſh in 1623, 4to., under title of

“Canon Triangulorum, or A Table of Artificial Sines and Tangents to a Radius of 10,000,000 parts to each Minute of the Quadrant,” to which were added “Logarithms of abſolute numbers, from an unit to ten thouſand,” with a rule for augmenting them to 100,000. It ought to be mentioned, to the honour of Mr. Gunter, that theſe were the firſt tables of the kind that were ever publiſhed. The utility of theſe tables is ſufficiently known to mathematicians and aſtronomers; as they facilitate the reſolution of ſpherical triangles, without the aid of ſecants or verſed ſines, and ſubſtitute the operations of addition and ſubtraction for thoſe of multiplication and diviſion. Mr. Gunter's claim to this application of logarithms to the ſolution of ſpherical triangles was ſatisfactorily eſtabliſhed by Mr. Edmund Wingate, Mr. Robert Burton, and Mr. Henry Bond, ſen. In the year 1622, Mr. Gunter found, by experiments on the variations of the magnetic needle, made at Deptford, that this variation varied, and that the declination had changed almoſt five degrees in the ſpace of 42 years; a diſcovery which was confirmed and eſtabliſhed by Mr. Gellibrand, his ſucceſſor at Greſham college. (See VARIATION.) The next invention of Mr. Gunter, which we have to record, is that of his “Rule of Proportion,” by which he applies the logarithms of numbers, and alſo of ſines and tangents, to ſtraight lines drawn on a rule or ſcale; by means of which proportions in common numbers and in trigonometry may be reſolved with a pair of compaſſes, in conſequence of the now well-known principle, that the logarithms of the terms of equal ratios are equidifferent. This was called “Gunter's Proportion,” and “Gunter's Line;” and the inſtrument in the form of a two foot ſcale, which is in common uſe for nautical and other purpoſes, is commonly called the “Gunter.” (See the following articles.) This invention was communicated, in 1624, to the French mathematicians at Paris by Mr. Wingate, who publiſhed an account of its uſe in the French language. Several years after Mr. Gunter's death, Mr. Wingate publiſhed an Engliſh tranſlation of his French tract, with many additions and improvements, which has ſince been called Wingate's “Rule of Proportion,” or more generally “Gunter's Line.” To Mr. Gunter we alſo owe the improvement of the *Sector* (which ſee), and other inſtruments of ſimilar uſe; the deſcription of which he publiſhed in 1624, 4to. under the title of the “Sector, Croſs-ſtaff, and other Inſtruments.” He alſo introduced the common meaſuring-chain, now conſtantly uſed in land-ſurveying, and hence called “Gunter's Chain.” In the year 1624 he publiſhed, by order of king James, a ſmall tract, entitled “The Deſcription and Uſe of his Majeſty's Dials in Whitehall Garden,” 4to. But it is needleſs to deſcribe theſe dials, on which the ingenious author drew the ſeveral lines, and of which he gave an account in this treatiſe, as theſe dials no longer remain; having been in a great meaſure defaced by the frolics of a certain nobleman in the reign of king Charles II.: and the ſtone upon which they were conſtructed having been removed ſince the fire at Whitehall, on the 4th of January 1697. Our ingenious author was the firſt who uſed the term “Co-ſine” for the ſine of the complement of an arc; and he alſo introduced the uſe of “Arithmetical Complements,” into the logarithmical arithmetic, as we learn from Brigg's Arith. log. c. 15. It has been alſo ſaid, that he firſt ſuggeſted the idea of the “Logarithmic Curve,” ſo called, becauſe the ſegments of its axis are the logarithms of the correſponding ordinates.

The works of Mr. Gunter, which were publiſhed in ſeparate tracts at different times, have been collected (his piece on the dials excepted); and various editions of them iſſued from the preſs. The fifth edition is that of Mr. W. Leybourn, 1673, 4to., containing the “Canon Triangulorum,” and an account of the ſector, croſs-ſtaff, croſs-bow, portable quadrant, and other inſtruments, with ſeveral additions by Mr. Samuel Foſter, Mr. Henry Bond, and the editor, Mr. William Leybourn. Ward's Lives of the Profeſſors of Greſham College, p. 77, &c.

GUNTER'S *Chain.* See CHAIN.

GUNTER'S *Line*, called alſo *Line of Lines*, and *Line of Numbers*, is a graduated logarithmic line uſually placed on ſcales, rules, ſectors, &c.

This line conſiſts of the logarithms transferred upon a ruler, from the tables, by means of a ſcale of equal parts, ſo as to anſwer much the ſame purpoſes, inſtrumentally, as the logarithms themſelves do arithmetically. What the logarithms do by addition and ſubtraction, is done in this line by turning a pair of compaſſes this way and that.

This line has been contrived various ways, for the advantage of having it as long as poſſible. As, firſt, on the two feet ruler, contrived by Edmund Gunter, and called “Gunter's Scale;” whence alſo the line itſelf took its popular denomination “Gunter's Line.”

After this, Wingate, in 1627, doubled the line, or laid down the logarithms on two ſeparate rulers, ſliding againſt each other, ſo that the uſe of compaſſes was ſuperſeded. In the ſame year they were applied to concentric circles by Oughtred: and about the year 1650 they were projected in a ſpiral form by Mr. Milburne of Yorkſhire. The father of the late Mr. George Adams, inſtrument-maker in Fleet Street, had a ſpiral engraved on a braſs plate, ſuppoſed to be conſtructed in the year 1748. The ſpiral has 10 turns, and its external diameter is 12 inches. It contains the numbers, ſines, and tangents, the latter being twice repeated, and may with eaſe be uſed to compute to four places, and an eſtimate figure; which is to the full as much as could be done with a common Gunter's ſcale of 60 feet in length. In 1657 they were inſcribed on the preſent common ſliding rule by Mr. Seth Partridge.

Laſtly, Mr. William Nicholſon propoſed another diſpoſition of them in concentric circles, in the Phil. Tranſ. for 1787. His inſtrument is equivalent to a ſtraight rule of the length of 28½ inches. It conſiſts of three concentric circles, engraved and graduated on a plate of about 1½ inch in diameter. From the centre proceed two legs, having right-lined edges in the direction of radii, which are moveable either ſingly or together. In uſing this inſtrument, place the edge of one leg at the antecedent of any proportion, and the other at the conſequent, and fix them to that angle: the two legs being thus moved together, and the antecedent legs placed at any other number, the other leg gives its conſequent in the like poſition or ſituation on the lines. The whole length of the line is divided into two equal intervals, or radii, of nine larger diviſions in each radius, which are numbered from 1 to 10, the 1 ſtanding at the beginning of the line, becauſe the logarithm of 1 is 0, and the 10 at the end of each radius: alſo, each of theſe nine ſpaces is ſubdivided into ten other parts, unequal according to the logarithms of numbers; the ſmaller diviſions being always tenths of the larger: thus, if the large diviſions be units, the ſmaller are tenth parts; if the larger be tens, the ſmaller are units or ones, and if the larger be 100, the ſmaller are tens, &c.

For other contrivance by Mr. Nicholſon, ſee his Philoſophical Journal, vol. i. p. 374, &c.

Deſcription of Gunter's Line.—The whole length of this line is divided into equal intervals, uſually called radiuſes; the firſt begins at the left-hand with the number 1; the middle point between the two radiuſes, where the firſt ends and the ſecond begins, is alſo marked with number 1; and the end of the ſecond radius, which terminates the line at the right-hand end, is marked with the number 10, againſt which are inſcribed the letters *num.* Each of theſe equal radiuſes or intervals is divided into nine equal ſpaces, marked 2, 3, 4, 5, 6, 7, 8, 9; but the ſpaces in one radius are exactly of the ſame lengths with the ſpaces alike marked in the other radius; each of theſe nine unequal ſpaces are ſubdivided, firſt into ten unequal, and then each of theſe into two or more parts, ſuch as thoſe ſpaces can conveniently contain. If the left-hand 1 ſtands for the number one, the middle 1 repreſents the number 10, and the 10 at the right-hand end ſtands for the number 100, then the figures 2, 3, 4, &c. in the firſt radius ſtand for the numbers 2, 3, 4, 5, 6, 7, 8, 9; and the like figures in the ſecond radius ſtand for the numbers 20, 30, 40, 50, 60, 70, 80, and 90; and the ten firſt ſubdiviſions in the ſpaces of the ſecond radius ſtand for the reſpective units between the marked ſpaces. If the left-hand 1 be called 10, the middle 1 ſtands for 100, and the 10 at the right-hand ſtands for 1000; the ſeveral ſpaces and ſubdiviſions in the firſt interval are then to be eſtimated as thoſe were eſtimated in the ſecond radius, when the right-hand end ſtood for 100; but now, in the ſecond interval, the firſt ſubdiviſions in the ſpaces ſtand for hundreds, and the leſſer diviſions of theſe ſtand for ſuch parts of 100, as there are parts introduced; thus, where only 2 of the laſt ſubdiviſions can be introduced, each ſtands for 50; where 4 can be contained, each ſtands for 25; if 5 are put in, each ſtands for 20; and where 10 are introduced, each ſtands for 10; again, if the firſt 1 be called 100, the ſecond 1 ſtands for 1000, and the ten at the end ſtands for 10000, &c. if the firſt 1 ſtands for $\frac{1}{10}$, the ſecond 1 ſtands for 1, and the 10 at the end ſtands for 10; and in this caſe, the numbered diviſions in the ſecond radius ſtand for the units between 1 and 10; the firſt ſubdiviſions ſtand for tenth-parts of unity, and the ſecond ſubdiviſions ſtand for the parts of tenths, according to the number of theſe ſecond ſubdiviſions, &c. ſo that whatever values are put upon any diviſion or ſubdiviſion in the ſecond radius, the value of the correſponding diviſion in the firſt radius will be only a tenth-part, and *vice verſâ*: thus, if the diviſion marked 5 in the ſecond radius ſtands for 5000, or 500, or 50, or $\frac{5}{10}$, &c. then the 5 in the firſt radius will ſtand for 500, or 50, or 5, or $\frac{5}{10}$, or $\frac{5}{100}$, &c.

Conſtruction of Gunter's Line.—From a ſcale of equal parts, accurately divided, and of ſuch a length, that 20 of the primary diviſions ſhall make the whole length of the intended ſcale of numbers, take the firſt ten of theſe diviſions, and lay this diſtance down twice on the logarithmic ſcale, making two equal intervals; marking the firſt point 1, the ſecond 1, (or rather 10), and the third 10, (or rather 100). From the ſame ſcale take the diſtances expreſſed by the three firſt figures of the logarithms of the numbers 2, 3, 4, 5, 6, 7, 8, 9 reſpectively, rejecting the indices, *viz.* 301, 477, 672, 699, 778, 845, 903, 954; lay theſe diſtances on each interval of the logarithmic ſcale, between the marks 1 and 10, 10 and 100, reckoning each diſtance from the beginning of its interval, *viz.* from 1 and from 10, and mark theſe diſtances with the figures 2, 3, 4, 5, 6, 7, 8, 9, in order. The diſtances expreſſing the logarithms of the numbers between 10 and 20, 20 and 30, 30 and 40, 40 and 50, 50 and 60, 60 and 70, 70 and 80, 80 and 90, 90 and 100, rejecting the indices, are alſo to be taken from the ſcale of equal parts, and laid on the logarithmic ſcale, in each of the primary intervals between the marks 1 and 2, 2 and 3, 3 and 4, 4 and 5, 5 and 6, 6 and 7, 7 and 8, 8 and 9, 9 and 10, reſpectively, reckoning each diſtance from the beginning of its reſpective primary interval. The laſt ſubdiviſions of the ſecond primary interval are to be divided into others, as many as the ſcale will admit of, by laying down the logarithms of ſuch intermediate diviſions.

The accuracy of the diviſion of this line may be determined by taking with a pair of compaſſes the diſtance between the diviſions marked with the numbers 1 and 2, which will reach from 2 to 4, from 4 to 8, from 8 to 16, &c. and from $1\frac{1}{2}$ to 3, from 3 to 6, from 6 to 12, &c. and alſo from $1\frac{1}{4}$ to $2\frac{1}{2}$, from $2\frac{1}{2}$ to 5, from 5 to 10, &c. or the ſame diſtance applied to any one of the diviſions between 1 and 2, will reach from thence to diviſions found always by doubling the laſt number. The ſame work may be done without compaſſes, by moving the ſlider till the left-hand 1 on the line of numbers ſtands againſt the diviſion expreſſing any number counted on the fixed line of numbers, then will the diviſions 2, 4, 8, 16, 32, &c. on the ſlider ſtand againſt the reſpective diviſions on the fixed line, which will repreſent twice 4 times, 8 times, 16 times, &c. the diviſion againſt which the 1 on the ſlider was ſet. Theſe diviſions on the fixed line which correſpond to the diviſions 2, 4, 8, 16, &c. on the ſlider will be cut by the edge of the braſs index by moving it along to the diviſions on the ſlider.

To find a diviſion or point in the line of numbers anſwering to any given number.—Let the number be 654: ſeek in the ſecond radius between the figures 6 and 7 for the fifth of the firſt ſubdiviſions; between this fifth and ſixth are 4 ſecond ſubdiviſions, each of which anſwers to $2\frac{1}{2}$ units; then will a point taken a little nearer to the ſecond than the firſt of theſe ſmaller ſubdiviſions anſwer to the number 654 very nearly; the correſpoding point in the firſt radius anſwers to the number 654, and if this point in the firſt radius anſwered to 654, the like point in the ſecond would anſwer to 6540. Let the number be 168: in the ſecond radius between 1 and 2, ſeek the ſixth of the larger ſubdiviſions, and the point will fall between this ſixth and the ſeventh of the ſubdiviſions, and the true point will be on the eighth of the ſmaller ones, which will repreſent the number 168; the like diviſion in the firſt radius repreſents 168, but if this ſtood for 168, then the like diviſion in the ſecond radius ſtands for 1680.

To find a fraction, conſider that the line properly only expreſſes decimal fractions, as thus, $\frac{1}{10}$, or $\frac{1}{100}$, or $\frac{1}{1000}$, and nearer the rule cannot well come than one inch, one-tenth, one-hundredth, or one-thouſandth part of an inch: ſo that for other fractions, as quarters, half quarters, &c. you muſt either eſtimate them as near as you can reaſonably, or elſe reduce them into decimals.

Uſe of Gunter's Line. 1. *Two numbers being given, to find a third geometrical proportional to them; and to three a fourth number, to a fourth a fifth, &c.*—Extend the compaſſes on the line from one number to another; then if that extent be applied upwards and downwards, as you would either increaſe or diminiſh the number from either of the numbers, the moveable point will fall on the third proportionable number required. Again, the ſame extent, applied the ſame way from the third, will give a fourth; and from the fourth a fifth, &c.

For example: let the two numbers 2 and 4 be propoſed to find a third proportional, &c. to them; extend the compaſſes on the firſt part of the line of numbers, from 2 to 4; which done, and the ſame extent being applied upwards from 4, the moveable point will fall on 8, the third proportional required; and from 8 it will reach to 16, the fourth proportional; and from 16 to 32, the fifth, &c. Contrariwiſe, if you would diminiſh, as from 4 to 2, the moveable point will fall on 1, and from 1 to $\frac{5}{10}$, or .5; and from .5 to .25, &c.

But generally in this, and in moſt other works, make uſe of the ſmall diviſions in the middle of the line; that you may the better eſtimate the fractions of the numbers you make uſe of; for how much you miſs in ſetting the compaſſes to the firſt and ſecond term, ſo much the more you will err in the fourth; therefore the middle part will be moſt uſeful. For example, as 8 to 11, ſo is 12 to 16.5, if you imagine one integer to be divided into ten parts, as they are on the line on a two-feet rule. See Sliding-*rule.*

2. *One number being given to be multiplied by another, to find the product.*—Extend the compaſſes from 1 to the multiplicator; and the ſame extent, applied the ſame way from the multiplicand, will make the moveable point fall on the product: thus, if 6 be given to be multiplied by 5, extending the compaſſes from 1 to 5, the ſame extent will reach from 6 to 30, the product ſought.

3. *One number being given to be divided by another, to find the quotient.*—Extend the compaſſes from the diviſor, *e. g.* 25, to 1, and the ſame extent will reach from the dividend, *e. g.* 750, to the quotient 30; or extend the compaſſes from the diviſor to the dividend, the ſame extent will reach the ſame way from 1 to the quotient.

4. *To reduce a vulgar fraction into a decimal.*—In this caſe, the denominator of the given fraction is to the numerator as 1 is to the decimal required: let the fraction be $\frac{7}{8}$, extend the compaſſes from 8 to 7, and this extent laid the ſame way from 1 will reach to .875, the required decimal.

5. *Three numbers being given, to find a fourth in direct proportion.*—Extend the compaſſes from the firſt number, ſuppoſe 7, to the ſecond, *e. g.* 22: that done, the ſame extent, applied the ſame way from the third, 28, will reach to the fourth proportional ſought, *viz.* 44, which is the circumference of a circle, whoſe diameter is 28, by Archimedes's proportion.

6. *Three numbers being given, to find a fourth in inverſe proportion.*—Extend the compaſſes from the firſt of the given numbers, ſuppoſe 60, to the ſecond of the ſame denomination, *viz.* 30; if that diſtance be applied from the third number backwards, 5, it will reach to the fourth number ſought, 2.5.

7. *Three numbers being given, to find a fourth in duplicate proportion.*—If the denominations of the firſt and ſecond terms be lines, extend the compaſſes from the firſt term to the ſecond, of the ſame denomination: this done, that extent being applied twice the ſame way from the third term, the moveable point will fall on the fourth term required. *E. gr.* the area of a circle, whoſe diameter is 1, being 0.78539, what will the content of a circle be, whoſe diameter is 28? Apply the extent from 1 to 28, the ſame way from .785 twice, the moveable point will fall on 616, the fourth proportional or area ſought.

8. *Having three numbers given, to find a fourth in triplicate proportion.*—In this caſe the firſt and ſecond terms muſt be always in the ſame denomination: *e. g.* if an iron bullet of 4 inches diameter weighs 9 pounds, what is the weight of another of the ſame metal, whoſe diameter is 6 inches: the extent from 4 to 6, laid on three times from 9, will reach to 30, 3 pounds.

9. *To find a mean proportional between two given numbers.*—Biſect the diſtance between the given numbers, the point of biſection will fall on the mean proportional ſought. Thus the quotient of the two extremes divided by one another, extremes being 8 and 32, the middle point between them will be found 16.

10. *To find two mean proportionals between two given lines.*—Triſect the ſpace between the two given extremes; the two points of triſection will give the two means required; thus, if 8 and 27 be the two given extremes, the two means will be found 12 and 18.

11. *To find the ſquare root of any number under* 1000000.—The ſquare root of a number is always a mean proportional between 1, and the number whoſe root is required; yet, with this general caution, that if the figures of the number be even, that is 2, 4, 6, 8, 10, &c. then you muſt look for the unit at the beginning of the line, and the number in the ſecond part or radius, and the root in the firſt part; or rather, reckon 10 at the end to be unity; and then both root and ſquare will fall backwards towards the middle in the ſecond length or part of the line. If they be odd, the middle 1 will be moſt convenient to be counted unity, and both root and ſquare will be found from thence forward towards 10. On this principle the ſquare root of 9 will be found to be 3; the ſquare root of 64, to be 8, &c.

12. *To find the cube root of any number under* 1000000000.—The cube root is always the firſt of two mean proportionals between 1 and the given number, and therefore to be found by triſecting the ſpace between them. Thus the cube root of 1728 will be found 12; the root of 17280, nearly 26; the root of 172800 almoſt 56.

Though the point on the line repreſenting all the ſquare numbers is in one place, yet, by altering the unit, it produces various points and numbers for their reſpective roots. The rule to find this is, to put dots, or to ſuppoſe them put, over the firſt figure to the left hand, the fourth figure, the ſeventh, and the tenth: if then the laſt dot on the left-hand falls on the laſt figure, as it does in 1728, the unit muſt be placed at 1 in the middle of the line, and the root, the ſquare, and the cube, will all fall forward to the end of the line.

If it fall on the laſt but 1, as in 17280, the unit muſt be placed at 1 in the beginning of the line, and the cube in the ſecond length; or the unit may be placed at 10 at the end of the line, and then the root, the ſquare, and cube, will all fall backwards, and be found in the ſecond part between the middle and end of the line. Thus will the cube root of 8 be found 2; and that of 27, 3; that of 64, 4; that of 125, 5; that of 216, 6, &c.

We may obſerve in general, with regard to theſe two laſt problems, that the line of numbers is only a line of logarithms, and any logarithm divided by 2, quotes the logarithm of the ſquare root of its natural number; if divided by 3, it gives the logarithm of the cube root, and if by 6, it gives the logarithm of the ſixth power, &c. Hence the roots of all powers may eaſily be found on the line of numbers, by dividing the diſtance or extent on the ſcale, between unity and the number given to be extracted, into as many equal parts as are directed by the index of that power, *i. e.* the ſquare into 2 equal parts; the cube into 3; the biquadrate into 4, &c. which half, third, fourth, &c. part, taken in the compaſſes, and laid off from unity (obſerving well the notation, or value of the figures) will give the reſpective root required.

For the particular uſe of Gunter's line in the meaſuring of timber, gauging of veſſels, &c. ſee Sliding rule.

For other uſes in geometry, trigonometry, &c. ſee Sector, and Gunter's *ſcale.*

Gunter's *Quadrant*, is a quadrant made of wood, braſs, or ſome other ſubſtance; being a kind of ſtereographic projection on the plane of the equinoctial, the eye being ſuppoſed in one of the poles: ſo that the tropic, ecliptic, and horizon, form the arches of circles, but the hour-circles other curves, drawn by means of ſeveral altitudes of the ſun, for ſome particular latitude every day in the year.

The uſe of this inſtrument is to find the hour of the day, the ſun's azimuth, &c. and other common problems of the globe; as alſo to take the altitude of an object in degrees.

See its deſcription and uſe more at large under the article *Gunter's* QUADRANT.

GUNTER'S *Scale*, alſo called by navigators abſolutely, *The Gunter*, is a large plain ſcale, with various lines upon it, of great uſe in working queſtions in navigation, &c. See SCALE and SAILING.

This inſtrument derives its name from its inventor, Mr. Edmund Gunter, who was profeſſor of aſtronomy in Greſham college, and firſt publiſhed the ſcales of logarithms, numbers, ſines, and tangents, in his deſcription of the croſſ-ſtaff, in 1624. The errors which had crept into Gunter's ſcale, by length of time and negligence in the fabrication of it, have been corrected by the late Mr. John Robertſon, late librarian to the Royal Society, and the inſtrument has been re-conſtructed, under his inſpection and with his improvements, by Meſſrs. Nairne and Blunt, mathematical inſtrument makers in London. See a deſcription of this inſtrument in its improved ſtate by W. Mountain, F. R. S. publiſhed in 1778.

On one ſide of the ſcale, repreſented *Plate* I. *Trigonom. fig.* 1. are the lines of numbers, marked *numbers;* the line of artificial ſines, marked *ſines;* the line of artificial tangents, marked *tangents;* the line of artificial verſed ſines, marked *V. S.* the artificial ſines of the rhumbs, marked *S. R.* the artificial tangents of the rhumbs, marked *T. R.* meridian line in Mercator's chart, marked *Merid.* and equal parts marked *E. P.*

To which, on the ſhorter ſcales of a foot long, are uſually added lines of latitudes, hours, and inclinations of meridians. On the backſide of the ſcale are the lines uſually found on a plain ſcale.

The lines of artificial ſines, tangents, and numbers, are ſo fitted on this ſcale, that by means of a pair of compaſſes, any problem, whether in right-lined or ſpherical trigonometry, may be ſolved very expeditiouſly, and with tolerable exactneſs; whence the inſtrument becomes extremely uſeful in all parts of mathematics where trigonometry is concerned, as navigation, dialling, aſtronomy, &c.

The ſame lines are alſo occaſionally laid down on rulers to ſlide by each other; hence called *ſliding Gunters;* ſo as to be uſed without compaſſes: but he that underſtands how to uſe them with, may, by what we have ſaid of Everard's and Coggeſhall's ſliding rules, uſe them without. See SLIDING-*rule.*

The Gunter's ſcale, as it has been lately improved, is made 30 inches long, two inches broad, and about half an inch thick. One face contains the natural ſcales; half the length of this face is filled with ſcales of equal parts; which are denominated by the diviſions of an inch, *viz.* ſcales of 10, $12\frac{1}{2}$, 15, 20, 25, 30, 35, 40, 45, 50, and the left-hand primary diviſion of each ſcale is divided into 10 equal parts, and alſo into 12 equal parts: on the other half of this face are put the ſeveral lines which conſtitute the plain *ſcale*, ſuch as the ſcales of rhumbs, chords, ſines, ſecants, tangents, and half-tangents, fitted to a radius of two inches; alſo the dialling ſcales, *viz.* inclination of meridians, latitudes, chords, and hours, to a radius of two inches; and a ſcale of chords and miles of longitude to a radius of three inches, and other ſcales of chords and rhumbs to a radius of one inch. The breadth of the other face, which contains the logarithmic ſcales, is divided into 12 parts, or ſcales running nearly the whole length: nine of theſe ſcales may be called fixed, and the other three moveable, being on a ſliding piece of about $30\frac{1}{2}$ inches long, $\frac{1}{2}$ an inch broad, and of the thickneſs of the ſcale. The other of theſe ſcales, or lines, is,

Fixed	1.	A line of ſine rhumbs, marked	S. R.
	2.	A line of tangent rhumbs, marked	T. R.
	3.	A line of verſed ſines, marked	V. S.
	4.	A line of ſines, marked	Sin.
Sliding	5.	A line of ſines, marked	Sin.
	6.	A line of numbers, marked	Num.
	7.	A line of tangents, marked	Tan.
Fixed	8.	A line of tangents, marked	Tan.
	9.	A line of numbers, marked	Num.
	10.	A line of meridian degrees to 50, marked	Mer.
	11.	A line of meridian degrees from 50 to about 74, marked	Mer.
	12.	A line of degrees of longitude, marked	Lon.

Along this face an index or thin piece of braſs, about an inch broad, is contrived to ſlide, which going acroſs the edge of the ſcales at right angles to it, will ſhew on the ſeveral lines the diviſions which are oppoſite to one another, although the lines are not contiguous. The apparatus at the right hand conſiſts of a braſs box and two ſcrews; the ſlider paſſes freely through the box, when the perpendicular ſcrew is caſed, and may be readily ſet by hand to the terms given; but for greater accuracy, and in order to keep the ſlider in its true poſition, move the perpendicular ſcrew, which by a ſub-ſpring will fix the ſlider in the box, and then by the motion of the horizontal ſcrew, the greateſt degree of accuracy poſſible may be obtained. Compaſſes may be uſed with this ſcale, as well as with the common Gunter, by firſt bringing the radius on the ſlider exactly in a line with the others on the right hand and fixing it there. In a convenient part of this inſtrument are marked 10 ſea-feet, each of which contains 13.8258 Engliſh inches, and each foot is divided into 12 equal parts, called ſea-inches. The method of forming and graduating the ſeveral lines on Gunter's ſcale is as follows: the conſtruction of the line of numbers has been already explained: for the line of logarithmic ſines, it is to be obſerved, that this line terminates at 90 degrees, juſt againſt the 10 at the end of the line of numbers; and from this termination the degrees are laid backwards, or from thence towards the left: in order to obtain diviſions anſwering to theſe, ſeek in a table of logarithmic ſines the numbers expreſſing the arithmetical complements of the ſeveral degrees, without the index: take theſe numbers from the ſcales of equal parts by which the lines of numbers was formed, and apply them to the ſcale of lines from 90°. Then the arithmetical complements of the logarithmic ſines (or the co-ſecants) abating the index, of 10, 20°, 30°, 40°, &c. are the numbers 76033, 46595, 30103, 19193, &c. and the equal parts anſwering to theſe numbers will give the diviſions for 10, 20°, 30°, 40°, &c. and proceed in the ſame manner for the intermediate degrees. The arithmetical complement of the ſine of 50° 44′ 21″ will be equal to 10 of the primary diviſions of the ſcale of equal parts, or to one interval in the logarithmic ſcale: ſo that a decreaſe of the index by unity anſwers to one interval; then a decreaſe of the index by 2 anſwers to two intervals, or the whole length of the logarithmic ſcale, which happens at the ſine of 0° 34′ 23″; and the diviſions anſwering to the ſine of a little above 3′, *viz.* 3′ 27″, will be equal to three intervals, and the ſine of 21″ will be four intervals; and therefore all the ſines between 90° and 0° 34′ are thoſe only which can be put on this ſcale, the leſſer ſines extending beyond this length. It has been uſual to inſert the diviſions to every 5′, as far as 10°; from 10° to 30°, the ſmall diviſions are made 15′ each; from 30° to 50°, every half degree is marked; from 50° to 70° only the whole degrees. On the improved ſcale the ſpace between 90° and 80° is too ſmall to admit of more than five diviſions; that neareſt to the 90° being the mark for 85°; between 80° and 60°, the diviſions are ſingle degrees; from 60° to 50° every degree and half degree are introduced: from 50 to 30° are degrees and third-parts, or every 20′; from 30 to 20° are degrees and quarters, or every 15′; and from 20° downwards are put in the degrees and ſixth parts of degrees. This line of ſines is put the uppermoſt of the three on the ſlider, and alſo the loweſt on the upper part of the fixed ſcales, whereby the two ſcales of ſines are contiguous.

For the line of tangents, it is evident, ſince the tangent of 45° is equal to the radius, or ſine of 90°, that 45° on this ſcale will terminate directly oppoſite to 90° on the ſines; and the ſeveral diviſions of this ſcale of logarithmic tangents are conſtructed in the ſame manner as thoſe of the ſines, by applying their arithmetical complements backwards from 45°, or towards the left hand. The degrees above 45 are to be counted backwards on the ſcale; thus, the diviſion at 40, repreſents both 40° and 50°, &c. In the new ſcale this line deſcends as low as 0° 34′ on the ſines; the ſpace between 10° and 45°, and back again from 45° to 80° are large enough to admit of four ſpaces in each; and therefore the ſubdiviſions between 10° and 80° extend to every 15 minutes; but the degrees under 10 and above 80 are each ſubdivided into ſix parts, of 10 minutes each. This line of tangents is like that of ſines, laid down twice on the new Gunter, once on the ſlider and once on the loweſt fixed part. The conſtruction of theſe lines of ſines and tangents, above explained, depends on the following theorems in trigonometry: 1. The coſine is to the radius as the radius is to the ſecant. 2. The ſine is to the radius as the radius is to the co-ſecant. 3. The tangent is to the radius as the radius is to the co-tangent. From theſe theorems it appears, that, if the radius of the tables be ſuppoſed equal to one, in either of the above caſes, one of the quantities will be equal to the quotient of unit divided by the other; but diviſion is performed by ſubtraction with logarithms, and the ſubtraction of a logarithm is the ſame as the addition of its arithmetical complement: conſequently, the logarithmic coſine and ſecant of the ſame degrees are the arithmetical complements of one another: and, as the arithmetical complement of any number is what that number wants of unity in the next ſuperior place, every natural ſine and its arithmetical complement are together equal to radius. Therefore, ſince the ſines begin at one end of the radius and terminate in 90° at the other end, in a ſcale of ſines, the arithmetical complement of any ſine or its co-ſecant, laid backwards from 90°, gives the diviſion for that ſine: and the caſe will be the ſame in a ſcale of logarithmic ſines. And as the logarithmic tangents and co-tangents are the arithmetical complements of one another, the diviſions to the degrees both under and above 45, in a ſcale of logarithmic tangents, are equally diſtant from the diviſion of 45°; conſequently, the diviſions ſerving for the degrees under 45 will ſerve, by reckoning backwards, for thoſe above 45.

For the verſed ſines: from the ſcale of equal parts take the arithmetical complements of the logarithmic coſines, or the ſecants of the complements, of 5, 10, 15, 20, 25, 30, &c. degrees, rejecting the indices; and the double of theſe diſtances will give the diviſions, on the propoſed ſcale of verſed ſines, expreſſing 10, 20, 30, 40, 50, 60, &c. degrees, continued and divided according to the length of the ſcale: otherwiſe having a table of logarithmic verſed ſines to 180°, ſubtract each logarithmic verſed ſine from that of 180 degrees, and lay the remainders ſucceſſively taken from the ſcale of equal parts on the ruler backward from the common termination. This line of verſed ſines begins at 0°; and runs thence towards the left hand to about 168°; one extremity of this line has the ſame termination with the lines of numbers, ſines, and tangents, where the mark for 180° ſhould be placed, but as the ſcale begins at this place, and the diviſions may be ſuppoſed to go backwards, therefore 0 is put for the beginning, and the numbers thence proceeding through 10, 20, &c. towards the left, are only the ſupplements of the verſed ſines themſelves.

On the new ſcale, the diviſions under 10° fall too cloſe to one another to be diſtinguiſhed; from 10 to 60 every ſingle degree is introduced; from 60° to 100° every degree and half degree; from 100 to 130 every degree and third of a degree; from 130 to 150° every degree and quarter of a degree; and above 150° every degree and ſixth part of a degree.

The conſtruction of the lines of ſine rhumbs and tangent rhumbs is eaſily underſtood; as theſe are formed by taking the ſines and tangents of the degrees and minutes anſwering to the rhumbs and parts of rhumbs from the lines of ſines and tangents reſpectively, and laying them down on their proper ſcales.

The ſcale of longitude is alſo a line of equal parts repreſenting the lengths of degrees of longitude, or of the degrees taken on the equator, in which the reckoning of a ſhip's longitude at ſea is kept; each degree, in the new ſcale, being about half an inch, and ſubdivided into 10 parts of ſix minutes each.

The ſcale of meridional degrees is formed from the preceding, and ſhews the length of the degrees of latitude, relative to the correſpondent degrees of longitude; the degrees being gradually increaſed in the ſame proportion as the degrees of longitude on the globe diminiſh from the equator towards either pole; and each of them is ſubdivided into ten parts of ſix minutes each.

This ſcale comprehends, in the improved Gunter, two lengths of the ruler; the firſt length extends from the beginning at 0° on the right, and proceeds thence towards the left as far as 50°; and begins again on the right hand at 50°, and goes on to the left as far as 75°, which is as far as moſt navigators extend, except thoſe of the Greenland fiſheries.

GUNTER'S *Scale, uſe of.* 1. *The baſe of a right-lined, right-angled triangle being given,* 30 *miles, and the oppoſite angle thereto* 26 *degrees, to find the length of the hypothenuſe.*—The trigonometrical canon or proportion is thus: as the ſine of the angle, 26 degrees, is to the baſe, 30 miles, ſo is the radius to the length of the hypothenuſe. Set one foot of the compaſſes, therefore, on the 26th degree of the line of the ſines, and extend the other to 30 on the line of numbers; and the compaſſes remaining thus opened, ſet one foot on 90 degrees, or the end of the line of ſines, and extend the other on the line of numbers: this will give 68½ miles for the hypothenuſe ſought.

2. *The baſe of a right-angled triangle being given,* 25 *miles, and the perpendicular,* 15, *to find the angle oppoſite to the perpendicular.*—As the baſe, 25 miles, is to the perpendicular, 15 miles, ſo is the radius to the tangent of the angle ſought. Extend the compaſſes, then, on the line of numbers, from 15, the perpendicular given, to 25, the baſe given; and the ſame extent will reach the contrary way, on the line of tangents, from 45 degrees to 31 degrees, the angle ſought.

3. *The baſe of a right-angled triangle being given, ſuppoſe* 20 *miles,*

miles, and the angle oppoſite to the perpendicular 50 *degrees, to find the perpendicular.*—As radius is to the tangent of the given angle, 50 degrees, ſo is the baſe, 20 miles, to the perpendicular ſought. Extend the compaſſes then on the line of tangents, from the tangent of 45 degrees to the tangent of 50 degrees; and the ſame extent will reach on the line of numbers the contrary way, from the given baſe, 20 miles, to the required perpendicular, 23¾ miles.

Note, the extent on the line of numbers is here taken from 20 to 23¾ forwards; that the tangent of 50 degrees may be as far beyond the tangent of 45 degrees, as its complement, 40 degrees, wants of 45 degrees.

4. *The baſe of a right-angled triangle being given, ſuppoſe* 35 *miles, and the perpendicular,* 48 *miles, to find the angle oppoſite to the perpendicular.*—As the baſe, 35 miles, is to the perpendicular, 48 miles, ſo is radius to the tangent of the angle ſought. Extend the compaſſes from 35 on the line of numbers to 48, the ſame extent will reach the contrary way on the line of tangents, from the tangent of 45 deg. to the tangent of 36 deg. 5 min. or 53 deg. 55 min. To know which of thoſe angles the angle ſought is equal to, conſider that the perpendicular of the triangle being greater than the baſe, and both the angles oppoſite to the perpendicular and the baſe making 90 deg. the angle oppoſite the perpendicular will be greater than the angle oppoſite to the baſe; and conſequently the angle, 43 deg. 55 min. will be the angle ſought.

5. *The hypothenuſe of a right-angled ſpherical triangle being given, ſuppoſe* 60 *degrees, and one of the ſides* 20 *degrees, to find the angle oppoſite to that ſide.*—As the ſine of the hypothenuſe, 60 deg., is to radius, ſo is the ſine of the given ſide, 20 deg., to the ſine of the angle ſought. Extend the compaſſes on the line of ſines from 60 deg. to the radius, or 90 deg. and the ſame extent will reach on the line of ſines the ſame way, from 20 deg. the given ſide, to 23 deg. 10 min. the quantity of the angle ſought.

6. *The courſe and diſtance of a ſhip being given, to find the difference of latitude and departure.*—Suppoſe a ſhip ſails from the latitude of 50 deg. 10 min. north, S.S.W. 48.5 miles; as radius is to the diſtance ſailed 48.5 miles, ſo is the ſine of the courſe, which is two points, or the ſecond rhumb from the meridian, to the departure. Extend the compaſſes from 8 or 90 deg. on the artificial ſine rhumb-line to 48.5 on the line of numbers, the ſame extent will reach the ſame way from the ſecond rhumb, on the line of artificial ſines of the rhumbs to the departure weſting 18.6 miles.

Again, as radius is to the diſtance ſailed 48.5 miles, ſo is the coſine of the courſe, 67 deg. 30 min. to the difference of latitude. Extend your compaſſes from the radius, on the line of ſines, to 48.5 miles on the line of numbers; the ſame extent will reach the ſame way, from 67 deg. 30 min. on the line of ſines, to 44.8 on the line of numbers; which converted into degrees by allowing 60 miles to a degree, and ſubtracted from the given north latitude, 50 deg. 10 min. leaves the remainder 49 deg. 25 min. the preſent latitude.

This problem may be eaſily ſolved with the ſlider, by ſetting 48.5 on the ſlider againſt 90 on the line of ſines, or 8 on the line of ſine-rhumbs; then againſt two points, or 22 deg. 30 min. on the line of ſines, is 18.6, the departure; and againſt two points on the line of ſine-rhumbs, or 22 deg 30 min. on the line of ſines, is 44.8 on the ſlider, for the difference of latitude.

7. *The difference of latitude and departure from the meridian being given, to find the courſe and diſtance.*—A ſhip from the latitude 59 deg. north, ſails north-eaſtward till ſhe has altered her latitude 1 deg 10 min. or 70 miles, and is departed from the meridian 57.5 miles, to find the courſe and diſtance. As the difference of latitude, 70 miles, is to radius, ſo is the departure, 57.5 miles, to the tangent of the courſe, 39 deg. 20 min. or three points and a half from the meridian. Extend the compaſſes from the fourth rhumb, on the line of artificial tangents of the rhumbs, to 70 miles on the line of numbers, the ſame extent will reach from 57.5 on the line of numbers, to the third rhumb and a half on the line of artificial tangents of the rhumbs.

Again, as the ſine of the courſe, 39 deg. 20 min. is to the departure, 57.5 miles, ſo is the radius to the diſtance, 90 6 miles. Extend the compaſſes from the third rhumb and a half, on the artificial lines of rhumbs, to 57.5 miles on the line of numbers; that extent will reach to the ſine of the eighth rhumb, on the lines of the rhumbs, to 90.6 miles on the line of numbers.

8. *Three ſides of an oblique ſpherical triangle being given, to find the angle oppoſite to the greateſt.*—Suppoſe the ſide A B, *Tab. Trig. fig.* 2. be 40 deg. the ſide B C 60 deg. and the ſide A C 96 deg. to find the angle A B C. Add the three ſides together, and from half the ſum ſubtract the greater ſide A C, and note the remainder: thus *e. gr.* the ſum will be 196 deg. half of which is 98 deg. from which ſubtracting 96 deg. the remainder is 2 deg.

Then extend the compaſſes from the ſine of 90 deg. to that of the ſide A B 40 deg. and applying this extent to the ſine of the other ſide B C 60 degrees, you will find it reach to a fourth ſine 34 degrees.

Again, from this fourth ſine extend the compaſſes to the ſine of the half ſum, *i. e.* the ſine of 72 deg. the ſupplement of 98 deg. to 180; this ſecond extent will reach from the ſine of the difference 2 deg. to the ſine of 3 deg 24 min. againſt which, on the verſed ſines, ſtand 151 deg. 50 min. the quantity of the angle ſought.

GUNTERSBERG, in *Geography,* a town of Germany, in the duchy of Anhalt Bernburg; 28 miles S.W. of Bernburg. N. lat. 51° 39′. E. long. 11° 11′.

GUNTOOR, called alſo *Mortizanagur* and *Condavir,* a circar of Hindooſtan, ceded to the Eaſt India company, which occupies the ſpace between Condipally, the ſouthernmoſt of our four circars, and the northern part of the Carnatic; extending along the ſea-coaſt of the bay of Bengal, more than 30 miles. The poſſeſſion of this diſtrict to the Engliſh is extremely eligible, as well for the purpoſe of ſhutting out the French nation from the Deccan, as to keep open a communication with the northern circars, and to preſerve the continuity of our poſſeſſions, and thoſe of our allies. Although the maritime parts of this circar are flat and open, yet the interior part of it contains ſome very ſtrong fortreſſes and poſts. The principal poſt in this circar is *Gondavir:* which ſee.

GUNTRAS, a town of S. America, in the province of Chocos, on a river of the ſame name; 130 miles S. of Popayan.

GUNTZ, or KESSEG, a town of Hungary, on a river of the ſame name, with a caſtle, ſurrounded by a rampart and ditch, in a country abounding with corn and wine; 40 miles S. of Vienna.

GUNWALE, or GUNNEL *of a Ship,* is that piece of timber which reaches on either ſide of the ſhip, from the half deck to the fore-caſtle, being the uppermoſt bend, which finiſhes the upper works of the hull in that part, and wherein they put the ſtanchions which ſupport the waſte-trees. This is called the gunwale, whether there be guns in the ſhip or not. The lower part of any port, where any ordnance are, is alſo termed the gunwale.

GUNZ, JUSTE-GODEFROID, in *Biography,* was born at Konigſtein, in the electorate of Saxony, on the 1ſt of

March, 1714, his father being a Lutheran miniſter at that place. After attending his courſes of humanity and philoſophy at Gorlitz, he determined on following the profeſſion of medicine, and went to Leipſic with a view of ſtudying that ſcience in 1733, and graduated there in 1738. The elector of Saxony, who was an active patron of merit, appointed him immediately to the profeſſorſhip of anatomy and ſurgery at Leipſic; in conſequence of this appointment, of the importance of which he was fully aware, Gunz requeſted permiſſion to travel, in order to accompliſh himſelf more fully in the requiſite acquirements, and he viſited the principal ſchools of Germany. He taught at Leipſic with conſiderable reputation; and, in 1750, was ſent for to Dreſden to attend the elector, who had become an invalid. His reputation at court ſoon equalled that which he had attained as a teacher, and was rapidly augmenting, when he was cut off by death in 1754, in the 41ſt year of his age. He left a conſiderable number of works, chiefly upon anatomical and ſurgical ſubjects. Eloy. Dict. Hiſt.

GUNZBURG, in *Geography*, a town of Germany, in the marggravate of Burgau, at the conflux of the rivers Gunz and Danube, where the regency of the marggravate reſides; 15 miles E. of Ulm. N. lat. 48° 26′. E. long. 10° 15′.

GUNZENHAUSEN, a town of Germany, in the marggravate of Anſpach, on the Altmuhl; containing two churches and an hoſpital; 10 miles S.S.E. of Anſpach. N. lat. 49° 7′. E. long. 10° 43′.

GUPHONISSA, two ſmall iſlands in the Grecian Archipelago, called *Great* and *Little*; three miles S.E. of Naxia.

GUPINDAPORUM, a town of Bengal; 70 miles S. of Dacca.

GUR, in *Mining*, is a ſuppoſed ſubſtance, which gave riſe to or was the mother of metals: a ſubſtance of a white mucous-like appearance, in contact with lead ore, in the ſhale, in Shaw-engine mine, near Eyam, in Derbyſhire, is mentioned by Mr. Whitehurſt, "Inquiry," 2d edit. p. 183, which it was conjectured might have generated the ore: whether the gur of the older miners was of this kind we are unable to learn. The colliers ſpeak of ſeed of coal, or coal-ſeed, much in the ſame way as the lead miners do of their gur, and perhaps with as much reaſon.

Gur, or *Ghur*, in *Mineralogy*, a word uſed to expreſs a fluid matter looking like milk, but reduced ſometimes, by evaporation, to the conſiſtence of honey, and appearing in form of a white ſediment. It is common in the mines of Sweden, and in ſome other places; it is ſometimes calcareous or chalky, and ſometimes metallic, and by dropping forms ſtalactitical concretions. Bromell. de Lapid.

Gur-*Lough*, in *Geography*, a lake of Ireland, in the county of Limerick.

GURÆI, in *Ancient Geography*, a people through whoſe territory Alexander paſſed in his march to the Indus; probably part of the preſent Cabul.

GURAGAMA, in *Geography*, a town of Bengal; 24 miles N.W. of Purneah.

GURAUNDI, in *Ornithology*, a name given to the Tanagra *Violacea*, otherwiſe called *Teitei*.

GURBA, in *Geography*, a town of Africa, on the E. coaſt of the kingdom of Tunis, anciently called "Curobis," formerly a conſiderable place, though the only remaining traces of its ancient grandeur are the ruins of an aqueduct and ciſterns, part of it has been ſwallowed up by the ſea; 35 miles E.S.E. of Tunis. N. lat. 36° 34′. E. long. 11° 10′.

GURBE, a town of the iſland of Ceylon; 18 miles E.S.E. of Columbo.

GURBOS, or Hammam-Gurbos, a town of Africa, on the E. ſide of the bay of Tunis, anciently called "Carpis," where are ſeen the ruins of an ancient hot-bath and other buildings; 23 miles E. of Tunis.

GURCK, a town of the duchy of Carinthia, on a river of the ſame name, which diſcharges itſelf into the Drave; within the territories of the archbiſhopric of Salzburg, the ſee of a biſhop. The principal article of its trade is iron; 12 miles N. of Clagenfurt. N. lat. 46° 50′. E. long. 13° 58′.

GURCKFELD, a town of Lower Carniola, on the Save; 12 miles S.S.E. of Cilly. N. lat. 49° 59′. E. long. 15° 20′.

GURDAIZ, or Kerdiz, a town of Candahar; 28 miles E. of Ghizni.

GUREV, or Gurief, a town of Ruſſia, in the government of Caucaſus, at the mouth of the Ural or Jaik, on the Caſpian ſea; 172 miles E.N.E. of Aſtrachan. This is a fortreſs, and the leaſt of thoſe along the Jaik, but the beſt conſtructed. It has only a ſingle gate, which leads towards the river. It conſiſts of 140 houſes, all of wood, except the governor's, and powder magazines. Its population conſiſts of the garriſon, compoſed of two companies of fuſileers, a ſquadron of Coſſacks, and ſome Aſtrachan merchants, who carry on a little trade with the Kirghis Tartars, who border on that country. The harbour of Gurief is one of the principal harbours of Ruſſia. N. lat. 47° 10′. E. long. 52°.

GUREUS, in *Ancient Geography*, the ancient name of the river Kameh, or Cabul, which ſee. It was croſſed by Alexander in his march with much difficulty, by reaſon of the depth and rapidity of its ſtream, and the nature of its bottom, which was compoſed of round ſlippery ſtones. Alexander's march from the Cophenes to the Gureus might probably be 100 road miles.

GUREWAR, in *Geography*, a town of Hindooſtan, in Oude, on the Dewah; 30 miles N.W. of Fyzabad.

GUREZ, a town of Walachia; 20 miles W.S.W. of Kimnik.

GURGA, a town of Hindooſtan, in Bahar; 18 miles S. of Rotas.

GURGENAGUR, a town of Hindooſtan, in the Carnatic; 10 miles N.W. of Trinomaly.

GURGIPTING, in *Falconry*, a term uſed when a hawk is ſtiff and choaked up. Dict. Ruſt.

GURGISTAN, in *Geography*, a town of Perſia, in the province of Farſiſtan; 15 miles S.E. of Jezdkaſt.

GURGONG, a town of Bengal; 12 miles N. of Roganatpour.

GURGOVATZ, a town of European Turkey, in the province of Bulgaria; 36 miles S.S.W. of Viddin.

GURGUDGAPOUR, a town of Hindooſtan, in Oude, on the left bank of the Ganges; 56 miles W.S.W. of Kairabad.

GURGULIO, in *Natural Hiſtory*, a name given by the ancients to a peculiar claſs of *ſcarabæi* or beetles; the characters of which are, that they have not a ſhort head like the other beetles, but a long one, forming a trunk in the manner of the common flies; in this the horns or antennæ of the creature are lodged. Theſe are divided by Liſter into two kinds; the one having only one joint in this promuſcis or ſnout, and that placed in or near the middle; the other having ſeveral placed near the end. Of the firſt kind we have only two ſpecies. Of the other kind, in which the promuſcis has ſeveral joints at the end, we have five ſpecies; and in all theſe, as well as in the former, the antennæ are inſerted in the promuſcis.

GURHEA, in *Geography*, a town of Bengal; 20 miles W. of Nagore.

GURIANO, a town of Africa; 40 miles S. of Tripoli.

GURIEL, a ſmall town of Aſia, bounded N. by Mingrelia, N.E. by Imiretta, E. by Turkiſh Armenia, and elſewhere by the Black ſea. It is governed by a prince, ſubordinate to the Turkiſh empire, and it reſembles Mingrelia in ſoil, climate, and the manners of its inhabitants. The chief place is Gonieh.

GURIRIBA, a harbour on the coaſt of Brazil. S. lat. 1°. W. long. 47°.

GURLAPAR, a town of Hindooſtan, in the Carnatic; 38 miles W. of Ongole.

GURMACKTISHER, a town of Hindooſtan; 40 miles E. of Delhi.

GURMADA, a town of Hindooſtan, in the circar of Cuddapa; 10 miles S. W. of Combam.

GURMAH, a town of Hindooſtan, in Bahar; 40 miles S. E. of Boglipour.

GURNADY, a town of Bengal; 45 miles S. E. of Mahmudpour.

GURNARD, in *Ichthyology*, a ſea fiſh, of which there are ſeveral ſpecies. See Trigla *Gurnardus*.

Gurnard, *Grey*. See Trigla *Gurnardus*.

Gurnard, *Red*. See Trigla *Cuculus*.

Gurnard, *Sapphirine*. See Trigla *Hirundo*.

Gurnard, *Streaked*. See Trigla *Lineata*.

Gurnard, *Yellow*, or *Dracunculus*. See Callionymus *Lyra*.

GURNET Point, in *Geography*, a cape or the N. coaſt of the Iſle of Wight. N. lat. 50° 45′. W. long. 1° 11′.

Gurnet *Bay*, a bay on the N. coaſt of the Iſle of Wight; two miles W. of Cowes.

GUROOKA, a town of Ruſſia, in the government of Ekaterinoſlaf, on the Ingul; 76 miles W.S.W. of Ekaterinoſlaf.

GURRAH, a town of Bengal; 64 miles N.N.W. of Midnapour.—Alſo, a town of Hindooſtan, in Oude; 27 miles S.E. of Lucknow.—Alſo, a town of Hindooſtan, and capital of a circar called "Gurrah Mundella," ſituated on both ſides of the Nerbuddah river; about 170 miles long, and from 40 to 80 broad. The town is about five miles N. of the river; 168 miles S.S.W. of Allahabad. N. lat. 23° 9′. E. long. 80° 23′.—Alſo, a circar of Hindooſtan, in the country of Allahabad.

GURRAMCONDA, a town of Hindooſtan, in Myſore; 73 miles N.E. of Bangalore. N. lat. 13° 47′. E. long. 78° 36′.

GURRAN Island, one of the ſmall Bahama iſlands. N. lat. 25° 14′. E. long. 77°.

GURRY, a town of Hindooſtan, in Oude; 60 miles W.S.W. of Kairabad.

Gurry-*But*, in *Rural Economy*, the name of a dung-ſledge in ſome places. It is a kind of ſliding cart, or barrow, that is much uſed in the county of Devon, of ſuch dimenſions as to be drawn by one horſe, though ſometimes made larger. They are ſuppoſed uſeful, by Mr. Marſhall, in drawing compoſts on fallows, as well as in moving earth, ſtones, rubbiſh, manure, &c. to ſmall diſtances. The ſides and ends are about 18 inches in height, and fixed; the loads being diſcharged by overturning them in the field. They are not by any means ſo convenient as ſmall ſingle horſe carts.

GURT, in *Mining*, ſignifies a ditch or trench for conveying water, otherwiſe a leat, goit, gool, &c.

GURTLER, Nicholas, in *Biography*, a learned Swiſs Proteſtant divine, was born at Baſil in the year 1654. He taught philoſophy and theology, in ſeveral German ſeminaries, with great reputation; and, in 1707, he was choſen profeſſor of theology in the univerſity of Francker, in Frieſland. He died at that place in 1711. His principal works are "Lexicon Linguæ Latinæ, Germanæ, Græcæ, et Gallicæ;" "Hiſtoria Templariorum;" "Origines Mundi;" and "Inſtitutiones Theologicæ."

GURTNAMACKIN, in *Geography*, a river of Ireland, in the county of Galway, which dips ſeveral times, and, after a concealed courſe of two miles, riſes on the beach below high-water mark, and diſcharges itſelf among the rocks in the bay of Kinvarra.

GURYA, a town of Bengal; 24 miles N. of Dinagepour.

GURYMURRY, a town of Aſſum; 45 miles E. of Rangamutty.

GUSDAL, a town of Norway, in the dioceſe of Chriſtiania; 85 miles N. of Chriſtiania.

GUSHAL. See Kushal.

GUSINO Nos, a cape on the W. coaſt of Nova Zembla. N. lat. 73° 30′. E. long. 51° 14′.

GUSIPOUR, a town in Bengal; 36 miles N.E. of Dacca.

GUSSET, in *Heraldry*, denotes one of the abatements of honour, appropriated to laſcivious, effeminate, or wanton perſons. It is formed of a line drawn from the dexter or ſiniſter angle of the chief, and deſcending diagonally to the chief point; from whence another line falls perpendicularly upon the baſe.

GUSSIAH, in *Geography*, a town of Bengal; 30 miles W. of Iſlamabad.

GUSSOLA, a town of Italy, in the department of the Po; 15 miles E.S.E. of Cremona.

GUSSOLENGO, a town of Italy, in the Veroneſe, on the Adige; ſix miles W.N.W. of Verona.

GUST. See Taste.

Gust is uſed by Bracton, and other ancient writers, for ſtranger or gueſt, who lodges with a perſon the ſecond night. See Uncuth.

In the laws of St. Edward, publiſhed by Lambard, the word is written *geſt*.

Gust denotes a ſudden and violent ſquall of wind, burſting from the hills upon the ſea, ſo as to endanger the ſhipping near the ſhore. Theſe are peculiar to ſome coaſts, as thoſe of South Barbary and Guinea.

GUSTAF, in *Geography*, a ſmall iſland in the Baltic, near the coaſt of Finland, in which is a town; 28 miles W. of Abo. N. lat. 61° 35′. E. long. 21° 12′.

Gustaf *Adolphs*, a town of Sweden, in Tavaſtland; 57 miles N.E. of Tavaſthus.

GUSTAN, a town of Perſia, in Couheſtan; 45 miles S.S.W. of Tabas-Kiliki.—Alſo, a town of Hindooſtan, in Lahore; 8 miles N.W. of Rotas.

GUSTATION. See Tasting.

GUSTATORIUS, in *Anatomy*, from *guſto*, to taſte; the branch of the inferior maxillary nerve, in which the ſenſe of taſte is conſidered to reſide. See Nerve.

GUSTAVIA, in *Botany*, ſo called by Linnæus, in compliment to Guſtavus III. king of Sweden, who graciouſly beſtowed upon him a large collection of Surinam plants, preſerved in ſpirits, which afforded the materials of his diſſertation entitled *Plantæ Surinamenſes*, publiſhed at Upſal in June 1775, and reprinted by Schreber, in

Amœn. Acad. v. 8. 249.—Linn. Suppl. 51. Schreb. 474. Willd. Sp. Pl. v. 3. 846. Mart. Mill. Dict. v. 2. Gærtn. t. 138. (Pirigara; Aubl. Guian. v. 1. 487. Juſſ. 326. Lamarck. Illuſtr. t. 592.)—Claſs and order, *Monadelphia Polyandria.* Nat. Ord. *Myrti*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, either a ſimple wavy border, or furniſhed with ſix acute teeth, permanent. *Cor.* Petals ſix or eight, ſlightly connected, or ſomewhat imbricated at the baſe, obovate, concave, regular, nearly equal, finely downy. *Stam.* Filaments very numerous, ſhorter than the petals, connected at the baſe into a broad deep cup; anthers terminal, erect, verſatile, oblong, quadrangular, obtuſe, opening by two pores near the top. *Piſt.* Germen turbinate, depreſſed, bordered with the calyx, ſomewhat umbilicated; ſtyle conical, very ſhort, permanent; ſtigma obtuſe. *Peric.* Berry nearly globular, dry, of four, five or ſix cells, crowned with the remains of the calyx. *Seeds* ſeveral in each cell, horizontal, oblong, thick, angular, each attached by a thick folded ſtalk.

Eſſ. Ch. Calyx waved or toothed. Petals ſix or eight. Berry inferior, dry, of ſeveral cells. Seeds numerous, ſtalked, ſtyle ſimple.

1. G. *auguſta.* Linn. Suppl. 313. Pl. Surin. n. 87. Am. Acad. v. 8. 259. t. 5. (Pirigara tetrapetala; Aubl. Guian. v. 1. 487. t. 192. Japarandiba; Marg. Braſ. 109. f. 1. Piſ. Braſ. 121. f. 2.)—Calyx waved, ſcarcely toothed. Petals eight.—Native of Surinam and Cayenne, bearing flowers and fruit in September. *Stem* woody, branched, twenty or thirty feet high. The wood is pliant, fœtid when cut, ſerving chiefly to make hoops. *Leaves* a foot or more in length, elliptic-oblong, or ſomewhat obovate, acute, ſmooth, veiny, ſlightly ſerrated, nearly ſeſſile; the lowermoſt whorled, the others alternate. The veins ſtand nearly at right angles with the rib, and are connected by innumerable reticulations. *Flower-ſtalks* terminal, two or three together, much ſhorter than the leaves, ſimple, ſingle-flowered, with a pair of very ſhort claſping bracteas about the middle. *Flowers* very handſome, and fragrant like a lily, three or four inches broad, their petals white, veined with red at the baſe. *Anthers* yellow. *Fruit* reddiſh, with four longitudinal furrows, and four cells.—Aublet having miſtaken the four outer petals for a calyx, overlooking the true one, has given this ſpecies a very unſuitable name, *tetrapetala*, and has miſled thoſe who had no guide but his book, and who doubtleſs muſt have found no ſmall perplexity in making his deſcription ſquare with that of Linnæus.

2. G. *hexapetala.* (G. faſtuoſa; Willd. n. 2. Pirigara hexapetala; Aubl. Guian. v. 1. 490. t. 193. Lamarck Illuſtr. t. 592. f. *a.*)—Calyx with ſix triangular teeth. Petals ſix.—Found by Aublet in the great foreſts of Guiana, near the river of Sinemari, forty miles above its mouth. *Stem* about twenty-five feet high, its wood exhaling a cadaverous odour. *Leaves* obovate, pointed, ſlightly ſerrated, ſmooth, veiny, ſix inches long at the utmoſt. *Flower-ſtalks* about the ends of the branches, axillary, and terminal, ruſty, with a pair of ovate, nearly oppoſite bracteas about their middle. *Flowers* an inch and half broad. *Calyx* in ſix deep, equal, aſcending, triangular, acute, thick and coriaceous, ruſty teeth. *Petals* white, longer than the calyx. *Anthers* yellow. *Fruit* ſcarcely furrowed. Aublet deſcribes four cells, but there are five in his plate. We have drawn up our deſcription from one of his own ſpecimens, and ſee no reaſon to change his expreſſive ſpecific name, which the younger Linnæus meant to adopt.

Theſe magnificent plants, have not, to our knowledge, appeared, or at leaſt have not been preſerved in any garden, yet they are not too large to bloſſom in our ſtoves.

GUSTAVUS I., in *Biography*, ſurnamed *Ericſon*, or *Vaſa*, king of Sweden, born in 1490, was ſon of Eric Vaſa, and allied to the royal family. He was diſtinguiſhed in his youth as well for his learning as for his perſonal and mental accompliſhments, and on the invaſion of Sweden by Chriſtiern II. in 1518, Guſtavus was one of the ſix hoſtages whom he took back with him to Denmark. He attempted, as well by threats as by promiſes, to detach Guſtavus from the allegiance which he owed to his own country, but finding the young man ſteady to his principles, he gave orders to put him to death, though he was induced to change the brutal ſentence to impriſonment in the caſtle of Copenhagen. Eric Banner, a Daniſh nobleman, feeling compaſſion for his ſufferings, obtained leave to take him to a fortreſs in Jutland, of which he was the governor. Here he paſſed his time with ſome ſatisfaction, till he heard of the acceſſion of Chriſtiern II. to the Swediſh crown, when his heart burnt within him, and he was reſolved to uſe every effort in reſcuing his country from ſervitude. For this purpoſe he made uſe of the indulgence granted him, eſcaped from the chace and fled to Lubec. Here he attempted to engage the regency of the city in favour of the Swedes, but they refuſed to give countenance to a party then in the loweſt ſtate of humiliation. He ſoon found that the Danes were in queſt of him, and was obliged to aſſume the habit and manners of a peaſant, and in this diſguiſe he paſſed through all quarters of their army, in a waggon loaded with hay, till he reached an old family caſtle at Sudermania. Thence he diſpatched letters to his friends, hoping to rouſe them to an attempt for the recovery of their liberty, but meeting with little ſucceſs with the great, he next tried his fortune among the peaſantry. He viſited their villages by night, harangued them at their feſtive aſſemblies, but as often as he came to the main point, the object of his wiſhes, they uniformly told him it was in vain for them to attempt to better their condition, for peaſants they were, and ſo muſt continue, whoever wore the crown. The news of the maſſacre of the ſenators at Stockholm, in which he loſt the greater part of his friends and relations, plunged him into deeper affliction, and nothing but hope, which remains unextinguiſhable in a great ſoul, could have prevented him from abandoning his deſigns in deſpair. He had one reſource left, he determined to try the patriotiſm of the miners of Dalecarlia. He penetrated the mountains of that remote province, and was obliged, for a ſcanty ſubſiſtence, to enter himſelf as a common labourer at a mine. Here he wrought within the dark caverns of the earth, but the fineneſs of his linen led ſome of his fellow labourers to ſuſpect that he was a perſon of rank in diſguiſe. The rumour ſpread, and a neighbouring gentleman recognized him, to his aſtoniſhment, for an old univerſity friend. He perſuaded him to become an inmate of his houſe, but when Guſtavus made him the confidant of his bold deſign, his friend, who had been extolling the courage of his countrymen, and their abhorrence of the preſent tyranny, ſtarted with horror at the propoſal. By another perſon he had been nearly betrayed, and was obliged to conceal himſelf in the family of a neighbouring clergyman, on whoſe fidelity he could rely. By the advice of this friend Guſtavus repaired to Mora, where an annual feaſt of the ſurrounding peaſantry was held. There, as his laſt reſource, he diſplayed with ſo much native eloquence and energy the miſeries of his country and the tyranny of Chriſtiern, that the aſſembly inſtantly determined to take up arms, and adopted him as their leader. He immediately, while their hearts were glowing with an ardent patriotiſm, led them againſt the governor's caſtle, which they ſtormed, and took or deſtroyed the whole garriſon. Succeſs increaſed his forces, multitudes were ready to enliſt under the banners of the conquering hero, and Guſtavus, at the head of his little army, magnified by the fears of the enemy, overran the neighbouring provinces, defeated the archbiſhop of Upſal, and advanced to Stockholm. The infamous Chriſtiern, who had in vain attempted to ſtop his progreſs by the threat of maſſacring his mother and ſiſters, at length put his menace into execution. The cruel deed animated Guſtavus to a ſeverer revenge. He aſſembled the ſtates of Sweden at Wadſtena, where he was unanimouſly choſen adminiſtrator, and after a variety of military tranſactions, he laid ſiege to Stockholm. Chriſtiern was glad to withdraw into Germany, the Danes were completely expelled from Sweden, and Guſtavus was raiſed to the throne in the year 1523. Stockholm ſurrendered, and peace and order were reſtored to the long afflicted country. Guſtavus, when ſettled on his throne, appeared as the encourager of the reformation, which had begun to make its way in Sweden: he cauſed the ſcriptures to be tranſlated into the native language, which had the effect of expoſing the corruptions of popery to popular detection. At length, finding himſelf ſtrong enough, he openly profeſſed the principles of the reformed religion, and propoſed the reſumption of the crowned lands uſurped by the church, and the abolition of the ſale of indulgences. Theſe points he carried, but was much mortified by a revolt of his favourite Dalecarlians, who were zealouſly attached to all the ancient inſtitutions, and were artfully inflamed by the ſuggeſtions of the prelates. At different periods, diſputes aroſe between Guſtavus and the kings of Denmark, but the Swediſh king generally came off with advantage over his enemies; and, owing to a conſpiracy formed by the Lubeckers againſt Guſtavus, a war enſued, in which Denmark became an ally of Sweden. In 1542 Guſtavus made an alliance with Francis I. of France, and in the ſame year he had ſufficient addreſs to render the crown of Sweden hereditary in his own family, and to procure the nomination of his eldeſt ſon Eric as his ſucceſſor. The aſſembly who ſanctioned theſe important laws, took an oath for the maintenance of the reformed religion, without the toleration of any other, ſo that the change of religion was fully completed. The king, from this time, bent his attention upon the encouragement of learning, commerce, the arts and ſciences. He was deſirous of giving additional ſplendour and authority to his eldeſt ſon by ſome potent matrimonial alliance. With this view he cauſed propoſals to be made to Elizabeth, queen of England, but while the affair was in agitation, he was attacked by a ſlow fever, of which he died in the ſeventieth year of his age. He had been thrice married, and left ſeveral children. He has been regarded by hiſtorians as one of the greateſt and beſt of ſovereigns of his age and country.

Gustavus, Adolphus, king of Sweden, who, for a ſhort time, was regarded as the hero of Europe, was grandſon of Guſtavus Vaſa, and ſon of Charles IX. He was born in 1594, and received an education ſuitable to his birth and his expectations. At an early age he was diſtinguiſhed for enterpriſing valour. In 1611 he ſucceeded to the crown; and ſo great was his reputation that it was agreed that his minority ſhould terminate at an age earlier than the law had preſcribed, and the reins of government were freely committed to his hands. He gave an admirable ſpecimen of his judgment by chuſing, for his prime miniſter, the great chancellor Oxenſtiern, one of the ableſt men that ever filled the office in any kingdom. Guſtavus aſſembled the ſtates in 1612, and reſumed the crown-grants, in order to enable him to carry on the war in which Sweden was involved with Denmark, Ruſſia, and Poland. Having terminated this, as far as related to the firſt two powers, to his ſatisfaction, he began moſt earneſtly to attend to affairs of domeſtic policy, among which were the eſtabliſhment of a commercial ſociety at Stockholm, the regulation of the univerſity of Upſal, and the abridgment of the proceſſes at law. In 1629, after various ſucceſſes, he concluded a truce with the Poles, by which he was left in poſſeſſion of Memel, Pillau, Elbing, Brunſberg, and his conqueſts in Livonia. He now panted for greater glory in the field of war; and having taken offence at the conduct of the emperor, and being, at the ſame time, deſirous of protecting the Proteſtants in Germany, he entertained the project of invading the imperial dominions, and contending, on their own territories, with a power, at that period, at the ſummit of military glory. At firſt the idea was oppoſed by the ſenate; but the king's ardour and eloquence overcame all oppoſition. Every aid was voted him, and an army of ſixty thouſand men, with a large navy, were put at his diſpoſal. England and France favoured his deſign; and, in June, 1630, he embarked on this great enterpriſe. His early ſucceſſes ſtruck the emperor with conſternation, and cauſed the electors of Brandenburg and Saxony to form a treaty of alliance with him. It was now that Ferdinand found, to his coſt, that Guſtavus was not, as he had once denominated him, a king of ſnow, who would melt away as he approached the warm regions of the ſouth—but an avalanche, increaſing in ſize and force as he rolled onwards. As he advanced into Saxony he was attacked by the great Tilly, who was repulſed; and the elector gladly formed an alliance with Guſtavus for his own protection. Tilly had inveſted Leipſic; and, on the 7th of September, 1631, Guſtavus led the united Swediſh and Saxon army into the field. The monarch, diſtinguiſhed by a green feather in his hat, led the charge againſt the braveſt of the enemy, and he gained a complete victory, the conſequences of which were the ſubverſion of all the emperor's meaſures, and an acceſſion to the renown of Guſtavus, whom the Proteſtants now began to look upon as their great champion and deliverer. After this he reduced many places in that part of Germany, and, in 1632, prepared to enter Bavaria. Here he was ſome times ſucceſsful; but upon the death of Tilly, he was oppoſed by the celebrated Walleſtein, who had collected an army ſuperior to that commanded by the king of Sweden. For ſome time the two armies lay encamped oppoſite to each other. At length Guſtavus made an attack and was repulſed; and, on the 16th of November, on the plains of Lutzen, a great action commenced, in which Guſtavus was ſhot in the arm while fighting at the head of a body of cavalry. For ſome time he diſregarded the pain, but the loſs of blood rendered him faint; and he was preparing to leave the field, when he was killed by a ſquadron of imperial cuiraſſiers. He ſunk, however, in the arms of victory, in the 38th year of his age, leaving behind him an only child, the celebrated Chriſtina. He has been characteriſed as the terror of Auſtria, the hope of the Proteſtant religion, and the admiration of all Europe. Few ſovereigns have poſſeſſed more of the qualities of a truly great prince. He was frank, acceſſible, generous, humane, and juſt; a lover of learning, and the patron of learned men. He was a maſter in the art of war, to which he contributed ſeveral inventions and improvements. He made the Swedes the beſt ſoldiers in

Europe, and trained a ſet of generals who long maintained the national renown. Many of our own countrymen ſerved under him, and brought home, and practiſed the diſcipline which they had learned.

GUSTAVUS III. king of Sweden, ſon of Adolphus Frederic and Louiſa Ulrica, ſiſter of Frederic II. king of Pruſſia, was born on the 24th of Jan. 1746, and educated under the care of the celebrated count Teſſin. He ſucceeded his father in the year 1771; and at the period of his acceſſion to the throne, the ſupreme authority, in conſequence of abuſes which had crept into government, reſided in a tumultuous aſſembly of four orders, into which were admitted tradeſmen, and even peaſants. The ſtatutes were ſigned by the king, and the ordinances iſſued in his name, yet he poſſeſſed no negative; and however odious particular meaſures might be to him, ſtill, if they were preſſed in the diet, they were regarded as laws; and, ſhould he refuſe to ſign the decrees, his name was affixed by a public ſeal. The king was, in ſhort, only an inſtrument in the hands of one or two great parties, which divided and governed the kingdom among themſelves. Guſtavus III. reſolved to emancipate himſelf and the kingly office from this ſtate of degradation, or to periſh in the attempt. He was a wary, as well as a bold and determined man; and he concerted meaſures ſo dexterouſly, that the plan was carried into execution in the courſe of a few hours, and without the leaſt bloodſhed. An account of this revolution will be found under the article SWEDEN. The king himſelf drew up the form of the new conſtitution, by which he had the power of convoking and diſſolving the aſſembly of the ſtates as often as he pleaſed. He had the ſole power over the army, navy, and finances. In caſe of an invaſion, or other urgent neceſſity, he might impoſe taxes of his own accord; and the diet could deliberate on no ſubject except thoſe which were firſt propoſed by the king. By theſe, and other articles of a ſimilar tendency, did Guſtavus become one of the moſt deſpotic monarchs, from being the moſt limited and even abject of ſovereigns. The power thus obtained, it has been generally admitted, was employed for the good of his ſubjects. He took care that the law ſhould be adminiſtered with ſtrict impartiality to the poor and to the rich; and made a ſevere example of ſuch judges as were proved to have made the ſeat of juſtice the ſource of venality. He was the encourager of commerce, was a liberal and enlightened patron of learning and ſcience, and laboured ſtrenuouſly to introduce into his kingdom the moſt important improvements in agriculture that had been adopted in other countries. Having attended to the arts of peace, he began to conſider how he could beſt provide for the reſtoration of his fleet and army, which he found in a feeble ſtate. He accordingly introduced new and very ſalutary regulations in both departments; he augmented the pay of the officers, and provided for the maintenance of thoſe who had ſerved the ſtate, when they were, by age, or other infirmities, incapable of farther public duties. Deſirous of diffuſing learning among his ſubjects, he gave every encouragement to the purſuit of the arts and ſciences, and to the belles lettres. He procured a good tranſlation of the bible by eminent ſcholars; and he invited men of talents to employ their pens in the production of elementary books on all ſubjects. Without following Guſtavus in the wars in which he engaged, and which will be more conveniently noticed in the article already referred to, we may obſerve, that though he was extremely popular among the lower claſſes, he met with great oppoſition from the nobility, the heads of whom were ſo implacable in their reſentment, on account of the revolutions, that no favours, preferments, nor honours, ſeemed capable of curing their animoſity. In the diet which met in January 1789, the uſual, and, in general, unmeaning, congratulations and compliments were paſſed; but it was ſoon perceived that the nobles were not only far from being diſpoſed to coincide with the king's views, but that they paid but little regard to the terms on which they ſtood with him. They ſeemed anxious to effect a counter revolution; they took every opportunity of thwarting his meaſures, and of treating with contempt thoſe who were particularly favoured by his majeſty. He had appointed count Lowenhaupt to be marſhal of the diet; whom they ſo groſsly inſulted that he abſented himſelf from his duty. In February the king, in perſon, appeared in the aſſembly, and demanded ſatisfaction for the inſult offered to his marſhal. A violent altercation enſued between his majeſty and the nobles, and the latter roſe in a body and quitted the aſſembly, leaving the king and the other ſtates together. For three days Stockholm was in a ſtate of confuſion, but on the fourth, *viz.* on the 20th of February, the houſes of all the nobility were ſurrounded at the ſame inſtant, and the nobles themſelves being arreſted were ſent priſoners to the caſtle of Frederickſhoff. From this moment Guſtavus aboliſhed the ſenate and ſupplied its place by a new court, which was endowed with large powers, but ſubject entirely to the king. The nobles continued ſtill diſcontented, and a conſpiracy was planned againſt Guſtavus under his own roof; he had entered into the alliance that was formed againſt the revolutionary government of France; and to raiſe an army which he was to lead in perſon, to co-operate with the emperor and king of Pruſſia, he was obliged to negociate large loans, and to impoſe on his ſubjects heavy taxes. The nobles took advantage of that circumſtance to prejudice the minds of many of the people againſt the ſovereign; who, with all his defects, had laboured ſo long for their good. On the 16th of March 1792, he received an anonymous letter, warning him of his immediate danger from a plot that was made to take away his life, requeſting him to remain at home, and to avoid balls and other aſſemblies for a year, and aſſuring him, that if he ſhould go to the maſquerade for which he was preparing, he would be aſſaſſinated that very night. The king read the note with contempt, and at a late hour entered the ball room. After ſome time he ſat down in a box by count d'Eſſen, and obſerved that he was not deceived in his contempt for the letter, ſince had there been any deſign againſt his life, no time could be more favourable than that moment; he then mingled, without apprehenſion, among the crowd, and juſt as he was preparing to retire, in company with the Pruſſian ambaſſador, he was ſurrounded by ſeveral perſons in maſks, one of whom fired a piſtol at the back of the king, and lodged its contents in his body. A ſcene of dreadful confuſion immediately enſued. The conſpirators, amidſt the general tumult and alarm, had time to retire to other parts of the room, but one of them had previouſly dropped his piſtols and dagger cloſe by the wounded king. A general order was given to all the company to unmaſk, and the doors were immediately cloſed, but no perſon appeared with any diſtinguiſhing marks of guilt. The king was conveyed to his apartment, and the ſurgeon, after extracting a ball and ſome ſlugs, gave favourable hopes of his recovery. The reports of his medical attendants ſoon proved to be fallacious, and on the 29th of March he expired, and on opening his body there were found within the ribs a ſquare piece of lead and two ruſty nails. The king had by his will appointed a council of regency, but convinced, by recent experience, how little dependance was to be placed on the attachment of his nobles, and aware of the neceſſity of a vigorous government, in times of ſuch difficulty and danger, he appointed his brother, the duke of Sudermania, ſole regent, till his ſon, then a minor, ſhould attain the age of eighteen years. In his dying moments he deſired that all the conſpirators, except the perſon who perpetrated the bloody deed, might be pardoned. Guſtavus III. was a prince of excellent talents. To a great fund of natural eloquence, he united the moſt inſinuating manners, and, it is ſaid, that the extent of his knowledge and the ſolidity of his judgment excited the admiration of thoſe who had acceſs to his converſation. He had ſeen much of the world, was well acquainted with mankind, and poſſeſſed ſufficient ſagacity to profit by his obſervations, and to apply them to the purpoſes of government. Guſtavus was a fine writer, of which there were abundant proofs in the private letters and memorials drawn up by his own hand, as well as in different pieces that have been printed, which, though anonymous, were known to be his, particularly one, the object of which was to expoſe the licentiouſneſs of the private life of Catherine II., and the arrogance of her inordinate ambition. He was author of ſeveral plays, written for the national theatre, which were well received, and the moral ſentiments of which are worthy of the prince and legiſlator.

GUSTEN, in *Geography*, a town of Germany, in the circle of Anhalt Cöthen, on the Wipper; 12 miles W. of Cöthen. N. lat 51° 50. E. long. 11° 45′.

GUSTI, a town of Perſia, in the province of Farſiſtan; 75 miles N. of Schiras.

GUSTO, in *Painting* and *Sculpture*, a word adopted from the Italian, and ſignifying the taſte or ſtyle in which a work of art is executed or conceived. Although in its native idiom it is uſed both for good and bad ſtyle, for the grand or the mean; with us it is ſeldom, if ever, employed, when the ſtyle of a work is of an inferior order. It is only when it juſtifies the higheſt approbation, and we can with propriety couple another Italian word with it, and deem it of the *grande guſto*, that cuſtom authoriſes the uſe of it in this country.

The ſtyle of Michael Angelo is in the guſto grande, wherein nature is enlarged upon, is inflated, and in danger of being caricatured, if the artiſt is not of the firſt claſs. The works of Goltzius the painter, who endeavoured to uſe this ſtyle and did not feel it, but only made bad and diſtorted imitations of M. Angelo, are a ſufficient proof how near the abyſs of affectation the grande guſto verges: where it is purely attained, the art is exalted by it, and nature preſented to the eye and the mind with inconceivably far greater force than in its ordinary appearances.

GUSTROW, in *Geography*, a town of the duchy of Mecklenburg, ſituated on the river Nebel, famous for its beer, which forms the principal article of its trade; 16 miles S. of Roſtock. N. lat. 53° 48′. E. long. 12° 3′.

GUSUM, a town of Sweden, in Eaſt Gothland; 22 miles E.S.E. of Nordkioping.

GUT-Tie, in *Rural Economy*, the name of a diſeaſe of the bowel kind, principally in calves that have been caſtrated, and which by ſome is ſuppoſed the conſequence of an improper method of performing the operation, a ſtoppage being produced in the inteſtines, the reſult of which is often mortification, and of courſe the ſpeedy deſtruction of the animal. It is aſſerted to be a diſeaſe very common in the county of Hereford.

Beſides the ſymptoms of an obſtruction in the bowels, there is a diſcharge of bloody mucus that is attended with great heat and fever. The animal kicks at its belly, lies down and groans. It is found ſometimes to attack the animals when they are fully grown. In the view of removing the obſtruction in the bowels, ſtrong ſaline laxative medicines have been employed with oil. And it is probable that caſtor oil would be found beneficial in the ſame intention. But in the diſtrict noticed above, it is uſual to have the following operation performed in order to the removal of the complaint. An inciſion is made in a perpendicular manner, four inches below the third vertebra of the loins, over the paunch or ſtomach, introducing the hand to diſcover the affected part, and remove the ſtring that is the cauſe of it, the beaſt being ſupported during the time in an upright ſituation.

GUTA, in *Geography*, a town of Hungary, in the iſland of Schit, near the conflux of the Waag and the Danube; 30 miles S.E. of Preſburg.

GUTENHAG, or Dobrodcin, a town of Sileſia, in the principality of Oppeln; 21 miles E. of Oppeln. N. lat. 50° 42′. E. long. 18° 28′.

GUTERA, a town of Sicily, in the valley of Mazara; 20 miles N. of Girgenti.

GUTIGUI, a town of Hindooſtan, in Viſiapour; 20 miles N. of Anamſagur.

GUTKIRAS, a town of Aſiatic Turkey, in the government of Sivas; 10 miles N.W. of Amaſia.

GUTLAND, a town of Pruſſia, in Pomerelia; 15 miles S.S.E. of Dantzic.

GUTS. It is obſerved, in the diſſections of many of the beaſts of prey, that the guts are very remarkably ſhort in compariſon of thoſe of other animals. The lion and the lynx are of this number; the guts being in theſe only of three times the length of the body. This argues ſpeedy digeſtion, and a great voracity of the creature. See Intestines.

GUTTA, a Latin term for what in Engliſh we call *Drop*.

Gutta, in *Geography*, a town of Bengal; 20 miles S.W. of Doeſa.

Gutta *Roſacea*, or *Roſea*, in *Medicine*, literally ſignifying *roſy drop*, a term applied to thoſe eruptions of red pimples which occur in the face, are very ſlow in their progreſs and changes, and continue to diſfigure the countenance frequently during a long courſe of years. The cauſe of the eruption is, in ſome inſtances, altogether inſcrutable; the diſeaſe appears to originate from a peculiar ſtate of the conſtitution, which is occaſionally obſerved to be hereditary. Moſt commonly, however, it is connected with a morbid condition of the liver or ſtomach, or is excited by the direct operation of certain articles of food or drink, taken under particular circumſtances of the body. The gutta roſea is a frequent occurrence in drunkards, and is uſually conſidered as indicative of the diſeaſe in the liver, which the habit of ſpirituous or vinous potation commonly induces. This is the *gutta roſea hepatica* of Dr. Darwin. But it often alſo ariſes from drinking cold water, eating raw turnips, or other cold vegetables, when the perſon is much heated and perſpiring after exerciſe. The ſtomach becomes painful with indigeſtion and flatulency, and in a day or two an eruption appears on the face, and continues with ſome relief to thoſe ſymptoms, but not with entire relief; as both the pimpled face and indigeſtion are liable to continue even to old age. This conſtitutes the *gutta roſea ſtomatica* of Dr. Darwin. (See his Zoonomia, Claſs II. i. 4, and IV. i. 2.) The colour of the eruption in the latter ſpecies is leſs deep than in the hepatic ſpecies; and the preſence of the ſtate of indigeſtion, as well as the patient's known habits in reſpect to drinking, may aſſiſt us in diſcriminating the nature of the diſorder.

The cure of this eruption, from whatever cauſe it may have ariſen, is extremely difficult; and local applications to the affected part, or internal remedies, are often equally inert. Where the eruption is ſympathetic of diſeaſed liver, the reſult of intemperance, it is obvious, that the firſt ſtep of the cure muſt be to correct the exciting cauſe, and then to uſe gentle laxatives, eſpecially of the mercurial claſs, with a view to reſtore the hepatic functions. And, in like manner, when the complaint is accompanied by obvious derangement of the ſtomach and bowels, medicines, which the nature of that derangement may indicate, muſt be reſorted to: light and nutritious diet, as of milk, and the farinaceous vegetable matters; the warm bath; exerciſe; the mineral waters, &c. will form the auxiliary part of the plan of treatment. Various topical applications are recommended by different practitioners, and, as the unſightlineſs of theſe ſpots on the face excites an uncommon anxiety in the patient to get rid of them, the herd of advertiſing quacks have never failed to find an abundant harveſt in the ſale of their various lotions and coſmetics. Theſe generally conſiſt of ſolutions of ſome of the metallic ſalts, eſpecially of thoſe of lead, zinc, and mercury, or of ſimple ſaponaceous mixtures. It cannot be doubted, that of the former ſome occaſionally ſucceed, though they much more frequently fail, and one will ſometimes prove uſeful, where others have been altogether inefficacious, when no ſatisfactory account of theſe various operations can be given. It has been alleged, however, that the ſudden removal of theſe ſpots by ſtrong metallic lotions has frequently been followed by other diſeaſes of more danger. Dr. Darwin has related a few inſtances of the ſuppreſſion of the eruption by ſaturnine lotions, and even by an alum poultice, in which epilepſy and palſy ſpeedily enſued. This phyſician affirms, that bliſtering the face all over the eruption, beginning with a part only, has appeared to him to ſucceed better than any other mode of practice. He recommends, alſo, the taking of five grains of rhubarb, and a quarter of a grain of emetic tartar every night for many weeks. The various herbs, to which the older phyſicians attributed the qualities of correcting the morbid humours, on which they ſuppoſed theſe eruptions to depend, and of purifying the ſkin, ſuch as fumitory, ſuccory, &c. are now conſidered as poſſeſſing no efficacy: and the various complicated ointments and lotions which they employed, perhaps receive as much praiſe as is due to them, when they are called harmleſs. See an abundant variety of theſe in Turner's Treatiſe on Diſeaſes of the Skin, part ii. chap. 1.

GUTTA *Serena*, or *Amauroſis*, denotes, in *Surgery*, a ſpecies of blindneſs, in which the ſenſibility of the retina and optic nerve is either partly, or entirely loſt. It is a diſorder, the exiſtence of which is made out with much more difficulty than is commonly imagined, when there is no viſible defect in the eye, and we have nothing more than the patient's aſſurance that he has loſt the faculty of ſeeing things. Almoſt all the palpable ſymptoms of the complaint are fallacious, and not to be truſted. It is uſually aſſerted, that the pupil of an eye, affected with amauroſis, is preternaturally dilated and motionleſs, while it ſtill retains its ordinary tranſparency and blackneſs. This is, indeed, the ſtate of numerous caſes; but not of all. In the moſt complete and incurable gutta ſerena, the pupil is not unfrequently of its natural ſize, and occaſionally it is even preternaturally ſmall and contracted. Although it is generally incapable of motion in the preſent diſeaſe, this is not invariably the caſe. In certain inſtances, the iris not only poſſeſſes its natural motion, but is capable of moving with uncommon activity, ſo that, in a very moderate light, it will contract in an unuſual degree, and nearly cloſe the pupil.

Nor can any certain concluſions be drawn from theſe various conditions of the pupil in the gutta ſerena, with regard to the particular nature and character of the complaint. For inſtance, the moveable or immoveable ſtate of the pupil can neither be conſidered as a favourable or unfavourable circumſtance in the caſe. Sometimes an amauroſis may be cured which is attended with a pupil extraordinarily dilated, and entirely motionleſs. Sometimes the diſorder proves incurable, notwithſtanding the pupil is of its proper ſize, and capable of motion. There are likewiſe examples, in which the pupil recovers its moveableneſs in the courſe of the treatment, although nothing will ſucceed in re-eſtabliſhing the ſight.

The pupil of an eye, affected with amauroſis, ſeldom exhibits the clear ſhining blackneſs, which is ſeen in a healthy eye. In general, it is of a dull, glaſſy, horn-like blackneſs, which alone is frequently enough to appriſe the experienced practitioner of the nature of the diſeaſe. Sometimes the colour of the pupil inclines towards green. On other occaſions, this opening ſeems thick, white, and cloudy, ſo that the complaint might eaſily be miſtaken for the beginning of a cataract. This error, into which unexperienced ſurgeons are liable to fall, may eaſily be avoided, by paying attention to the following circumſtances. The miſty appearance is not ſituated cloſe behind the pupil, in the poſition of the cryſtalline lens; but frequently is manifeſtly deeper in the eye. Nor is it in proportion to the loſs of ſight, the patient being quite blind, while the miſty appearance is ſo trivial, that, if it aroſe from an opacity of the cryſtalline lens, it could at moſt only occaſion a ſlight weakneſs and obſcurity in viſion. It muſt be acknowledged, that it is more difficult to avoid miſtake, when a beginning amauroſis is accompanied with this cloudineſs in the eye, and conſequently, when the degree of blindneſs ſeems to bear ſome proportion to the degree of miſtineſs in the pupil. However, in this caſe, the true nature of the diſeaſe may generally be known by conſidering, that, though the patient's ſight is weak, it is not rendered faulty by an appearance of miſt before the eyes, which latter circumſtance is always complained of by perſons who are beginning to be afflicted with cataracts, not to mention that there are uſually preſent ſeveral other ſymptoms which excluſively belong to the gutta ſerena.

Sometimes the interior of the eye, a good way behind the pupil, ſeems quite white. A concave white ſurface may be remarked, upon which blood-veſſels may be plainly ſeen ramifying. In particular inſtances this white ſurface extends over the whole back part of the eye; while, in other caſes, it only occupies a half or a ſmall portion of it. It is believed that the retina itſelf is the occaſion of this appearance, and indeed, this ſeems to be the real caſe. The appearance, which is at firſt miſty, and at length quite white, occupying a deep ſituation in the eye, ariſes from the retina, which, in this caſe, is deprived of its natural tranſparency, and becomes externally viſible. See Haller, Element. Phyſiol. tom. v. p. 469.

According to Richter, a degree of ſquinting is the only one ſymptom, which is inſeparable from amauroſis. This obliquity of ſight has alſo been particularly noticed by Mr. Hey in the Medical Obſervations and Inquiries. The patient not only does not turn either eye towards any object in ſuch a manner, that the object looked at is in the axis of viſion; but he alſo does not turn both his eyes towards the ſame thing. This, ſays Richter, is the only ſymptom which we can truſt in thoſe examples, in which confidence ſhould not be put in the mere aſſurance of the patients, that they cannot ſee.

The gutta ſerena originates with very various ſymptoms, and in exceedingly different ways. Richter thinks it probable that this variety, attendant on the beginning of the diſeaſe, depends upon ſome difference in the cauſe of the complaint, and indicates the propriety of having variety in the plan of treatment. Sometimes the patient loſes his ſight quite ſuddenly; while, in other inſtances, the power of ſeeing diminiſhes ſo ſlowly, that months and even years elapſe before the diſeaſe attains the worſt degree. Sometimes the gutta ſerena commences with ſeveral ſymptoms, which ſeem to betray an increaſe of ſenſibility in the eye, or ſome irritation affecting this organ. In moderately light places, the patient can diſcern things very well; but in a great light he is not able to ſee at all. The eye is ſometimes ſo ſenſible, that a ſtrong light will make it weep, and become painful. Patients of this deſcription ought always to wear a ſhade, however bad their ſight may be. Sometimes the gutta ſerena originates with ſymptoms of weakneſs and diminiſhed irritability. The ſight is cloudy, and the patient finds that he can ſee better in a light than a dark ſituation. He feels as if ſome dirt, or duſt, were upon his eyes, and conſequently often wipes them. His power of viſion is greater after meals than at the time of faſting. His ſight is always for a ſhort time plainer after the external uſe of tonic remedies, ſuch as hartſhorn, cold water, &c. Richter informs us of a perſon who was nearly quite blind, but was always able to ſee very well for the ſpace of an hour, after drinking champaigne wine. He alſo mentions a woman who had entirely loſt her ſight, who was in the habit of having it reſtored again for half an hour, whenever ſhe walked a quick pace up and down her garden. This author likewiſe acquaints us with the caſe of a lady who had been blind for ſome years, but experienced a ſhort recovery of her ſight on having a tooth extracted.

Sometimes, as Richter obſerves, the ſymptoms appear to indicate a preternatural accumulation of the humours of the eye. The patients complain of a tenſion in the eyeball, which is frequently very irkſome. As often as this ſenſation is exceedingly great, the eye-ſight is weak, and whenever it ſubſides, the patient is again able to ſee better. The eye-ball feels hard, and indeed frequently ſeems ſwollen, ſo that the ſtate of the organ ſomewhat reſembles that which takes place in the hydrophthalmia. When a cataract is complicated with a gutta ſerena, the vitreous humour is ſometimes found, in operating for the firſt diſeaſe, to be preternaturally thin, the eye being, as it were, in a dropſical ſtate. The blood-veſſels of the conjunctiva are occaſionally enlarged, the patient ſees black ſpecks, net-like appearances, ſtreaks, ſnake-like figures, &c. It ſeems as if, in this caſe, the blood-veſſels of the retina and choroides were in the ſame varicoſe ſtate as thoſe of the conjunctiva, ſo as to make preſſure upon the firſt of theſe membranes. That the veſſels are thus dilated is rendered probable by the bleeding, which is apt to occur in the eye in operating for cataracts complicated with the gutta ſerena.

In certain inſtances the eye ſeems to be acted upon by ſome kind of irritation; the patients ſee ſeveral moving objects of different colours, particularly ſhining, fiery ſpots, flames, and rays of light. Sometimes amauroſis ariſes after violent inveterate ophthalmies and head-aches. Some patients, before the diſeaſe, are repeatedly afflicted with catarrhs, which ceaſe as ſoon as the gutta ſerena is formed. Richter ſtates that the noſe then becomes unuſually free from moiſture. Some patients of this kind have been known to regain their ſight for a ſhort time, on a copious diſcharge of mucus ſpontaneouſly taking place from the noſe. Paying diligent attention to theſe various circumſtances during the origin of the diſorder, ſays Richter, will often be of great aſſiſtance to the practitioner in chooſing a method of treatment, when all other indications are abſent.

The diſeaſe commonly makes its attack upon both eyes at once, and even in thoſe occaſional inſtances in which only one is deprived of ſight, the other rarely continues for a long time ſound. The diſorder generally extends over the whole eye; but ſometimes only a half of the organ is affected, the caſe being then named *amauroſis dimidiata.* In the firſt example, the patient is quite blind; in the ſecond, he can diſcern the half of objects. Sometimes the malady ſeems to be confined to a ſingle little ſpot in the eye, in which caſe the patient is conſcious of having before the retina an immoveable black ſpeck. It is to this particular inſtance that ſome pathologiſts apply the term *ſcotomia.* Alſo patients, who are wholly blind, ſometimes have a ſmall part of the retina, which is ſtill ſuſceptible of the impreſſion of light, and is uſually ſituated towards one ſide of the eye. (See Hey in Medical Obſervations and Inquiries, vol. v.) Richter notices that in one man, who was in other reſpects entirely bereft of viſion, this ſenſible part was ſituated obliquely over the noſe, and ſo ſmall, that it was always a conſiderable time before its ſituation could be diſcovered; he adds, that it was alſo ſo ſenſible, as not only to diſcern the light, but even the ſpire of a diſtant ſteeple. According to this author, it is the centre of the eye which ſeems to be the firſt and moſt ſeriouſly affected in the gutta ſerena. Hence the generality of patients who have a beginning, imperfect amauroſis, can always ſee objects which are to one ſide better than thoſe which are immediately before them.

The gutta ſerena is ſometimes an intermittent diſorder, now making its appearance, and now ſubſiding again, repeatedly. In certain examples, as Richter remarks, the diſorder prevails at particular times, commonly all day till a certain hour, ſometimes from one day till the next, and occaſionally, at a ſtated time every month. The attacks of the complaint ſometimes take place at indeterminate periods. Now and then, ſome other morbid affection is aſſociated with the impairment of ſight. Richter mentions a man who became blind at twelve o'clock in the day, when the upper eyelid uſed alſo to hang down, in conſequence of being affected with paralyſis. The attack always laſted twenty-four hours. On the following day, at twelve o'clock, the ſight uſed to return, and the patient then ſuddenly regained the power of raiſing the eyelid. He would continue thus able to ſee for the ſpace of the next twenty-four hours. Whenever he took bark, the diſeaſe was regularly doubled, that is to ſay, the man then alternately remained blind forty-eight hours, and afterwards retained the power of ſeeing things only twenty-four. In another patient cited by this experienced ſurgical writer, the aqueous humour during the blindneſs always became diſcoloured, whitiſh, and turbid, but regularly recovered its tranſparency, on the ceſſation of the attack. Richter ſtates that the periodical amauroſis commonly depends upon ſome gaſtric irritation, the ſtimulus of worms, or irregularity in the menſtrual diſcharge. Sometimes a periodical blindneſs is the form in which a lurking intermitting fever affects a patient; and ſometimes it is plainly a ſymptom of a decided ague, the patient becoming affected with an ordinary intermittent, and blind during every paroxyſm; but always regaining his ſight as ſoon as each fit is over.

There cannot be any doubt that in the gutta ſerena, the immediate organ of ſight is principally affected, the proximate cauſe of that diſeaſe conſiſting of a paralyſis of the optic nerve and retina. That ſuch is the nature of the diſorder is ſhewn to be in the higheſt degree probable, by the blindneſs being occaſioned by ſuch cauſes as produce paralytic affections of other parts, and by its frequently being curable by the ſame remedies as are known to relieve paralyſis in other ſituations.

The manifold ſhadowy, black, and coloured objects, and ſhining fiery appearances which hover before the eyes of patients labouring under a gutta ſerena, alſo make it ſeem likely that the cauſe of the diſeaſe chiefly affects the retina and optic nerve. The pale white appearance which is frequently obſervable at the bottom of an eye afflicted with amauroſis, can only be derived from the retina, of which membrane it indicates ſome diſeaſe. Sometimes indeed, ſays Richter, the optic nerves have actually been found in an unnatural ſtate, as for inſtance, ſhrivelled and conſiderably ſhrunk. He ſtates that aqueous veſicles, earthy concretions, and other ſorts of indurations, have been diſcovered near the optic nerves, in diſſecting ſubjects, who, before their deceaſe, had been blind with amauroſis. The thin ſtate in which the vitreous humour is ſometimes found in caſes of gutta ſerena, is to be regarded as an effect, and not the cauſe of the diſeaſe. Richter's Anfangſgründe der Wandarzneykunſt, vol. iii. chap. 14.

Before treating of the different cauſes of the gutta ſerena, it ſeems proper to detail the ordinary ſymptoms of the diſeaſe. When the patient is firſt attacked, his ſight gradually grows weaker, he feels as if a gauze, or ſpider's web were drawn over his eyes, and imagines he ſees a white ſurface ſtudded with black ſpecks, which he endeavours to wipe away. The pupil of the eye gradually loſes its brilliancy, and diſtends itſelf much beyond the natural ſize; and if the patient's eye be cloſed, the upper eyelid gently rubbed, and then ſuddenly opened to the light, the pupil will contract itſelf very little, if at all. The ſight grows weaker and weaker, ſpectacles and convex glaſſes are of no ſervice, and the patient, generally ſpeaking, ſees worſe in the open daylight, than in a dark ſituation. While the patient is at all conſcious of the impreſſion of the rays of light, or while a certain power of ſeeing ſtill continues, the diſeaſe is called the *imperfect* or *incomplete amauroſis*; but when the patient is wholly inſenſible of the ſtimulus of light, the diſorder is termed *perfect* or *complete*.

Schmucker remarks, that although the *complete* gutta ſerena is generally a gradual diſeaſe, there are caſes in which it comes on without being preceded by the above-mentioned circumſtances. Theſe caſes, he ſays, have frequently fallen under his inſpection, and been more eaſy of cure, than when the affliction has taken place in a more gradual way. In ſuch inſtances, the ſight is totally loſt, the patient can diſtinguiſh no object whatever, the pupil of the eye is uncommonly enlarged, and if the eye be rubbed, and then opened, and expoſed to the light, that opening in the iris remains fixed, and incapable of contraction. A lighted candle may even be held to the patients' eyes, without exciting ſenſation. The pupil now loſes its ſhining black gloſs, and grows pale, ſo that a ſkilful practitioner can perceive the difference, without being near the patient. Such perſons uſually have an unhealthy and timid look. See Schmucker's Vermiſcht. Chirurgiſch. Schriften.

According to Richter, the remote cauſes of gutta ſerena may be properly divided into three principal claſſes, the differences in which indicate three general methods of treatment.

This author obſerves, that the firſt claſs of cauſes ſeem to depend upon an extraordinary plethora and turgidity of the blood-veſſels of the brain, or of the optic nerves and retinæ, and a conſequent preſſure upon theſe parts. In ſuch ſtate, the functions of the retina and optic nerves muſt be obſtructed, and the important indication is to leſſen the quantity of blood ſent into the veſſels of the head. A great degree of plethora, eſpecially when the patient heats himſelf, or lets his head hang down, will frequently excite the appearance of black ſpecks before the eyes, and ſometimes complete blindneſs. A plethoric perſon, ſays Richter, who held his breath, and looked at a white wall, was conſcious of diſcerning a kind of network, which alternately appeared and diſappeared with each pulſation of the arteries. This probably originated from the plethoric ſtate of the veſſels of the retina. Boerhaave mentions a man who always loſt his ſight on getting tipſy, and regained it again on becoming ſober.

Richter thinks it likely, that it is in this manner that the diſeaſe is produced, by the ſuppreſſion of ſome habitual diſcharge of blood, by not being bled according to cuſtom, by the ſtoppage of the menſes, and by the ceſſation of hemorrhage from piles, circumſtances which frequently give birth to the gutta ſerena, if we can give credit to all the accounts of Schmucker, Scarpa, Richter, and other experienced writers on the ſubject. In the ſame manner, the complaint may be brought on by great bodily exertions, which in all probability determine a larger current of blood into the head. Richter informs us of a man who became all on a ſudden blind, while carrying a heavy burden up ſtairs. He tells us of another man, who laboured exceſſively hard for three days in ſucceſſion, exerting his ſtrength very much, and who became quite blind at the end of the third day. Pregnant women in like manner are ſometimes blind during the time of labour. Schmucker has recorded a remarkable inſtance of this in a ſtrong young woman, thirty years old, and of a full habit. Whenever ſhe was pregnant, ſhe was troubled with violent ſickneſs till the time of delivery, ſo that nothing would ſtay on her ſtomach. She was bled three or four times without effect. Towards the ninth month her ſight grew weak, and for the laſt eight or ten days ſhe was quite blind. The pupil of the eye was greatly enlarged, but retained its ſhining black appearance. She recovered her ſight immediately after delivery, and did not ſuffer any particular debility. Schmucker aſſures us, that he has been three times a witneſs of this extraordinary circumſtance. Richter ſpeaks of a perſon who loſt his ſight during a violent fit of vomiting. Schmucker acquaints us, that it is not uncommon for ſoldiers, who are performing forced marches in hot weather, to become blind all on a ſudden. All great exertions of ſtrength, when the perſon is plethoric or heated, the body bent forwards, and the head in a low poſture, are uſually attended with ſome danger of amauroſis.

The blindneſs which follows external injuries of the head, particularly violent concuſſions, may probably belong to the preceding claſs of caſes. A man, ſays Richter, who received a forcible box on the ear loſt his ſight on the ſpot. This writer conceives it probable, that the concuſſion may ſometimes produce an atony of the blood-veſſels, ſo that theſe conſequently become dilated and make preſſure upon the adjacent nerves. He ſuſpects that the gutta ſerena, which originates during a violent ophthalmy, or during a ſevere inflammatory fever, may be of the ſame nature. He thinks it probable that perſons who become blind, while expoſing themſelves to the burning ſun with their heads uncovered, have their ſight impaired in a ſimilar way.

The diagnoſis of this firſt ſpecies of the gutta ſerena is founded on an acquaintance with the preceding remote cauſes, which are for the moſt part very evident, as the blindneſs, which is the conſequence of them, follows with remarkable quickneſs.

The ſecond claſs of cauſes, ſays Richter, operate by weakening either the whole body or the eye alone, and they indicate the general or topical uſe of tonic remedies. In the firſt caſe, the gutta ſerena appears as a ſymptom of conſiderable univerſal debility of the whole ſyſtem; in the ſecond caſe, the diſeaſe is altogether local. Every great general weakneſs of the body, let it proceed from any cauſe whatſoever, may be followed by a loſs of ſight. The gutta ſerena, if we can credit what Richter ſtates, has ſometimes been the conſequence of a tedious diarrhœa, ſometimes of a violent cholera morbus, ſometimes of great loſs of blood, and in other inſtances of an immoderate ſalivation. He informs us of a dropſical woman, who became blind on the water being ſuddenly let out of her abdomen. According to the ſame author, no general weakening cauſes operate upon the eyes and occaſion total blindneſs, ſo powerfully and often, as premature and exceſſive indulgence in venereal pleaſures.

The cauſes of local weakneſs in the eyes are various. Nothing tends to debilitate the eyes more, than keeping them fixed very attentively for a long while upon minute objects. However long and attentively objects may be looked at, the eye does not ſuffer nearly ſo much, if the objects are at all diverſified. A frequent change in ſuch things as are looked at ſtrengthens and refreſhes the eye. The ſight becomes ſtill more impaired by looking at objects with only one eye, as is done with teleſcopes and magnifying glaſſes; for when one eye remains ſhut, the pupil of that which is open always becomes dilated beyond its natural diameter, and lets an extraordinary quantity of light into the organ. The eye is generally very much hurt by being employed in the cloſe inſpection of brilliant, light-coloured, ſhining objects. They are greatly miſtaken, ſays Richter, who think that they ſave their eyes, when they illuminate the object which they wiſh to ſee in the evening with more lights, or with a lamp which intercepts and collects all the rays of light, and reflects them on the body which is to be looked at. Richter makes mention of a man, who, in the middle of winter, went a journey on horſeback through a ſnowy country, while the ſun was ſhining quite bright. He ſpeaks of another perſon who loſt his ſight in conſequence of the chamber in which he lay being ſuddenly lighted in the night-time by a flaſh of lightning. A man was ſeized with blindneſs, while one night he was keeping his eyes fixed for ſome minutes upon the full moon, in a fit of contemplation. In Richter's opinion the concuſſion of the head from external violence may ſometimes in all probability operate directly upon the nerves, ſo as to weaken and render them completely paralytic.

The third claſs of cauſes conſiſt of irritations, which in ſome inexplicable way, directly, or probably, for the moſt part directly, affect the optic nerves ſo as to make them inſenſible of the impreſſion of light. The greater part of ſuch irritations lies in the abdominal viſcera, whence they ſympathetically operate upon the eyes. It is indiſputably true that the kind of amauroſis which is moſt common depends upon ſome irritation in the gaſtric organs. It will often be learnt that patients of this kind have had a great deal of trouble, long griefs, and repeated cauſes of vexation, anger, and other paſſions, which are ſuppoſed to diſorder the bilious ſecretion, and bring on a wrong ſtate of the fluids in the alimentary canal. Richter tells us of a man, who loſt his ſight a few hours after being in a violent paſſion, and recovered it again the next day, upon taking an emetic, by which a conſiderable quantity of bile was evacuated. A woman was known to become blind, whenever ſhe was troubled with acidities in the ſtomach. (Anfangſgr. der Wundarzn).

The continental ſurgeons are exceſſively comprehenſive in their ideas of the cauſes of the gutta ſerena, and with many truths, they blend an evident quantity of uneſtabliſhed conjectures, and palpable abſurdities. It would be idle credulity indeed, to put faith in the aſſertions of this diſeaſe being occaſioned by the bad treatment of particular fevers, ſuppreſſed diarrhœas, the repelling of eruptive complaints, &c. Worms are alſo alleged to be ſometimes the cauſe of amauroſis, and this ſtatement may poſſibly be correct. The intermitting or periodical gutta ſerena is ſaid to depend in general upon ſome diſorder in the gaſtric organs.

Beſides theſe irritations in the chylopoietic viſcera, there are many others, which are repreſented as occaſionally affecting the eyes, and producing blindneſs. From moſt of theſe latter cauſes we ſhall withhold our belief, notwithſtanding they are ſupported by the high united authorities of Schmucker, Richter, and Scarpa. In a work like the preſent, however, it might not be altogether right to paſs over in ſilence any important opinions of theſe eminent ſurgeons, in relation to the cauſes of amauroſis. What will the Engliſh practitioner think, when he reads that *arthritic* or *gouty matter* is one of the moſt remarkable irritations which are productive of the gutta ſerena? What will be his ſentiments when he is told, that this ſerious blindneſs ſometimes originates from the repulſion of the gout or rheumatiſm, from a badly treated itch, and from repelling a tinea capitis? Can he ſenſibly believe, that a lady could really have a gutta ſerena brought on by merely going to cool herſelf in her garden, while heated with dancing? Ought he to credit, that what is called the *imprudent drying up* of an old ulcer will ſometimes occaſion a gutta ſerena? Ought he to believe, that the ſtoppage of a fluor albus will? Can he be made to ſuppoſe, that the matter of lues venerea is a frequent cauſe of amauroſis? Will he imagine with Richter, that the gutta ſerena, which ſometimes comes on at the termination of acute fevers, is likely to be the effect of the critical matter? For our own part with all the reſpect which we can ſummon for the moſt experienced ſurgeons of the continent, we cannot look upon the preceding aſſertions as any thing elſe than groſs errors, ariſing from the unexploded ſtate of the humoral pathology in foreign countries.

A violent fright, which is conſidered as being a frequent cauſe of the gutta ſerena, is ſuppoſed by Richter to operate chiefly by irritating the nerves.

The blindneſs ſometimes proceeds from a mechanical kind of irritation A man received in his right eye a ſmall ſhot, which pierced the upper eyelid, and lodged at the upper part of the orbit, between the eye-lid and eye-ball, ſo that it could be externally felt. Richter adds that he ſhortly afterwards became blind in the left eye, but recovered his ſight in it again upon the exciſion of the ſhot.

Sometimes, ſays this experienced ſurgeon, the irritation, exciting amauroſis, ſeems to have its ſeat in the mucous membrane of the noſe and frontal ſinuſes. He fancies, that there is ſome ground for believing, that the ſtoppage of a catarrhal running from the noſe may ſometimes actually occaſion a gutta ſerena. However this may be, he ſtates it as certain, that ſuch patients frequently complain of a great dryneſs of the noſe, and that the coming on of a ſpontaneous or excited diſcharge from the noſtrils has been known to effect conſiderable benefit. Such patients alſo frequently experience many diſagreeable ſenſations about the frontal ſinuſes, a heavineſs, ſhootings, contractions, &c. The fact of wounds of the eye-brow being often followed by a gutta ſerena, proves that the cauſe of this diſeaſe is not ſituated far from thoſe bony cavities. However, the reader ought to be appriſed that it is chiefly ſuch wounds as intereſt the ſupra-orbitary nerve, which are commonly ſuppoſed to be apt to bring on amauroſis.

The gutta ſerena is generally difficult of cure. However, the degree of difficulty in relieving the diſeaſe varies in different caſes, according to the way in which the malady originates, and the nature of its cauſe.

We ſhall extract the following prognoſis, relative to the gutta ſerena, from Scarpa's excellent work on the diſeaſes of the eye. "The *perfect inveterate amauroſis*, with organic injury of the ſubſtance, conſtituting the immediate organ of viſion, is a diſeaſe abſolutely incurable. The *imperfect recent amauroſis*, particularly that which is *periodical*, generally admits of a cure, ſince it is moſt frequently connected with a diſordered ſtate of the ſtomach and primæ viæ, or is dependent on cauſes which, though they affect the immediate organ of viſion, may be removed without leaving any trace of diſorganization, either in the optic nerve or retina.

"In general, thoſe caſes of amauroſis may be regarded as incurable, which have exiſted for ſeveral years in perſons advanced in age, and whoſe ſight has been weak from their youth; which have been ſlowly formed, at firſt with a morbid increaſe of ſenſibility in the immediate organ of viſion, and afterwards with a gradual diminution of perception in this organ to complete blindneſs; in which the pupil is immoveable, without being much dilated, but where it has loſt its circular figure, or when it is ſo much dilated as to appear as if the iris were wanting, having alſo an unequal or fringe-like margin; in which the bottom of the eye, independently of opacity of the cryſtalline lens, has an unuſual paleneſs, ſimilar to horn, ſometimes inclining to green, reflected from the retina as if from a mirror; which are accompanied with pain of the whole head, and with a conſtant ſenſe of tenſion in the eye-ball; which have been preceded by great and protracted excitement of the whole nervous ſyſtem, and afterwards by general debility and languor of the whole conſtitution, as after the long abuſe of ſpirituous liquors, manuſtupration, or premature venery; which have been preceded or accompanied by attacks of epilepſy, or by frequent and violent hemicrania; which have come on in conſequence of violent and obſtinate internal ophthalmia, at firſt with an increaſed, but afterwards diminiſhed ſenſibility of the retina, and ſlowneſs of motion in the pupil; which, beſides being inveterate, are the conſequence of blows upon the head; which have been occaſioned by direct blows upon the eye-ball; which have appeared after a violent contuſion and laceration of the ſupra-orbital nerve, whether the diſeaſe has taken place immediately after the blow, or ſome weeks after the healing of the wound of the ſupercilium; which have been occaſioned by extraneous bodies penetrating the eye-ball, as leaden ſhot, &c.; which are derived from a confirmed lues venerea, in which the preſence of one or more exoſtoſes upon the forehead, upon the ſides of the noſe, or upon the maxillary bone, lead to the ſuſpicion, that there may be alſo ſimilar exoſtoſes within the orbit. Laſtly, thoſe are incurable, which are conjoined with a manifeſt change of figure and dimenſion of the whole eye-ball, as when it is of a long oval figure, or of a preternatural bulk or ſmallneſs.

"On the contrary, thoſe caſes of *recent imperfect amauroſis* moſt frequently at leaſt, if not always, admit of a cure, which, although the patient be almoſt or even completely deprived of ſight, have not been produced by any of thoſe cauſes, which are capable of contuſing or deſtroying the organic texture of the optic nerve or retina; in which the immediate organ of viſion preſerves ſome, though little, ſenſibility to the light, whether in the direction of the axis of viſion, or laterally; in which the amauroſis being ſudden and recent, the pupil, although preternaturally dilated, is not exceſſively ſo, and is regular in its circumference; behind which, the bottom of the eye is of a deep black colour, as in a natural ſtate, which have not been preceded or accompanied by violent and continual pain in the head and eye-brow, nor by a ſenſe of conſtriction in the eye-ball; which have originated from violent anger, exceſſive grief, or terror; which have ſucceeded an exceſſive fulneſs and crudity of the ſtomach, plethora, either general, or confined to the head, the ſuppreſſion of accuſtomed ſanguineous diſcharges from the noſe, uterus, or hemorrhoids; which are occaſioned (as Scarpa unwarrantably ſuppoſes) by an evident metaſtaſis of variolous, herpetic, or gouty matter; which are the conſequence of profuſe loſs of blood; which are to be referred to a nervous debility, not inveterate in perſons who are young, and which is conſequently yet ſuſceptible of being remedied; which are produced by convulſions and violent efforts during a laborious parturition; which accompany the courſe or decline of acute or intermittent fevers; laſtly, which are periodical, or which come on and diſappear at intervals, every day, every three days, every month, or at a certain ſeaſon of the year."

Before entering into the conſideration of the treatment of the gutta ſerena, we are deſirous of noticing a few remarkable circumſtances, which are connected with the diſeaſe. It ſometimes happens that when a patient ſhuts one eye, he can only half diſtinguiſh objects, but that if he opens both eyes, he ſees every thing in its natural form. In this caſe, according to Schmucker, one eye is ſound, and only ſome fibres of the nerve of ſight are injured in the other. It alſo ſometimes happens, that in the gutta ſerena, which comes on gradually, the patient ſees double with both eyes. Some years ago Schmucker cured a major of huſſars, who ſaw the three lines of his ſquadron double, and the ſame ſurgeon was ordered by the king of Pruſſia to attend a gentleman who was afflicted in a ſimilar way. Such caſes are, in the opinion of the foregoing writer, brought on by a violent diſtention of the veſſels of the choroides, where he thinks that varices may eaſily ariſe, in conſequence of the weak reſiſtance of that membrane. In this manner the filaments of the retina ſuffer preſſure, and the rays of light are broken. Under theſe circumſtances, if prompt aſſiſtance be not afforded, total, and frequently incurable blindneſs may be the conſequence. Schmucker met with an example of this (the only one in his practice) in a young man 26 years of age. When he applied to this eminent ſurgeon, he had been blind a year. Before he became blind he remarked, that, after any violent emotion, his ſight at firſt was weak, and that objects were afterwards ſeen double. When his circulation was at all hurried, he ſaw black ſpots before his eyes, and at length was quite blind. The veſſels of the choroides were as large as if they had been injected with wax, and every kind of ſurgical aſſiſtance proved ineffectual.

In the perfect gutta ſerena, the pupil of the eye is generally deſtitute of motion. This ſymptom, however, as we have already ſtated, is not invariably attendant on the diſorder.

der. Janin and Richter have ſeen the pupil capable of motion in caſes of amauroſis; Schmucker has twice ſeen the ſame circumſtance; and we have obſerved it in not leſs than eight inſtances, ſome of which were in St. Bartholomew's hoſpital, and others in the York hoſpital, Chelſea. The reaſon of this occurrence is thus explained by ſurgical authors: the iris, which forms the pupil, is a continuation of the choroides; the various nervous filaments, which are diſtributed to the iris, and endue it with ſenſibility and a power of motion, ariſe from the lenticular ganglion, which is formed by the third and fifth pairs. As all theſe nerves have no connection with the nerves of ſight, it is poſſible for them to retain their ſenſibility, while the latter are quite devoid of that property.

The preceding kind of caſe is ſometimes reverſed; namely, the nerves of the iris may be paralytic, while thoſe of ſight continue unimpaired. Schmucker informs us that he was acquainted with a woman whoſe pupil was uncommonly diſtended, and totally incapable of motion. Her ſight was very weak, and ſpectacles were of no uſe to her. She could ſcarcely diſcern any thing by day, or in a ſtrong light; but ſhe could ſee rather better at night and in the dark. This infirmity of ſight depended upon the dilated paralytic ſtate of the pupil, by which too many rays of light were admitted into the eye; and the reaſon why the patient could ſee better at night, was becauſe the pupil, in its natural ſtate, always becomes widened and dilated in a dark ſituation. See Vermiſchte Chirurgiſche Schriften Von J. L. Schmucker.

In the treatment of the gutta ſerena, the practitioner ought firſt to endeavour to diſcover and remove the cauſe of the diſeaſe. This is the ſureſt and beſt way of proceeding; but it is worthy of notice that ſight does not invariably return, although the real cauſe of the blindneſs is radically removed. In ſuch caſes, the continuation of the loſs of ſight is aſcribed to the torpor of the nerves, which have been for a conſiderable time without action, and have been impaired by the diſeaſe. The practitioner uſually preſcribes ſtimulants and tonics, with a view of bringing the nerves into their original ſtate of activity. In other caſes ſight returns as ſoon as the cauſe of the diſeaſe is removed. When it is found impoſſible to make out any thing reſpecting the cauſe of the diſorder, the ſurgeon ſhould found the curative indications upon the ſymptoms and appearances which have taken place in the origin and courſe of the diſeaſe, and from which ſome conjectures may be drawn reſpecting the nature of the caſe. When no appearances of this kind occur, and nothing can be learnt about the cauſe of the malady, the ſurgeon muſt have recourſe to ſuch empirical remedies as extenſive experience has ſhewn to be ſometimes truly capable of removing the affection, although an explanation cannot always be given of the manner in which they operate.

We ſhall follow Richter, and firſt treat of that method of cure which is directed againſt the cauſes of the diſeaſe, and which is to be regarded as the moſt proper whenever circumſtances will admit of its adoption. In that ſpecies of amauroſis, which ariſes from the firſt claſs of cauſes, namely, from thoſe which ſeem to induce the diſeaſe, by means of a preternatural fulneſs and dilatation of the blood-veſſels of the brain or eye, the indication is evidently to leſſen the quantity of blood, and divert this fluid from the head. For this purpoſe the patient may be bled in the arm, temporal artery, or foot. This evacuation is to be repeated as often as ſeems neceſſary, and it will be better to begin with taking away from twelve to ſixteen ounces. It is alſo adviſed by Schmucker to apply ten or twelve leeches to the neck and temples. The efficacy of bleeding in the cure of particular caſes of the gutta ſerena is ſtrikingly exemplified by numerous well authenticated obſervations; and a ſingle evacuation of this kind has been known to ſuffice for the reſtoration of ſight. Richter informs us of a woman, who had left off having children, who loſt her ſight, and recovered it again by being only once bled in the foot. A ſpontaneous hemorrhage from the noſe alſo cured a young man who had been blind for ſome weeks.

General bleeding ſometimes proves ineffectual, unleſs aſſiſted by topical. Leeches may be applied to the temples, or cupping-glaſſes to the back part of the neck. When the diſorder ſeems to be connected with an interruption of the menſes, or the ceſſation of bleeding from piles, leeches may be put on the perinæum, the inſide of the thigh, or the ſacrum. Local bleeding, however, ſeldom avails, except the whole maſs of blood has been previouſly diminiſhed by a prudent employment of the lancet. Beſides bleeding, the ſurgeon may advantageouſly have recourſe to other means, emollient glyſters, purgatives, bliſters on the lower extremities, bathing the feet in warm water, &c.

In ſome caſes all the foregoing means fail in producing the deſired benefit, even when they have been followed up as far as the pulſe and ſtrength of the conſtitution will allow. Here the diſorder may be of two kinds. It may either depend upon the ſtoppage of ſome wonted evacuation of blood, or elſe upon ſome other cauſe of the firſt claſs. In the firſt of theſe caſes, ſays Richter, experience ſhews that the diſeaſe will ſometimes not give way before the accuſtomed diſcharge is re-eſtabliſhed on which the malady depends; notwithſtanding evacuants may be employed in any way whatſoever. A woman (as this author acquaints us) who had loſt her ſight in conſequence of a ſudden ſuppreſſion of the menſes, could not recover it again till three months after the return of the menſtrual diſcharge, notwithſtanding every ſort of evacuation was tried. He alſo tells us of another woman who had been blind half a year, and did not menſtruate, and to whoſe external parts of generation leeches were ſeveral times applied. As often as the leeches were put on, ſays Richter, the menſes in part recommenced; and as long as they made their appearance, which was ſeldom above two hours, the woman always enjoyed a degree of viſion.

In the ſecond ſort of caſe, to which we have alluded above, or that in which the diſeaſe has not its origin from a ſtoppage of any natural or habitual diſcharge of blood, and does not yield to the evacuating plan, Richter thinks that the ſurgeon is juſtified in concluding that the preternaturally dilated veſſels have loſt their tone and proper diameter, and in employing topical corroborating remedies, particularly cold water. That the veſſels do ſometimes remain in this weakened ſtate, ſo as to protract the diſeaſe, the preceding author endeavours to ſhew, by the caſe of a woman who loſt her ſight in conſequence of the ſtoppage of the menſes; and though, on the return of this diſcharge, ſhe recovered it again, yet ſhe was afterwards in the habit of loſing it again, for the ſpace of two days, before the beginning of every menſtruation, and of regaining it as ſoon as this evacuation began. Waſhing and bathing the whole head with cold water, eſpecially the parts about the eyes, may often be practiſed in theſe caſes with ſingular benefit after free evacuations.

When the return of ſight cannot be brought about in this manner, the ſurgeon may put in practice ſuch means as ſeem calculated to ſtimulate the nerves, and remove the torpid affection of the optic nerves in particular. Of the latter remedies, Richter ſays emetics are the principal. Soldiers, who loſe their ſight in performing forced marches in hot weather, very commonly have it re-eſtabliſhed again by being immediately bled, and taking an emetic the next day. (See Schmucker's Chir. Wahrnehmungen, 1 Theil.) Paralytic affections, remaining after injuries of the head, may ſometimes be cured by making an iſſue upon the mamillary ſuture. (See Bromfield's Chirurg. Obſervations, vol. i.) Perhaps, obſerves Richter, this plan might be of ſervice in the gutta ſerena, which is conſequent to injuries of the head and concuſſions of the brain.

The treatment of that ſpecies of the gutta ſerena, which is regarded as the effect of ſome unnatural irritation, requires the inveſtigation and removal of ſuch irritation. When this cannot be diſcovered, Richter adviſes the employment of remedies which leſſen the ſenſibility of the nerves, and conſequently render them leſs apt to be affected by the irritation of whatever ſort it may be. Sometimes the irritation is both diſcoverable and removeable, and ſtill the effect, that is, the blindneſs, continues. In this circumſtance, the ſurgeon muſt endeavour to obviate the impreſſion which the irritation has left on the nerves by the uſe of anodynes, or elſe he ſhould try to remove the torpor of the nerves by the employment of ſtimulants. In moſt caſes, according to Richter, Schmucker, and Scarpa, the irritation, which is productive of the diſeaſe, is ſituated in the abdominal viſcera. Sometimes, ſays the firſt of theſe eminent continental ſurgeons, it is plainly of a bilious nature, and demands the exhibitions of purgatives and emetics. He informs us of a man who became blind after a ſevere bilious colic, but was cured by merely taking an emetic and a purge. Another perſon alſo, who loſt his ſight in conſequence of meeting with ſome conſiderable vexation, recovered it by only taking one emetic.

Scarpa, the celebrated anatomiſt and ſurgeon at Pavia, has lately publiſhed, in his excellent work upon the diſeaſes of the eye, a very intereſting relation of the kind of treatment, which is found upon the continent to be attended with uncommon ſucceſs in the caſes of gutta ſerena, connected with ſome diſorder in the gaſtric ſyſtem. "It is found," ſays he, "from the careful obſervations of Schmucker and Richter, that this diſeaſe is moſt frequently derived from a morbid excitement or irritation in the digeſtive organs, either alone, or accompanied with general nervous debility, in which the eyes participate ſympathetically. According to theſe principles, in the greater number of caſes of *recent imperfect amauroſis*, the principal indication of cure, which the ſurgeon ought to fulfil in the treatment of this diſeaſe, is that of unloading the ſtomach and primæ viæ of the ſaburræ and morbific ſtimuli; and afterwards of ſtrengthening the gaſtric ſyſtem, facilitating the digeſtion, and, at the ſame time, exciting the whole nervous ſyſtem, and particularly that of the eyes, which are affected and rendered torpid by a ſympathetic connection.

"With reſpect to the firſt part of the treatment of the *imperfect amauroſis*, the intention is perfectly anſwered by emetics and internal reſolvents. In the claſs of emetics, experience has taught that the antimonium tartarizatum is preferable to every other; and that when given afterwards, in ſmall and divided doſes, it anſwers the purpoſe of a reſolvent medicine, the action of which may be increaſed by conjoining it with gummy or ſaponaceous ſubſtances. In the treatment of the imperfect amauroſis, therefore, which is moſt frequently ſympathetic, and depending on acrid matters in the primæ viæ, it will be proper at firſt, in the greater number of caſes, to diſſolve, for an adult, three grains of tartarized antimony in four ounces of water, of which two table-ſpoonfuls may be taken every half hour, until it produces nauſea, and afterwards abundant vomiting. On the following day he ſhould be ordered to take the reſolvent powders, compoſed of one ounce of the cryſtals of tartar and one grain of the tartarized antimony, divided into ſix equal parts, of which the patient ſhould take one in the morning, another four hours afterwards, and the third in the evening, during eight or ten ſucceſſive days. This medicine will produce a ſlight nauſea, and ſome evacuations of the bowels more than uſual; and perhaps, after ſome days, even vomiting. But if, during the uſe of this opening powder, the patient makes ineffectual efforts to vomit, and complains of a bitter taſte and want of appetite, without any amendment of the ſight, the emetic ſhould be repeated, and even a third and fourth time, if the preſence of the morbific ſtimuli in the ſtomach, bitter taſte, tenſion of the hypochondria, and eructations and tendency to vomit, require it; for it not unfrequently happens that the patient, on the firſt evomition, throws up only matter, with a little mucus; but, on repeating the emetic, after the nauſeating powder has been uſed for ſome days, a conſiderable quantity of yellowiſh green matter will be thrown up, which will greatly relieve the ſtomach, head, and eyes.

"The ſtomach being cleared, the opening pills of Schmucker ſhould be preſcribed, or thoſe of Richter. (The firſt are compounded as follows: ℞ Gum-ſagapen. Galban. Sap. Venet. an. drachmam unam, Rhei opt. drachmam unam et ſemis. Antimonii tartarizati grana ſexdecim, Suc. liquirit. drachmam unam. F. pilulæ gran. unius. Schmucker makes his patients take fifteen of theſe pills, morning and evening, for the ſpace of four or even ſix weeks. Richter's pills are thus made: ℞ Gumm. Ammoniac. Aſſ. fœtid. Sap. Venet. Rad. Valerian. ſ. p. Summit. Arnicæ an. drachmas duas. Antim. tartariz. grana octodecim. F. pilulæ granorum duorum. On the continent fifteen are preſcribed thrice a day; but in this country it would be better to make the pills larger, and direct a ſmaller number to be taken at a time.) The phenomena, which are uſually obſerved to happen, in conſequence of this treatment, are the following: the patient, after having vomited copiouſly, feels more eaſy and comfortable than before. Sometimes, on the ſame day on which he has taken the emetic, he begins to diſtinguiſh the ſurrounding objects; at other times this advantage is not obtained till the fifth, the ſeventh, or tenth day; and in ſome caſes, not till ſome weeks after the exhibition of the emetic, and the uninterrupted uſe of the opening powders or pills. As ſoon as the patient begins to recover his ſight the pupil is found leſs dilated than before, and is alſo more contracted, when expoſed to the vivid light of a candle; and in proportion as the power of viſion augments, this contraction and mobility of the pupil increaſe. Upon the whole, the cure is ſeldom completed in leſs than a month, during which time the uſe of local remedies, calculated to excite the languid action of the nerves of the eye, ſhould not be neglected, as will be hereafter mentioned.

"When the ſurgeon ſhall have ſufficient reaſon to believe that, by means of theſe remedies, the offending matters which ſtimulated the ſtomach, have been perfectly eliminated, and eſpecially after the patient has in a great meaſure regained his ſight, the plan of treatment ſhould be directed to ſtrengthen the ſtomach and invigorate the nervous ſyſtem in general, and that of the nerves of the eye in particular. He ſhould, therefore, preſcribe a powder, compoſed of one ounce of the cinchona, and half an ounce of valerian root, divided into ſix equal parts, of which the convaleſcent ſhould take one in the morning, and another at night, in any convenient vehicle, and ſhould continue the uſe of this medicine for at leaſt five weeks. In the mean time he ſhould live on tender ſucculent food and cooling broths, ſhould take a moderate quantity of wine, and uſe gentle exerciſe in a ſalubrious air.

"As a local application, both during the continuance and decline of the imperfect amauroſis, in order to rouſe the languid action of the nerves of the eye, the vapour of the aqua ammoniæ puræ, properly applied to the affected eye, is of the higheſt advantage. This remedy is employed by placing a ſmall veſſel containing it near the patient's eye, ſo that the very penetrating vapour, with which it is ſurrounded, may excite a pricking ſenſation in that organ; by the action of which, in leſs than half an hour, the eye, which is expoſed to it, becomes red and waters copiouſly. It is then proper to deſiſt from it, and repeat it three or four hours afterwards, and continue it in this manner, until the amauroſis is perfectly cured. If both the eyes are affected with this diſeaſe it is unneceſſary to obſerve, that it is requiſite to have two ſmall veſſels filled with the aqua ammoniæ puræ, or if one only be employed, that it will be neceſſary to hold it firſt to one eye and then to the other, until both water abundantly and become red. It is neceſſary to renew the aqua ammoniæ puræ every third day, in order to preſerve its activity. This very uſeful application ought to be employed from the commencement of the treatment of the imperfect amauroſis, or, at leaſt, immediately after the patient's ſtomach has been unloaded of the offending matter, by means of an emetic, and continued for a length of time, even after the amauroſis is diſſipated. Thilen (Med. und Chirurgiſche Bermerkungen, § Amauroſis,) beſides many others, aſſures us, that he has alſo uſed this local remedy in ſuch caſes with advantage. The action of the vapour of the cauſtic volatile alkali, applied to the eyes affected with incomplete amauroſis, may be alſo aſſiſted by other external ſtimuli, applied to parts of the body, which have a cloſe conſent with the eyes, as bliſters to the neck, friction upon the eye-brow with the anodyne liquor, and irritation of the nerves of the internal noſtrils by means of ſternutatory powders, as that compoſed of two grains of the hydrargyrus vitriolatus, and a ſcruple of the powder of the leaves of betony; and laſtly, the electric fluid. Electricity has been propoſed as one of the principal means of curing the amauroſis; but experience has ſhewn, that no confidence is to be placed in it, except as a ſecondary remedy; and Mr. Hey (Med. Obſerv. and Enquiries, vol. v. p. 26.), one of the moſt zealous promoters of this practice confeſſes, that electricity is only uſeful in caſes of recent amauroſis, and moſt frequently only when combined with appropriate internal remedies, among which reſolvents are the principal. Scarpa on the eyes, tranſl. by Briggs.

Beſides the remedies above-mentioned, ſeveral other medicines have obtained repute for their efficacy in the caſes of gutta ſerena, proceeding from ſomething wrong in the abdominal viſcera. We ſhall juſt enumerate a few of the principal: half a dram of kali tartarizatum, from four to ſix times every day, with from eight to fifteen grains of caſtor; a grain of the antimonial powder, from four to eight times a day, either alone, or conjoined with the kali tartarizatum and bitter reſolvent extracts; a ſolution of from one to two grains of antimonium tartarizatum in an ounce and a half of aqua ammoniæ acetatæ, two drams of ox's gall, and three ounces of water, of which mixture the patient is to take two table-ſpoonfuls from four to ſix times a day; five grains of belladonna once or twice a day; a ſolution of black hellebore in antimonial wine, of which medicine the patient is to take a ſufficient quantity to procure a couple of gentle evacuations from the bowels every day; a thin electuary, compoſed of from one to two drams of the powder of hemlock, and four ounces of honey, which quantity the patient is to take gradually in the courſe of four and twenty hours; a powder made of one grain of calomel, one grain of the ſulphur auratum antimonii, and eight of hemlock, which is to be taken at night, or every evening and morning.

Some of the preceding reſolvent remedies have a warm heating effect, while the other are of a cooling, lowering nature. The laſt are ſerviceable to ſuch patients as are ſubject to fluſhes of heat, and have a ſmall irritable pulſe, while the firſt are principally calculated for patients, who have a ſmall, ſoft, ſlow pulſe, and are not of irritable habits. However, as Richter further informs us, we cannot always foretel with certainty what kind of reſolvent medicine will anſwer in every particular caſe. Comparative trials with different remedies will, in general, ſoon point out the one which is the beſt. During the employment of ſuch medicines as the foregoing, emetics and purgatives are to be adminiſtered as often as occaſion requires. At length, tonic nervous medicines become neceſſary. Richter, in confirmation of the propriety of the preceding plan, cites the caſe of a man, two and twenty years of age, who had been blind three years, but was entirely cured in the courſe of eight weeks, by the alternate uſe of emetics and doſes of the kali tartarizatum. In this ſpace of time he took twelve vomits. Whenever he had taken the kali tartarizatum for four or ſix days in ſucceſſion, he was affected with giddineſs, loſs of appetite, a furred tongue, oppreſſions, &c. An emetic not only always removed theſe ſymptoms, but improved the ſight ſo much, that viſion was perfectly re-eſtabliſhed after the twelfth vomit.

According to ſurgical writers, worms are frequently a cauſe of the gutta ſerena, particularly in children. Perſeverance in the uſe of calomel, ſemen ſantonicum, rhubarb, or jalap, and laſtly, of valerian, will generally effect an entire cure of this ſpecies of blindneſs. Richter, and other continental ſurgeons, alſo comprehend among the cauſes of amauroſis the repulſion of eruptive complaints, the healing of old ulcers, and the ſtoppage of aqueous, or mucous diſcharges. The chief remedies recommended in theſe caſes are from ſix grains to a ſcruple of the ammonia præparata; a mixture of the ſpiritus ammoniæ ſuccinatus, and antimonial wine; bathing, eſpecially in ſulphur waters; the ſolanum lignoſum, or dulcamara, either alone, or conjoined with antimonial wine; emetic tartar adminiſtered in ſmall doſes ſo as only to excite nauſea, and occaſionally in larger ones, for the purpoſe of bringing on vomiting; the extractum aconiti with antimonial wine; the tinctura thebaica, and antimonial wine in equal parts; ſulphur; iſſues; and electricity. It is plain that ſeveral of theſe remedies are dictated by the idea of ſome particular kind of morbid matter being driven inward into the blood, according to the exploded notions of the old humoral pathology. We fear, that the continental ſurgeons here give their advice more from hypotheſis than experience. However, if the medicines are productive of the benefit imputed to them, we will not argue about the principle of their operation, or whether the repulſion of a ſcald head, or other eruptive diſeaſe, can bring on the gutta ſerena. Richter adduces the following example in illuſtration of the ſoundneſs of his practice. A boy, twelve years old, who had entirely loſt his ſight, in conſequence of the drying up of a tinea capitis, was completely cured by uſing the enſuing ointment: ℞ Flor. Sulph. Vitriol. Alb. Pulv. baccar. laur. āā Olei Olivæ q. s. ad linimentum. Some of this application (ſays Richter) was rubbed, every morning and evening, upon the elbow joints; in three weeks the tinea capitis re-appeared; and from that moment the ſight began to return.

Foreign ſurgeons make mention of an amauroſis, which proceeds from a venereal cauſe, and demands the employment of mercury. This caſe, they ſay, is ſometimes incurable, and perhaps may depend upon an exoſtoſis, ſituated in the orbit, and making preſſure upon the optic nerve.

The gutta ſerena, by many writers alleged to originate from the ſudden check of gouty complaints, requires, ſays Richter, either that the gouty matter ſhould be expelled from the ſyſtem, or brought back to the place from which it has been driven. This author informs us, that a man who had applied cold water to his gouty foot became blind, and the pain of the diſeaſe ſubſiding, and upon the recurrence of this ſymptom, the next day, the power of ſeeing returned. A gutta ſerena, brought on by what Richter ſuppoſes was a metaſtaſis of a fever, Schmucker cured by ſome pills containing emetic tartar. (See Vermiſchte Schriften, 2 Band.) In another ſimilar caſe, reported in the Memoirs of the Swediſh Academy of Sciences, a ſeton in the neck was found of ſervice. A woman, who had loſt her ſight in conſequence of a violent fright, is ſaid by Richter to have been cured by taking valerian, after ſome mildly purging medicines. He ſtates that, in another caſe of this kind, cajeput oleum was found of uſe, after a gentle evacuation. (See Anfangſgr. der Wundarzneykunſt. Band 3.)

The foreign mode of treating the gutta ſerena, connected with the gout, fevers, ſmall-pox, or meaſles, may be fully underſtood from the following caſes, and remarks afforded us by Schmucker. "You muſt endeavour (ſays he) to remove the remnants of theſe diſeaſes as quickly as poſſible, and bring the conſtitution into its proper ſtate. Emetic tartar, in the doſe of three or four grains, is at firſt an efficacious remedy, on account of its active operation. You then apply bliſters to the neck, arms, and calves of the legs. If the ſight is improved by this firſt ſtrong vomit, you repeat ſmall doſes of the emetic tartar, and immediately exhibit an infuſion of woodlice. I ſhall cite a few inſtances in confirmation of its efficacy. A man two and fifty years of age, who was ſubject to fits of the gout, about two years ago, had ſo violent an attack in the right ſhoulder, and was in ſuch extreme pain, that it not only prevented him from ſleeping for ſeveral nights, but brought on a conſiderable degree of fever. A friend adviſed him to apply to the part affected cloths dipped in cold water, and this had not been repeated above four times when the pain ceaſed, but in twelve hours the patient became blind in both eyes. I was conſulted the following day, and found the pupil greatly diſtended and immoveable, the patient being quite unconſcious of the impreſſion of light. I immediately ordered the part where the pain had been to be rubbed with bruſhes, and covered with a bliſtering plaſter, and three grains of emetic tartar to be taken, which occaſioned violent vomiting. The next day the patient aſſured me, that he had already had ſome perception of light, and I found the pupil ſomewhat moveable. The plaſter of cantharides had drawn well; I took it off, applied another, and, in order to increaſe the irritation, placed another bit lower down, about as broad as my hand. As an internal medicine, I ordered him four grains of emetic tartar in four ounces of orange water, half of which I made him take, and, when that had operated, he was directed to take a ſpoonful every hour. He vomited ſeven times in the day, and in the evening ſaw a little better, though he could not diſcern any objects diſtinctly. The emplaſtrum cantharidum was taken off, and the ſore dreſſed with the unguentum baſilicum, in which there was ſome of the powder of cantharides. On the third morning the patient could already diſtinguiſh me tolerably well. I again mixed two grains of emetic tartar with ſix ounces of water and gave him a ſpoonful every two hours. This only operated once, making him, however, very ſick. The pupil of the eye again recovered its power of motion, and began viſibly to contract. On the following day I gave him an infuſion of woodlice, with the above-mentioned reſolvent pills, and in nine weeks the patient was entirely cured. Latterly, I made him hold ſome ſtrong ſpirits in the palm of his hand, and apply the vapour to his eyes.

"A girl, ſeven years of age, caught the meaſles, and being ſuffered to run about in the cold, they were driven in, and the child became quite blind in both eyes. Several perſons were conſulted, but, notwithſtanding their efforts, ſhe continued blind. Two years afterwards I was conſulted; but as the diſeaſe had been of ſo long duration, I had little hopes of a cure. Nevertheleſs, I conſented to make the trial. I made her take, at firſt, a ſcruple of the kali tartarizatum three times a day, obſerve a vegetable diet, and drink a decoction of graſs-root for her beverage. On the tenth day I gave her a gentle laxative, and then made her take ten of reſolvent pills. During the firſt fortnight ſhe did not experience any ſickneſs, nor did any change happen; but in the third and fourth weeks ſhe was ſick at the ſtomach, and had occaſional vomiting. In ſix weeks, the pupils of the eyes, particularly that of the right eye, had ſome motion, and the girl could diſtinguiſh day and night. I then gave her every morning forty woodlice in ſome broth, two pills every day, and made her apply ſpirituous vapours to her eye. After uſing theſe remedies ſix weeks, ſhe could diſtinctly diſcern objects, particularly with the right eye. I therefore continued this plan, and applied behind the ears plaſters of cantharides, which were kept open nineteen days. In the mean while, her ſight grew better and better; but in order to excite greater irritation, and more diſcharge, I put another larger bliſter on the neck. I afterwards made an iſſue in her left arm, ordering her to take twelve pills at bed-time, and uſe the ſpirituous vapour. In nine months ſhe got perfectly well." (See Schmucker's Vermiſchte Chirurgiſche Schriften).

With regard to the gutta ſerena, ariſing from wounds of the eye-brow, Richter thinks it improbable that the diſeaſe can proceed from an actual injury of the ſupra-orbitary nerve; for it ſeldom follows the wound immediately, but moſtly at a late period, when the part is either nearly or entirely healed. The kind of wound, alſo, which induces the loſs of ſight, is not always preciſely in the ſituation of the nerve. The nerve has ſometimes been purpoſely divided, without being followed by blindneſs, and, occaſionally, this ſpecies of amauroſis has been cured, which could hardly have happened, if the diſorder had actually depended upon a wound of the nerve.

In the opinion of this author, it appears likely, that the proximate cauſe of the gutta ſerena, in this inſtance, is to be imputed to the cicatrix, by which the nerve is preſſed and irritated, as the loſs of ſight in general does not take place till the ſcar begins to form. It is in the ſame way that the epilepſy is produced, which is ſometimes the conſequence of caſtration. (See Theden's Bermerkungen). The method by which the blindneſs has ſometimes been removed, likewiſe increaſes the probability of this account. This kind of amauroſis has occaſionally been cured by ſtrong frictions upon the eye-brow (Platner), and alſo by frequently rubbing the ſame part, for a conſiderable time, with ſoftening emollient oils and ointments.

It is adviſable, in all wounds of the eye-brow, to prevent ſuppuration by healing them by the firſt intention. When matter cannot be hindered from forming, we ſhould endeavour to avoid every thing likely to make the ſuppuration more extenſive, and the conſequent cicatrix larger. Should the wound be already healed, and the blindneſs have come on, we muſt put in practice ſuch means as have, in ſome inſtance or another, been found ſucceſsful. Hence emollient oils and ointments ought to be ſtrongly and frequently rubbed on the eye-brow, eſpecially in the ſituation of the ſcar. Emollient fomentations may likewiſe be employed with a proſpect of benefit. As this ſort of amauroſis evidently originates from nervous irritation, Richter queſtions, whether ſome good might not be derived from opium and other antiſpaſmodic remedies? And whether, in the event of this plan failing, benefit might not be expected from making a diviſion of the nerve? (Anfangſgr. der Wundarzneykunſt, Band 2).

It is rather to the practice, than the theories, of the continental ſurgeons, in caſes of amauroſis, that we are anxious to excite the reader's attention. We do not deſire him to believe, that checking a rheumatiſm, a gouty attack, an itch, or a gonorrhœa, has ever really been the cauſe of a gutta ſerena. As we know that ſuch diſeaſes cannot make a perſon inſuſceptible of the latter diſorder, ſo we can readily conceive, that, in many caſes, the blindneſs may begin about the time when a rheumatiſm, a clap, an itch, &c. are giving way to their particular remedies. When Richter informs us, that an amauroſis, attended with conſiderable weeping and irritability of the eye, and originating after the repreſſion of a rheumatiſm, was cured by bliſtering the eye-brow and adminiſtering to the patient thrice a day from twenty to forty drops of a mixture, compoſed of an ounce of antimonial wine and half a dram of the extractum aconiti, we do not wiſh the reader to credit the alleged cauſe of the blindneſs, but only to recollect the ſucceſsful mode of treatment. When valerian is ſtated to have cured a gutta ſerena, which followed the repreſſion of an itchy eruption, the reader is only required to attend to the practice, and he may diſmiſs as much of the theory as he likes.

The third ſpecies of the gutta ſerena, or that which ariſes from debilitating cauſes, is of two kinds: ſometimes the diſeaſe is the conſequence of a general weakneſs of the body, while, in other inſtances, it is the effect of a debility, which is confined to the eye itſelf, and does not extend to the whole conſtitution. In the firſt caſe, nouriſhing food, and tonic remedies, eſpecially bark, ſteel, and cold bathing, are the moſt beneficial, while, at the ſame time, topical corroborants may alſo be employed. In the ſecond kind of caſe, theſe laſt means alone are neceſſary. Bathing the eye with cold water is one of the moſt powerful local means of ſtrengthening the eye. The patient ſhould dip in cold water a compreſs, doubled into eight folds, and ſufficiently large to cover the whole face and forehead, and this he ſhould keep applied as long as it continues cold. Or elſe, he ſhould apply cold water frequently to his eyes and face with his hand, or a piece of rag. He may alſo bathe the whole of his head with cold water. Richter does not approve of employing in theſe caſes eye-glaſſes for bathing this organ; he objects to their ſmallneſs, from which the eye ſoon makes the fluid warm, or preſſes the greater part of it out. The eye is alſo remarkably ſtrengthened by repeatedly applying bliſters, of a ſemilunar ſhape, above the eye-brows, ſometimes in one place, ſometimes in another. However, Richter adviſes the bliſter only to be allowed to remain on the part juſt long enough to produce redneſs, without occaſioning a veſication. He alſo recommends rubbing the upper eye-lid, ſeveral times a day, with a mixture of the tinctura cantharidum and ſpiritus ſerpilli, in equal proportions, great care being taken that none of the application come into contact with the eye. All ſpirituous and aromatic remedies are likewiſe proper, which have the quality of ſtrengthening this organ. The infuſum valerianæ et ſalviæ, with a fourth part of camphorated ſpirit, Richter ſpeaks of as an uſeful application, with which the eye-lids, and parts around the eye, may be repeatedly rubbed. He alſo recommends ſmearing the upper eye-lid now and then with the oleum cajeput.

When no probable cauſe whatſoever can be aſſigned for the diſeaſe, the ſurgeon is juſtified in employing ſuch remedies as have been proved by experience to be capable ſometimes of relieving the affection, although upon what principle is utterly unknown. The chief means of this kind are emetics, given in ſmall doſes to excite nauſea, and occaſionally in larger ones to occaſion vomiting. A ſimple ſolution of two grains of the antimonium tartarizatum in a few ounces of water, taken by ſpoonfuls, frequently proves productive of remarkable benefit. Experience is alſo highly in favour of giving a trial to Schmucker's pills, the compoſition of which has already been deſcribed in the preſent article. The operation of theſe pills may be greatly aſſiſted with the exhibition of arnica and valerian, ſixteen grains of which ſhould be taken every morning and evening, and the doſe gradually increaſed. The leaves and flowers of arnica in an infuſion, or elſe in powder, have been found efficacious. Of the laſt, at firſt ten grains, afterwards gradually increaſed to half a dram, may be preſcribed every two or four hours. Arnica has likewiſe been found uſeful conjoined with roſemary. Mercury may be alſo given by itſelf till the commencement of a ſalivation, or conjoined with ſarſaparilla, powder of cicuta, or the ſulphur auratum antimonii.

Valerian alone, in the form of powder, and in the doſe of a half a dram ſeveral times a day, may alſo be tried. Or this medicine may be joined with a decoction of bark, containing either ſome of the ammonia præparata, or a proper proportion of the ſpiritus ætheris vitriolici compoſitus. Snuff may be taken up the noſtrils, or may be uſed as an ingredient in a collyrium, of which one-third ſhould be camphorated ſpirit. Stork has recommended pulſatilla, in the form of an extract, of which from half a grain to two grains is to be taken with ſugar, or antimonial wine, or an infuſion of this plant may be given. The extractum hyoſcyami albi is ſaid to be an excellent remedy, either alone, in the doſe of from two to eight grains twice a day, or together with antimonial wine. A ſort of tincture of millepedes is among the empirical medicines in repute upon the continent for its efficacy in caſes of gutta ſerena. Hemlock is another celebrated remedy. So is the powder of belladonna, given in the doſe of five grains a day. The ammonia præparata, in the doſe of a ſcruple once a day, is likewiſe praiſed. Externally, the aqua ammoniæ acetatæ mixed with ſage, or ſetwell tea, may be uſed as a collyrium. A mixture of oleum caſtorei and hartſhorn, in equal parts, may be taken inwardly in the doſe of forty drops, and alſo rubbed on the upper eye-lid and the eye-brow. Warner exhibited the oleum animale and muſk. (See Anfangſgrunde der Wundarzneykunſt. Band 3.)

Electricity has been ſtrongly recommended as a remedy for the gutta ſerena by Mr. Hey. (See Medical Obſervations and Enquiries, vol. v. Mem. of the Med. Society, vol. iii.) Sparks may be drawn from the eyes, or electrical ſhocks may be given to the patient. With the exception of one caſe, related by Valſalva, Scarpa tells us, that he is unacquainted with any amauroſis, occaſioned by a wound of the eye-brow, yielding to ſurgery. However, one of the examples, recorded by Mr. Hey, was of this kind, and yet was cured by electricity, and adminiſtering every night the following medicine : ℞ Calomel. Camph. ā ā gr. iij. Conſerv. Cynoſb. q. s. probe miſceant et fiant bolus. The patient, who was a lady, had been previouſly bled twice, and had taken ſome nervous medicines. She was placed upon a ſtool with glaſs feet, and had ſparks drawn from her eyes, and the parts about the orbits, particularly where the ſuperciliary and infra-orbitary nerves ramify. After this operation had been continued half an hour, ſhe was made to receive, for an equal time, ſlight ſhocks through the affected parts. In a few days, ſight began to return, and in leſs than three months it was quite reſtored. In another caſe, one grain of calomel and two of camphor, adminiſtered every night in conjunction with electricity, effected a cure. The diſeaſe had come on gradually, without any previous accident or pains in the head. The patient was a boy nine years of age.

Mr. Hey has recorded ſeveral other intereſting caſes of amauroſis, all of which tend to prove electricity a powerful remedy for this diſeaſe, though it is true, as Scarpa has obſerved, that in moſt of the inſtances adduced by Mr. Hey, internal medicines were given, and bleeding practiſed, beſides electricity. The laſt author was led to impute ſo much efficacy to the electricity, becauſe, in two of the caſes, no medicines were employed, and yet the progreſs of the amendment ſeemed to be as quick in them as in the other examples, and becauſe, in two inſtances, a degree of ſight was obtained by the firſt application of electricity. We believe it was Mr. Hey who firſt noticed the obliquity of ſight, which is invariably attendant on amauroſis. He informs us, that it was moſt remarkable in thoſe patients who had totally loſt the ſight of either eye ; for in them the oblique rays of light ſeemed to make the firſt ſenſible impreſſion upon the retina ; and, in proportion as that nervous coat regained ſenſibility, the ſight became more direct and natural.

Mr. Ware has recommended electricity, and the uſe of a mercurial ſnuff, for the cure of the gutta ſerena. The ſnuff is compounded of ten grains of turbith. mineral (hydrargyrus ſulphuratus), well mixed, with about a dram of the pulvis ſternutatorius, glycirrhiza, or common ſugar. A ſmall pinch of this ſnuff is found to ſtimulate the noſe very conſiderably, ſometimes exciting ſneezing, but, in general, producing a very large diſcharge of mucus.

According to Mr. Ware, the caſes which receive benefit from electricity are generally attended with a dilated ſtate of the pupil. However, he notices that there are many inſtances in which a contraction of the pupil is the only change which takes place in the appearance of the eye. In this ſort of caſe, the impairment of ſight is uſually preceded by ſevere pain, and the original cauſe may be an internal ophthalmy of long continuance. The cryſtalline is ſometimes, ſays Mr. Ware, viſibly opaque. Here electricity has been found uſeful ; though this eminent oculiſt at the ſame time beſtows a higher commendation on the ſublimate, which is ſaid to have proved ſuperiorly and more certainly efficacious, and which the ſame gentleman conſequently prefers to all other external applications whatſoever. He adviſes giving one-fourth of a grain, as a proper ordinary doſe, and aſſures us, that it agrees beſt with the ſtomach, when firſt diſſolved, as Van Swieten directs, in half an ounce of brandy, and taken in a baſon of ſago or gruel. For young patients, the doſe muſt be leſs in proportion to their early age. The medicine is to be continued as uninterruptedly as the conſtitution will allow, for a month, ſix weeks, or even longer.

If Mr. Ware's obſervations are correct, electricity has proved more ſtrikingly uſeful in caſes of gutta ſerena originating from lightning, than in any other ſpecies of the diſorder. This author makes us acquainted with a very intereſting example in which the efficacy of electricity was demonſtrated. The diſeaſe made its attack very ſuddenly, on the ſubſidence of a ſevere pain in the teeth and ſwelling of the face. The affection came on more ſuddenly ; the temporary blindneſs was more entire ; the eye-lids were more affected ; and the cure more ſpeedy, than in the examples recorded by Mr. Hey in the fifth volume of the Medical Obſervations and Enquiries. (See Chirurgical Obſervations relative to the Eye, vol. i.)

Schmucker preſcribes a ſternutative powder made of mercury, ſugar, and valerian.

Beſides irritating the Schneiderian membrane, ſtimulating applications may be rubbed on the upper eye-lid, and on the parts about the eye-brows. Two drops of fennel, or cajeput oil, may be uſed in this manner, or elſe a little hartſhorn.

Cantharides are alſo of eminent uſe in numerous caſes of gutta ſerena, eſpecially the bliſtering plaſter which is made of them. This may be applied alternately behind the ears and over the eye-brows for a length of time; or the tinctura cantharidum diluted may be rubbed about the eye-brows, until redneſs and ſwelling are excited. Since, alſo, the internal uſe of cantharides has been found ſerviceable in ſome paralytic affections, (ſee Briſbane's Select Caſes, &c.), it is not unreaſonable to infer, that the ſame remedy may ſometimes do good in caſes of amauroſis. From ten to twenty drops of the tinctura lyttæ may be adminiſtered, twice a day, in any convenient vehicle.

The ſhower bath, which has proved uſeful in other weakneſſes and paralytic diſorders, may likewiſe be of ſervice in ſome caſes of gutta ſerena.

Abroad, cauteriſing the parts about the eye-brow with a heated iron, or the moxa, is ſometimes practiſed, and, as is aſſerted, with beneficial effects. We would not wiſh, however, to ſee the uſe of actual fire again revived among Engliſh ſurgeons.

Richter informs us of a man, who was completely blind, recovering his ſight by having his eyes expoſed ſeveral times a day, for a quarter of an hour at a time, to the vivid rays of the ſun. When the patient had regained ſuch ſenſibility in the eyes, that the light of the ſun was annoying, he was directed to keep theſe organs fixed on ſhining objects. Upon the the ſame principle, it is obſerved, deaf perſons have occaſionally had their hearing re-eſtabliſhed by ſome violent noiſe.

Sometimes, however, as Richter remarks, the foregoing empirical kinds of remedies admit of a rational choice being made in the employment of them. They may, for the moſt part, be divided into two claſſes, namely, ſtimulants and anodynes. The firſt is evidently the moſt advantageous, when the gutta ſerena originates from any debilitating cauſes, or from plethora of the veſſels, and ſtill continues notwithſtanding the removal of ſuch cauſes. Here the duration of the diſeaſe may be aſcribed to a torpid inactive ſtate of the nerves, and ſome benefit may be expected from ſtimulants, ſuch as bliſters, emetics, ſternutatories, electricity, &c. The ſecond claſs of empirical remedies, which leſſen the effects of irritation, ſeems the moſt proper, when the amauroſis has ariſen from ſome irritating cauſe, and continues, notwithſtanding ſuch cauſe is removed. He is of opinion, that the continuation of the diſeaſe may be aſcribed to the impreſſion which the irritation has left upon the nerves, and that benefit may be expected from the uſe of ſuch remedies as tend to diminiſh ſuch impreſſion, as, for inſtance, the extract of the hyoſcyamus albus, the volatile alkali, hemlock, valerian, &c.

Sometimes, as we have already explained, ſymptoms and appearances occur in the courſe of the caſe, which aſſiſt the ſurgeon in making a choice of the means of cure, and lead him to give a preference to this or that empirical remedy, or to ſome other of a ſimilar claſs. For inſtance, the practitioner may occaſionally remark ſymptoms of preternatural irritation, or of unuſual ſenſibility in the eye; the patient ſees ſeveral kinds of coloured or ſhining objects; his eye is painful, and though he is quite blind, he cannot bear a ſtrong light; the pupil is conſiderably contracted; the patient has a beginning amauroſis, and can diſcern better in a dark than a light ſituation. When the ſurgeon cannot detect any particular cauſe of this irritability, he is juſtified in employing ſuch general means as tend to diminiſh irritability, and leſſen irritation. A decoction of white poppy heads may be uſed as a collyrium lukewarm. The extractum hyoſcyami albi, belladonna, cicuta, valerian, bark, gum. ammon. galbanum, oleum cajeput, and opium, eſpecially the tincture with antimonial wine, are all proper medicines in the preceding ſort of caſe.

Sometimes the gutta ſerena ariſes with ſymptoms which indicate weakneſs and diminiſhed ſenſibility of the eye. While the patient continues not entirely blind, he finds his ſight cloudy, he ſees better in a light than a dark ſituation, and feels a ſort of languor in the eye. He experiences a ſenſation, as if ſome dirt were in his eyes, and is frequently endeavouring to wipe it away. He finds himſelf able to ſee better juſt after meals, or whenever he has been having recourſe to external corroborant remedies. Such circumſtances direct the ſurgeon to employ tonics and ſtimulants, when all debilitating cauſes are quite undiſcoverable. Bark, ammonia præparata, valerian, cold water, arnica, cantharides, ſpirituous and aromatic external remedies, &c. are proper.

Sometimes, as Richter further informs us, the ſymptoms ſeem to indicate a preternatural accumulation of fluid in the eye. The patient complains of the eye-ball being tenſe, and of a ſenſation as if there was not room enough in the orbit for the globe of the eye. The eye-ball ſeems to the patient ſtiff, immoveable, and harder than uſual. All kinds of evacuations, bliſters over the eye-brows, behind the ears, and upon the nape of the neck, kept open or frequently repeated; large doſes of emetics, ſetons, iſſues, and ſternutatories, are now the right remedies: Richter thinks, that even dividing the cornea, and letting out the aqueous humour, might, in this inſtance, be advantageous. At all events, in his opinion, it could not be productive of any harm. This ſlight operation, however, muſt either be repeated every day for a few days, or elſe the firſt opening muſt be prevented from cloſing, in order that the fulneſs of the eye may continue, for a certain time, in a diminiſhed ſtate.

The external and internal veſſels of the eye ſometimes, ſays Richter, ſeem to be in a varicoſe condition. The patient ſees immoveable black ſpots, which gradually become larger and more numerous, net-like figures, and ſeveral other unchangeable ſhadowy appearances. The veſſels of the conjunctiva are ſwollen, without being inflamed. Repeated general and topical bleeding, ſcarifying the varicoſe veſſels of the conjunctiva, bathing the eye with cold water, &c. are the moſt ſuitable means in the preſent caſe.

The ſame author alſo remarks, that ſome patients, for a certain ſpace of time, before the diſeaſe, are afflicted with frequent catarrhal diſcharges from the noſe, and, when the blindneſs comes on, feel an unuſual dryneſs in the noſe, uneaſineſs about the root of this part and the frontal ſinuſes. Here ſternutatories are indicated. The ſnuff recommended by Mr. Ware may be employed, or elſe that uſed by Schmucker, and thus compoſed: ℞ Mercur. Viv. drachm. j Sacchar. Alb. dr. iij pulv. Lill. Alb. Rad. Valerian. ā ā dr. j Miſce. The patient may alſo apply to his noſtrils the ſteam of any emollient decoction, containing a proportion of valerian.

In thoſe caſes in which a white, or light-coloured appearance is obſervable at the bottom of the eye, the retina itſelf is probably thickened and diſeaſed. Here ſuch medicines as cicutæ, belladonna, mercury, aqua ammoniæ, &c. may be tried.

In certain inſtances, amauroſis comes on, attended with an obſtinate, frequently returning ophthalmy. When there is no manifeſt cauſe for ſuch inflammation, antimonials, mercurials, and anodynes may be employed.

Richter next obſerves, that, with reſpect to the periodical amauroſis, although it is common to preſcribe bark; yet, ſince the diſorder may proceed from a variety of cauſes, bark can be of no ſervice, and may even do harm, and lengthen the attacks of the diſeaſe, while ſuch cauſes continue unremoved. The cauſe of the periodical amauroſis is moſt frequently in the viſcera of the abdomen. A man, who uſed to be blind every morning, ſays Richter, always felt at the ſame time a ſevere pain juſt under the falſe ribs, on the right ſide. The attacks always terminated with the diſcharge of a large quantity of air from the bowels. Hence it is generally proper, in ſuch caſes, to clear out the alimentary canal, and it is only when this has been accompliſhed that bark can prove uſeful. Frequently, alſo, valerian, arnica, or ſmall doſes of ipecacuanha, may then be adminiſtered with advantage.

Sometimes the periodical amauroſis originates from worms, or from an interruption of the menſtrual diſcharge. Theſe caſes demand a mode of treatment already deſcribed. Occaſionally, the gutta ſerena is connected with hyſterical complaints, with which it ſubſides. The remedies for hyſteria are here the proper remedies for the blindneſs. The oleum cajeput has been found ſerviceable. (See Richter's Anfangſgrunde der Wundarzneykunſt. Band 3, Kapitel 14).

Some caſes of gutta ſerena are, from their nature, incurable. Of this kind may be deemed ſuch as depend upon tumours ſituated in the cerebrum, and compreſſing the optic nerves; ſuch as depend upon original malformations of the optic nerves; ſuch as proceed from a permanent alteration of the optic foramen in conſequence of caries, &c.

Some additional obſervations, connected with the ſubject of gutta ſerena, will be found under the heads HEMERALOPIA and NYCTALOPIA.

The late Mr. Ferguſon contrived an inſtrument for applying the power of electricity to diſorders in the eyes: this inſtrument conſiſts of a pointed braſs wire, faſtened by means of a cork at the ſmaller end of a conical glaſs, open at both ends, and paſſing through the axis of this glaſs, ſo that its point comes within about half an inch of the larger aperture of the glaſs: the inſtrument is to be ſo fixed, that the larger aperture of the glaſs may ſurround the eye, and keep its lid open, and the point of the wire is directed to the pupil, and at the diſtance of about half an inch or an inch from it. In the uſe of this inſtrument a ſpark often proceeds from the point of the wire, which occaſions very acute pain; and, therefore, Mr. Partington fixed a wooden point upon the pointed wire; but the directors of this laſt gentleman are better adapted to the purpoſe.

GUTTÆ *Anglicanæ*, *Engliſh drops*, *volatile Engliſh drops*, or *Goddard's drops*, a name of a medicinal liquor, prepared from divers ingredients, formerly ſuppoſed to be of ſovereign

reign efficacy againſt coagulations of the blood, malignant fevers, and particularly the ſmall-pox, obſtructions, epilepſies, drowſy diſeaſes, vapours, &c.

The inventor of theſe celebrated drops was Dr. Goddard, a phyſician of London. The ſecret of their compoſition was purchaſed by king Charles II. at the price of 50,000*l.* ſterl. whence they were denominated *guttæ Anglicanæ.*

This coſtly receipt we ſhall here gratify the reader with, *a meilleur marche:* "Take five pounds of human cranium, of a perſon hanged, or dead of ſome violent death, two pounds of dried vipers, two pounds of hartſhorn, and two of ivory; mince the whole ſmall, put it in two or three retorts, and diſtil it in a reverberatory furnace, with the ſame precautions as are ordinarily uſed in diſtilling hartſhorn and vipers, to extract their volatile ſalt. When the veſſels or receivers are cold, unlute them, and ſhake them well, in order to looſen the volatile ſalts from the ſides of the veſſels. Pour the whole in a large glaſs cucurbit, and filtrate it through a brown paper, in order to ſeparate the oil, which is here uſeleſs: put the filtrated liquor in a glaſs retort, and place it in a ſand heat, and fit another glaſs retort thereto, as a recipient; take care all things be well luted, and make a cohobation of the ſaid matters at three times. But, by the way, add all the ſalt before ſeparated from the receivers; and after the ſaid three cohobations, unlute the retorts, and pour the whole into a matraſs with a long neck, to which fix a ſuitable capital, and a receiver; lute all the joinings on each ſide with a wet bladder, and ſet the veſſel in a ſand heat; by this means, the volatile ſalt will be ſublimed, and ſtick to the capital and upper part of the matraſs. Continue the fire till ſpirit enough hath riſen to diſſuſe and diſſolve the ſalt which aroſe firſt: then take all the fire out of the furnace, that the diſtillation may proceed no farther, which is a circumſtance of the laſt importance, without which the medicine would be weakened by too much phlegm." Biet. in Mem. de Trev. 1713.

As to the doſe of this remedy, they begin with ſeven or eight drops, increaſing by degrees to forty or fifty, on preſſing occaſions, as in apoplexies, lethargies, weakneſſes, &c.

The real compoſition of the guttæ, however, is ſomewhat controverted. Dr. Liſter aſſures us, that he had the ſecret communicated to him by king Charles II. that it is no other than the volatile ſpirit of raw ſilk, rectified with oil of cinnamon, or ſome other eſſential oil.

The ſame author aſſures us, he had found by experience, that the guttæ Anglicanæ were not in any reſpect preferable to the common volatile ſpirits of hartſhorn and ſal ammoniac, except that the ſmell is more ſupportable. Mem. de l'Acad. des Scien. ann. 1700.

Guttæ, in *Architecture*, are ornaments in form of little cones, in the plafond of the Doric cornice, on the architrave, underneath the triglyphs, repreſenting a ſort of drops or bells; they are uſually ſix in number. They are ſometimes alſo called *lachrymæ*, *tears;* and *campanæ* or *campanulæ*, *bells.* Leon Baptiſta Alberti calls them *nails.* See Drops.

GUTTE. See Gutty.

GUTTEMBERG, John, in *Biography*, regarded as the inventor of the noble art of printing, was born at Mentz about the year 1400. Much has been ſaid with reſpect to the author of this invention, who is now generally given as the ſubject of the preſent article · the controverſy will, however, be conſidered more at large when we come to the word Printing. It appears, by a public document entitled "An Enquiry, ordered by the Senate of Straſburg, in regard to the Suit carried on againſt John Guttemberg, &c. in 1439," that he was the inventor of typography, that he had at this period a preſs mounted, and that in this preſs there were forms, locked by ſcrews, which ſhew that the types were moveable. The characters which he employed were cut out of wood, though he ſometimes uſed lead, or ſome other harder metal, for his types. In the year 1465, Guttemberg was honoured by the archbiſhop Adolphus with a mark of diſtinction, to which his genius and labour entitled him. He was admitted among the nobility of his court, allowed to wear the dreſs peculiar to that order, and had a penſion, together with ſeveral privileges and exemptions, conferred upon him. Guttemberg is ſuppoſed to have died in the year 1467 or 1468. He was interred in the church of Recollets at Mentz, and the following epitaph was placed over or near his tomb. "D.O.M.S, Johanni Genſfleiſch, (from the name of his houſe,) artis impreſſoriæ repertori, de omni natione et lingua optime merito, in nominis ſui memoriam immortalem, Adam Gelthus poſuit." Over another houſe, in which Guttemberg lived, was placed the following inſcription in the year 1507.

Joanni Guttembergensi
moguntino,
qui primus omnium literas ære
imprimendas invenit
hac arte de orbe toto bene merenti;
ivo vintigensis
hoc saxum pro monumento posuit.

GUTTER, in *Geography*, a ſea-port of Perſia, in the province of Mecran; ſituated in a bay of the Arabian ſea; 40 miles W. of Guadel. N. lat. 25° 18'. E. long. 61° 15'.—Alſo, a ſmall iſland in the Arabian ſea, near the coaſt of Perſia. N. lat. 25° 15'. E. long. 61° 10'.

Gutter, in *Agriculture*, a narrow ditch, trench, or furrow, formed in any kind of ground for the purpoſe of draining it. It may be moſt conveniently formed by the plough, and ſpades proper for the purpoſe.

Gutter, in *Building*, a channel for collecting and conveying the water from the roof, ſituated between the parapet and the inclined ſide of the covering, or between the inclined ſides of a double roof, the interſection of the vertical plane of the wall and the inclined plane of the roof, or the two inclined planes forming horizontal lines. When two inclined ſides of a roof meet each other at an internal angle, and form an inclined interſection to the horizon, the angle thus formed is called a valley. The external angles formed by two inclined planes are called hips; and hence hips are exactly the reverſe of vallies, and thus we have the difference between gutters, hips, and vallies. The interſection of the planes which form the ſides of gutters are horizontal, but the interſection of the planes which form hips and vallies are inclined.

Gutters for lead are formed partly by a boarding perpendicular to the plane of the walls, and partly by the inclined ſides of the roof and the vertical planes of the walls, and are ſupported by horizontal bearers from the walls to the ſides of the rafters, againſt which they are nailed at one end; the other end is ſupported cloſe to the wall upon ſmall poſts or puncheons, which are notched and nailed to the bearers. The boarding which is ſupported by the bearers, and which ſtands perpendicular to the planes of the walls, forms the bottom of the gutter, and is laid with a declivity in the parallel direction of the plane of the wall, of about an inch in ten feet, and with ſteps called drips at every twelve or eighteen feet. The drips are formed in planes perpendicular to the horizon and to the walls, riſing about two, or two and a half inches, ſo as to add to the deſcent of the gutters, and at ſuch diſtances from each other as are equal to the length of the ſheets. Gutters are laid with lead of ſuch weight, that the ſuperficial foot contains from ſeven to twelve pounds, according to the ſtreſs that is ſuppoſed to be on the ſurface. The ſheets are laid from twelve to eighteen feet in length, as the deſcent for the water may permit. When there is a ſufficient current for the water, ſhorter ſheets of twelve feet in length are to be recommended in preference to longer ones, on account of the latter ſometimes cracking by expanſion, as all metals are liable to do. Caſt lead is preferable to milled lead, as being more ſolid in its texture, and on this account is more to be depended upon when it expands, ſo as to keep from tearing aſunder; but milled lead is equally thick throughout, and has its ſurface regularly ſmooth, properties which, however, are not to be found in caſt lead; therefore, wherever beauty and neatneſs of workmanſhip are required, milled lead muſt be employed. The goodneſs of caſt lead depends upon the equality of its thickneſs, which cannot at all times be depended upon, and it is but juſtice to inform the reader that plumbers themſelves are divided in their opinion whether caſt or milled lead ought to have the preference.

In London, parapet walls and leaden gutters are indiſpenſible, on account of the building act, as the numerous inhabitants are leſs liable to accidents from the falling of broken ſlates or tiles; and in caſes of fire in the lower part of the building, they are convenient for making an eſcape from the danger, and alſo for aſſiſting in extinguiſhing the flames. Several attempts have been made to ſubſtitute copper, but this material has not been found to have the deſired effect. The water is conveyed from the gutters by leaden pipes.

In the country, dripping-eaves are much uſed, and to be preferred in elevated ſituations, as in the winter ſeaſon the gutters and pipes are frequently ſtopped by ſnow or froſt, ſo as to bring down the ceilings and plaſtering, injure the walls, and rot the timber; and thus not only render the building unfit for living in, but reduce it to ruin in the courſe of a few years. On this account, many of the firſt rate houſes ſuffer much by the overflowing of the water, unleſs the gutters areſo conſtructed that the water may eſcape before it finds its way into the building. Gutters ſhould never be ſoldered where it can be avoided, particularly when the ſoldering would make the ſheets of unuſual length, as in this caſe it would be impoſſible to enſure it from cracking; the expences of repairing would be frequent, and the ultimate effect would be ruinous. The thickeſt lead is uſed in gutters and flats, each generally of the ſame weight, while the hips and ridges are from five to ſix pound to the foot, and moſt generally of milled lead.

Gutter, in *Mining*, ſignifies in Staffordſhire, and ſome other places, a ſlough, adit, level, or ſubterraneous drain to a mine.

Gutter and *Blaſt*, denotes one of the modes of working a hard vein of lead ore, which conſiſts in picking out or cutting a gutter or vertical nick in the vein-ſtuff on one ſide of the rib of ore or vein, and then ſetting a ſhot or ſhots on the other ſide, in order to blaſt out the ore, &c.

Gutter-*ledge* is the name of a croſs-bar, laid along the middle of a hatch-way in ſome ſhips, for ſupporting the covers, and any weighty body that may be laid or moved upon them.

Gutter *Tyles*. See Tyle.

GUTTERANA, in *Geography*, a town of Hindooſtan, in the circar of Sanore; 15 miles E. of Sanore.

GUTTERING *of* Land, in *Agriculture*, the forming of drains of the gutter kind in lands, either by the plough or the ſpade, ſo as to free them from overabundant moiſture.

Guttering *Plough*, the name of a ſmall and ſimple plough of the draining kind, that is much employed on wet lands in ſome diſtricts. It is capable of being wrought by a ſingle horſe or a man. A trench or opening, four or five inches in breadth, and ſix or eight inches in depth, may by this means be readily formed; on which account it is much employed in making drains in bleaching and other ſimilar grounds, and may do very well for wet clayey meadow land, where the ſoil is ſhallow, and liable to the production of ruſhes and other coarſe plants.

The tool conſiſts of a piece of iron, about five inches in breadth, and pointed at the end: upon this piece two other pieces are fixed perpendicularly to the former, one on each ſide, the fore edges inclining backwards; ſo that the three edges of the inſtrument form a ſort of letter A: and to the bottom plate is fixed a ſocket for receiving the ſtale or handle, which is ſet higher or lower by means of a wedge on the under ſide. At the end of the ſtale is a croſs piece three feet in length, againſt which the man's breaſt is placed, when he ſhoves the tool before him in cutting the drain. A rib, twenty-four inches long, is fixed on the ſocket, at the end of it; a peg, about a foot long, and two inches in diameter, is faſtened to the ſide of the ſtale by ſcrews. This peg reſts on the land when the clod is turned out of the tool. See Plough-*draining*.

GUTTETÆ Pulvis, is the name of an epileptic powder in the Paris Pharmacopœia, compoſed of miſletoe of the oak, roots of white dittany, the root and ſeed of peony, of each half an ounce; the ſeeds of gooſe-foot, two drams; human ſkull, three drams; red coral prepared, two drams; the horns of elk's foot, half an ounce; and a ſcruple of gold leaf: all which ingredients are to be reduced to a fine powder. This powder has been deemed a very powerful antiſpaſmodic, and is ſaid to have been adminiſtered in the quantity of a ſcruple for a doſe, for a conſiderable time, with great ſucceſs in the epilepſy.

GUTTIFERÆ, in *Botany*, ſo called by Juſſieu, becauſe of the gum or reſin for which ſome of them are noted, a Natural Order of Plants, the 69th in the ſyſtem of that diſtinguiſhed author, and the 9th of his 13th claſs. For the full characters of this claſs, ſee Gerania.

The order of *Guttiferæ* is thus defined. *Calyx* either of a definite number of leaves, or of one leaf deeply divided, or very rarely wanting. *Petals* definite in number, often four. *Stamens* moſtly indefinite, rarely definite, their filaments ſometimes diſtinct, ſometimes, but more rarely, monadelphous, or polyadelphous; their anthers incorporated with the filaments. *Germen* ſimple; ſtyle ſimple or none; ſtigma ſimple or divided. *Fruit* moſtly of one cell, either a berry or drupa, or capſular, in ſome caſes entire, in others burſting by valves, and containing one or many *ſeeds*, ſometimes attached to the central receptacle, ſometimes to the encloſing part. *Corculum* ſtraight, without any albumen, its lobes ſomewhat callous or corky. The *plants* are either trees or ſhrubs, many of them abounding with reſinous juice. *Leaves* moſtly oppoſite, generally coriaceous, undivided, ſmooth, with one central longitudinal nerve, the reſt tranſverſe. *Flowers* axillary or terminal, occaſionally monoecious or dioecious by abortion of parts.

The firſt ſection conſiſts of ſix genera, which have no ſtyle; *Cambogia* adopted from Rheede and Linnæus; *Cluſia; Garcinia; Tovomita*, Aubl. t. 364; *Xanthe* of Schreber, which is *Quapoya* of Aubl. t. 343, 344; and *Grias*. See the latter, which we have preſumed to remove to another order.

Section ſecond, flowers with one ſtyle, comprehends eight genera; *Symphonia* of Schreber, which is *Moronobea* of Aubl. t. 313; *Macoubea*, Aubl. t. 378, a genus with which no other perſon has ventured to meddle, all parts of the flower being unknown; *Mammea; Macanea*, or *Macahanea*, Aubl. t. 371, of whoſe flower there is no account; *Sterbeckia* of Schreber, which is *Singana* of Aubl. t. 230; *Meſua; Rheedia;* and *Calophyllum*.

The third ſection conſiſts of four genera, whoſe leaves are alternate, and which are judged for that reaſon akin to the next order, *Aurantia*. Theſe are *Valeria; Elæocarpus; Vatica;* and *Allophylus*.

GUTTSTADT, in *Geography*, a town of Pruſſia, in Ermeland; 64 miles S. of Konigſberg.

GUTTURAL Letters, are thoſe pronounced or formed, as it were, in the throat.

Dr. Wallis diſtinguiſhes the vowels in our language into labial, palatine, and guttural; according to the ſeveral degrees of opening the mouth to pronounce them, larger, middle, and leſs. On this footing he makes three guttural vowels, and three labial, and as many palatines.

The four guttural letters in Hebrew are א, ה, ח, and ע, formed into the technical word אהחע.

GUTTUROSUS Piscis, in *Ichthyology*, a ſmall fiſh common in the Mediterranean, and brought to market at Rome, Venice, and elſewhere; and called in different parts *gotoroſala*, *gottorugine*, and *gotto di mare*.

GUTTUS, a term among antiquaries for a ſort of vaſe uſed in the Roman ſacrifices, to take the wine and ſprinkle it *guttatim*, drop by drop, upon the victim.

Vigenere on T. Livy gives the figure of the guttus, as repreſented on divers medals, and other ancient monuments.

GUTTY, or Gutte, in *Heraldry*, is when a thing is repreſented as charged or ſprinkled with drops.

In blazon, the colour of the drops is to be named; thus, gutty of ſable, of gules, &c.

Some authors will have red drops called *gutty de ſang*, or *drops of blood;* black ones, *gutty de poix*, *of pitch;* white, *gutty d'eau*, *of water*, &c.

GUTZKOW, in *Geography*, a town of Anterior Pomerania, capital of a country to which it gives name; 24 miles S. of Stralſund. N. lat. 53° 56′. E. long. 13° 23′.

GUUL, a river of Norway, which runs into Drontheim bay; 14 miles W. of Drontheim.

GUY, Thomas, in *Biography*, the founder of a noble hoſpital in Southwark, that bears his name, was the ſon of a lighterman and coal-dealer in Horſley-down. He was apprenticed to a bookſeller, and began trade with no larger ſtock than 200*l.*; he was, however, induſtrious and ſucceſsful: but the bulk of his fortune was acquired by purchaſing ſeamen's tickets during the wars in queen Anne's reign, and by fortunate ſpeculations in the South-ſea ſtock, in the year 1720. Beſides Guy's hoſpital, he erected a wing to St. Thomas's hoſpital, and alſo an alms-houſe at Tamworth. He died in 1724, at the age of eighty-one, leaving behind him the vaſt ſum of 300,000*l.*

Guy, in *Geography*, a town of Hindooſtan, in Benares; 10 miles S. of Chunar.

Guy, in a *Ship*, is any rope uſed to keep off weighty bodies from bearing or falling againſt the ſhip's ſide, when they are to be hoiſted or lowered. Thus, if any thing is to be haled in over the gunwale, it is gently eaſed in by a *guy* rope, faſtened uſually to the ſtanchions of the waſte-trees.

Guy is likewiſe a large ſlack rope, extending from the head of the main-maſt to the head of the fore-maſt, and having two or three large blocks faſtened to the middle of it. This is chiefly employed to ſuſtain the tackle uſed for hoiſting in and out the cargo of a merchant-ſhip, and is removed from the maſt-heads as ſoon as the veſſel is laden or delivered. See Garnet.

Guy's *Hoſpital*. See Hospital.

GUYANDOT, in *Geography*, a river of America, in Virginia, which runs into the Ohio; N. lat. 38° 22′. W. long. 82° 20′.—Alſo, *Little Guyandot*, a river of Virginia, which runs into the Ohio; N. lat. 38° 14′. W. long. 81° 12′.

GUYERN, a town and caſtle of Germany, in the principality of Anſpach; 20 miles S.E. of Anſpach.

GUYON, Jeanne-Marie Bouvieres de la Mothe, in *Biography*, a female enthuſiaſt and myſtic of the 17th century, was born in 1648, at Montargis, of a reſpectable family; and at the age of 16 ſhe was married to the ſon of the celebrated Guyon, who obtained rank and fortune by his execution of the noble undertaking of the canal of Briare. At the age of 28 years, ſhe was left a widow with three children. She had always been diſtinguiſhed by deeds of charity, and a highly devotional turn of mind; and ſoon after the commencement of her widowhood, ſhe became acquainted at Paris with D'Arenthen, biſhop of Geneva, a prelate of ſingular worth and piety, who invited her to enter into a community of new Catholics, which was about to be eſtabliſhed in his dioceſe for the converſion of Proteſtant females. She complied with this propoſal, to the neglect of her young children, and to the ſurpriſe of her acquaintance. In this inſtitution, Madame Guyon renewed her acquaintance with Father Lacombe, a very devout Barnabite; who, having a turn of mind ſimilar to her own, inflamed her heated and elevated imagination, and confirmed her in the idea which ſhe had conceived, that ſhe was called to exerciſe an extraordinary miniſtry in the church. Indeed her whole life proved the mania of founding a myſtic aſſociation. Upon the application of her family, ſhe gave up a large ſettlement for the education of her children, and of her whole property reſerved to herſelf only a ſmall annuity. Leaving Gex, ſhe now followed Father Lacombe to the Chublais, and thence to Grenoble. This circumſtance gave riſe to the ſcandalous reports which were circulated at a ſubſequent period, and which Boſſuet endeavoured to employ to the prejudice of Fenelon, though the attempt ended in his own confuſion. In 1687, Madame Guyon returned to Paris, after an abſence of ſix years, which were conſumed in excurſions, conferences, and preachings. The principles ſhe inculcated were the entire renunciation of ſelf, the ſilence of the ſoul, the annihilation of all emotions, and a total indifference to life or death, future happineſs or miſery; and during this time ſhe publiſhed her two works, "An eaſy Method of Praying," and the "Myſtical Explication of the Songs of Solomon." Theſe performances were ſanctioned by very reſpectable names, but were generally conſidered as chargeable with extravagancies; and ſhe was arreſted on account of them, as well as on other grounds, and underwent various examinations by the official of the archbiſhop of Paris. On this and on all other inveſtigations of her proceedings, ſhe was freely acquitted of any moral irregularities; nevertheleſs ſhe remained in cuſtody in the convent of St. Mary. The ſiſters of that houſe were edified by her ſociety, and charmed with her converſation and behaviour; and their teſtimonies procured her great and powerful friends, all of whom ſhe was able to intereſt ſtrongly in her favour. The cautious and reflecting Madame de Maintenon was among the number who at length obtained her releaſe. Although the firſt accounts which archbiſhop Fenelon received of this lady had prepoſſeſſed him againſt her, yet upon paying her a viſit and inquiring into the courſe of her life, his unfavourable impreſſions were totally removed, and he was led to form a very high opinion of her piety and charity. He was afterwards introduced to her at the houſe of the ducheſſe de Beauvilliers, and upon repeated intercourſe ſhe gained a complete aſcendancy over his mind. Madame Maintenon had ſo high an eſteem for her, that ſhe was allowed to make frequent viſits to the convent of St. Cyr, where ſhe communicated her doctrines and her works. At length, however, Madame Maintenon became ſuſpicious, and upon conſulting her ſpiritual director, the biſhop of Chartres, ſhe became more cautious and guarded; and the pious Fenelon, much as he was prepoſſeſſed in favour of M. Guyon's doctrines and writings, concurred in recommending to withdraw the latter from the ſiſters of St. Cyr, and to diſcourage the prevalence of the former. About this time ſhe ſubmitted her works to the examination of Boſſuet, biſhop of Meaux, as it has been ſaid, by the advice of Fenelon; and ſhe alſo entruſted to the inſpection of the firſt named prelate, who afterwards betrayed her confidence, a MS. life, which contained many extravagances. In conſequence of an examination of her works by Boſſuet and other prelates, 34 articles were drawn up in condemnation of the myſteries of quietiſm, and Mad. Guyon, who had placed herſelf in a convent at Meaux, under the eye of the biſhop, her imagined friend, but in reality her enemy and perſecutor, was obliged, in 1695, to ſign theſe articles, and to teſtify her unqualified ſubmiſſion to the deciſions of the church. Upon her return to Paris, and her renewed zeal in making proſelytes, ſhe was confined at Vincennes, at Vaugirard, and finally in the Baſtile. When Fenelon, who was implicated in this buſineſs, as we have ſhewn under his article, made his ſubmiſſion, Mad. Guyon was liberated from the Baſtile in 1702, and then retired to Blois; where ſhe paſſed the remaining years of her life in obſcurity, and in the private exerciſes of a devotion, ſincere though enthuſiaſtic. She died with all the raptures of divine love which an ardent imagination could inſpire, in the year 1717, at the age of 69. To her teſtament ſhe prefixed a confeſſion of her faith, and an avowal of invariable obedience to the Catholic church. It cannot, however, be diſputed, that her fanaticiſm had much miſled her judgment, and that in her account of herſelf ſhe made pretenſions to a degree of perfection above the attainment of human nature in a ſtate of trial. Among her writings, we may mention "Chriſtian Diſcourſes," "The Old and New Teſtament, with Explanations and Reflections," 20 vols. 8vo.; "Spiritual Letters," and "Spiritual Songs and Nuptial Poems." To thoſe who are acquainted with the ſentiments and diſpoſition of the late excellent Mr. Cowper, whoſe character and poetical productions have claimed juſt approbation, it will not be ſurpriſing that he ſhould have cauſed to be ſelected, tranſlated, and printed ſome of the poems of Madame Guyon. Bauſſet's Hiſt. of Fenelon. Nouv. Dict. Hiſt. See Fenelon and Quietiſts.

GUYSBOROUGH, or Mancheſter, in *Geography*, a townſhip of Nova Scotia, on Chedabucto bay, 10 leagues N.W. of Cape Canſo, and 40 leagues E. of Halifax, which in 1783 contained 250 families.

GUYSE, John, in *Biography*, was born at Hertford in the year 1680, where he afterwards ſettled as a diſſenting miniſter. He was a zealous Trinitarian, and publiſhed ſome pieces in defence of the orthodox doctrine, as it was then, and ſtill is denominated. From Hertford he removed to London, and accepted an invitation to become paſtor of an Independent congregation in New Broad-ſtreet, with which he ſpent the remainder of his days, in the exemplary diſcharge of the duties connected with his office. In the year 1732 the univerſity of Aberdeen conferred on him the degree of doctor of divinity. His principal work was a paraphraſe on the New Teſtament, in three vols. 4to. which was completed in 1752. In the latter part of life Dr. Guyſe loſt his ſight, but as he was an extempore preacher, he continued his miniſterial duties till within a few months of his death, which happened in 1761, when he was in the eighty-firſt year of his age. He was author alſo of "The Youth's Monitor," "Sermons to young People," and other pieces.

GUZEL-HISAR, in *Geography*, a town of Aſiatic Turkey, in Natolia, anciently called "Magneſia Meandri," the reſidence of a pacha; divided into two parts by a river, anciently the "Lethæus." The air in the hot months is inſalubrious; 27 miles E. S. E. of Scalanova. N. lat. 37° 45′. E. long. 27° 50′.—Alſo, a town of Natolia, near the W. coaſt; 15 miles N. E. of Fokia. N. lat. 38° 48′. E. long. 26° 54′.

GUZERAT, a peninſula of Hindooſtan, about 200 miles in length, and 140 wide, formed by the Arabian ſea, (called by the Aſiatics the "ſea of Omman,") and the gulfs of Cambay and Cutch, both of which penetrate far within the continent; ſubject to high and rapid tides, which throw up dangerous ſand-banks, and to the "bore," (which ſee,) which elevates the water many feet above the common ſurface of the ſea, and rages here with great violence. By the numerous ſubdiviſions of this tract, and ſtill more by the amount of its revenue, ſtated in the Ayin Acbaree, we are led to conſider it as of very great importance, in the opinion of the Moguls. This province, though the ſoil is dry and ſandy, and ſome parts of it are woody and mountainous, is one of the richeſt in the Mogul empire; abounding in rice, cotton, corn, ſugar, fruits of various kinds, with plenty of cattle and game. The rain is conſtant from the middle of June to the middle of September; but during the other months the air is clear and ſerene: and the abundance of night-dew refreſhes the plants, which are ſcorched by the rays of a hot ſun during the day. Guzerat contains a conſiderable number of towns, which have flouriſhing manufactures, and the woods are richly ſtored with timber fit for building. The greateſt part of it is occupied by the Poonah Mahrattas. The weſtern part of the peninſula is inhabited by a wild, hardy race, and they are governed by rajahs of their own, nor do they appear to have undergone much change by the late revolutions in Hindooſtan. The largeſt, as well as the fineſt part of Guzerat, is divided between the Paiſhwah, or head of the weſtern empire, reſiding at Poonah, (which ſee,) and Futty Sing Guicuar, or Guicker, who holds his ſhare chiefly in the northern part of it. (See Mahrattas.)

The fineſt part of this country was conquered by the Engliſh under general Goddard, but reſtored to the Mahrattas after the war with Hyder Ally. Guzerat, being a frontier province, as it reſpects the acceſs by ſea, contains a greater mixture of races, and a greater variety of religions, than any other province. Beſides Hindoos, the principal inhabitants, who follow the worſhip of the Bramins, this province is occupied by Moguls, Arabians, Perſians, Armenians, and Europeans. Its chief city is Amedabad, which ſucceeded Mahmoodabad, as the capital, ſituated on the banks of a ſmall river, called Sabermatty, and not Sabremelli, as is erroneouſly ſtated under the article *Ahmedabad*; which ſee.

GUZES, in *Heraldry*, roundles of a ſanguine or murry colour.

GUZGOOTY, in *Geography*, a town of Bengal; 8 miles N. of Rungpour.

GUZNOORGUL, a province of Aſia, belonging to Caferiſtan or Kuttore, lying on the W. of Bijore, and between it, and the Chuganſerai river, which forms the N.E. boundary of Cabul.

GWABR-MERCHED, in our *Old Writers*, a Britiſh word ſignifying a payment or fine, made to the lords of ſome manors, upon the marriage of their tenants' daughters; or otherwiſe, on their committing incontinency. See Marchet.

GWAIF, or Waif. See Waif.

GWALIOR, in *Geography*, a celebrated fortreſs of Hindooſtan, in the circar of Gohud, ſtanding on a hill, 1 $\frac{6}{10}$ mile in length, and 300 yards in its greateſt breadth. The height at the N. end, where it is greateſt, is 342 feet. At this end is a palace, and about the middle of the fort are two remarkable pyramidal buildings of red ſtone, conſtructed in the ancient ſtyle of Hindöo architecture. A ſtone parapet runs all round, cloſe to the brow of the hill, which is ſo ſteep, that it was judged perfectly ſecure till major Popham took it by eſcalade, on the 3d of Auguſt 1780. The only gate is towards the northern extremity of the eaſt ſide, from which, by ſeveral flights of ſteps, you aſcend to the top of the rock. Within are ſeveral large natural cavities in the rock, which contain a perpetual ſupply of excellent water. On the outſide, about half way up, are many cells, which contain the figures of men and animals, carved, like the excavations, out of the ſolid rock. Along the eaſt ſide, near the ſummit, runs a line of blue enamel, very freſh and brilliant; a proof that this manufacture had attained conſiderable perfection in Hindooſtan at an early period. The town, which runs along the eaſt ſide of the hill, is large, well inhabited, and contains many good houſes of ſtone, abundantly furniſhed by the neighbouring hills. Theſe form a kind of amphitheatre, ſurrounding the fort and town, at the diſtance of from one to four miles. They are principally compoſed of a reddiſh ſchiſtus, which ſeems to contain a large proportion of iron. On the eaſtward of the town runs the ſmall river Soonrica. At the diſtance of 700 yards from the northern extremity of the fort is a conical hill, having on the top a remarkable ſtone building, which conſiſts of two high pillars, joined by an arch, and ſeeming to be of ancient workmanſhip. Beyond the river Soonrica is a handſome ſtone building, with a cupola covered with blue enamel, the tomb of Mahommed Ghous, a man celebrated for learning and ſanctity, in the time of the emperor Acbar. Within the incloſure which ſurrounds this monument, is a ſmall tomb, to the memory of Tan-Sein, a muſician of incomparable ſkill, who flouriſhed at the court of the ſame monarch. The tomb is overſhadowed by a tree, concerning which a ſuperſtitious notion prevails, that the chewing of the leaves will give an extraordinary melody to the voice. The diſtrict depending on this town, which includes the country of "Ghod," yields 22 lacks of rupees, 15 of which are paid into the treaſury, the remaining ſeven being allowed for the expence of collection. A conſiderable trade is carried on here in cloth from Chanderi, and in indigo. About ſeven coſs from hence, on the road to Nirwir, at the village of Beereih, is a mine of iron, which is worked to conſiderable advantage. The fort itſelf, from its great ſecurity, is made uſe of by Sindiah as a place of confinement for his ſtate priſoners, and the grand repoſitory of his artillery, ammunition, and military ſtores. N. lat. 26° 15'. E. long. 78 28'. Aſiatic Reſearches, vol. vi.

GWENDRAETH River, in Caermarthenſhire, in South Wales, is navigable only about two miles up from the Briſtol channel to Kidwelly town, where it is joined by the *Kidwelly*, or Miſs Keymer's coal canal (ſee our article Canal). In 1806 Mr. Anthony Bower made a ſurvey of the lower port or eſtuary of this river, and, in 1809, Mr. William Smith alſo ſurveyed it, and propoſed a new cut for the current of the river (as has been done at Briſtol), and by means of embankments and a ſea-lock, to hold up 100 acres of floating dock or harbour, below the town of Kidwelly: his eſtimate of theſe works being 15,000*l*. Coals and limeſtone would be the principal articles of export from this harbour.

GWINNE, Matthew, in *Biography*, was born in London. In the year 1574 he was elected a ſcholar of St. John's college, Oxford, of which he afterwards became perpetual fellow. In 1582 he was made regent-maſter, agreeable to the cuſtom of the univerſity at that time, and was appointed to read lectures on muſic. After taking his degrees in arts, he entered upon medicine, and practiſed as a phyſician in Oxford and its neighbourhood. In 1588, he was choſen junior proctor; and in September 1592, was the firſt replier in a diſputation held at Oxford for the entertainment of queen Elizabeth. The following year he was created doctor of phyſic, and in 1595, by leave of the college, he attended ſir Henry Unton, ambaſſador from queen Elizabeth to the French court, in quality of his phyſician. On the fonndation of Greſham college, in 1596, he was choſen its firſt profeſſor of phyſic, being one of the two nominated by the univerſity of Oxford, and having a further recommendation from lord chancellor Gerton. In the beginning of the year 1605, he was appointed phyſician to the Tower, and in December, the ſame year, was admitted a fellow of the college of phyſicians. After this he continued to practiſe in London with great reputation, both in the city and at court. He died, according to Wood, in 1627.

He publiſhed the following works: 1. "Epicedium in Obitum illuſtr. Herois, Henrici Comitis Derbienſis," Oxon. 1593. — 2. "Nero, Tragædia nova," Lond. 1603. — 3. "Orationes duæ, Londini habitæ in Ædibus Greſhamiis," 1605.—4. "Vertumnus, ſive Annus recurrens," 1607.—5. "Aurum non Aurum, &c."—6. "Verſes in Engliſh, French, and Italian."— 7. "A Book of Travels." — 8. "Letters concerning Chemical and Magical Secrets." Aikin's Biog. Mem. of Medicine.

GWYNEDD, one of the three principalities or kingdoms into which Wales was divided in the time of the heptarchy; the other two being Deheubarth and Mathravel, or Powys-land. Gwynedd, now North Wales, the country of the Ordovices, was divided into the four diſtricts of Mon, now Angleſey, Avuon, now Caernarvon, Meryonydd, now Merionethſhire, and of Berweddhylod, now Denbighſhire and Flintſhire. The chief reſidence of the princes of Gwynedd, or North Wales, was at Aberfraw, in the iſle of Angleſey. Each of theſe diſtricts or provinces in the three principalities of Wales, were ſubdivided into ſo many cantreves, and theſe again into ſo many commots; ſo as to make 51 cantreves, and 158 commots, in all Wales.

GY, a town of France, in the department of the Upper Saone, and chief place of a canton, in the diſtrict of Gray; nine miles E. of Gray. The place contains 2695, and the canton 12,886 inhabitants, on a territory of 247$\frac{1}{2}$ kiliometres, in 30 communes.

GYALGUR, called alſo *Gawile*, the principal fortreſs of Moodajee, the depoſitary of his treaſures and valuables, ſituated on a ſteep mountain, about 103 geographical miles to the W. by N. of Nagpour. See Gawile.

GYARMATH, a town of Hungary; 20 miles E.S.E. of Levens.

GYAROS, or Gyarus, in *Ancient Geography*, a ſmall iſland of the Archipelago, and claſſed by Steph. Byz. among the Sporades, but rather belonging to the Cyclades; ſituated at a little diſtance from the coaſt of Attica, between Scyros to the S. W., and Andros to the N. W. The Romans in the time of the emperors had made it a place of exile: Thus Juvenal (Sat. I. v. 73.)

> " Aude aliquid brevibus Gyaris et carcere dignum,
> Si vis eſſe aliquis: probitas laudatur et alget."

GYBING, in *Sea Language*, denotes the art of ſhifting any boom-ſail from one ſide of the maſt to the other.

GYEY, in *Geography*, a town of France, in the department of the Upper Marne; 12 miles N. W. of Langres.

GYGANEUM, in *Ancient Geography*, a town of Aſia, in the Colchide, on the coaſt of the Euxine ſea, near the mouth of the Iſis, and to the S.W. of it.

GYGAS, a promontory of Aſia, in the Troade, near Dardanus.

GYGES, in *Biography*, the miniſter and favourite of Candaules, king of Lydia, rebelled againſt his ſovereign, and having ſlain him, aſcended the throne in his ſtead. This event is placed about 718 B. C. He made war upon the people of Miletus and Smyrna, and conquered the whole diſtrict of Troas. He is ſaid to have reigned 38 years. This is the account given by Plutarch. Gyges, by other authors, is made the ſubject of a fable, which gives him the poſſeſſion of a magical ring that had the property of rendering the wearer inviſible. This fact is alluded to by many of the beſt claſſical authors. Herodotus gives another account of the ſubject. He tells us that Candaules expoſed the naked charms of his wife to Gyges, which, when ſhe diſcovered, ſo enraged her, that ſhe ſent for the miniſter, and gave him the choice of loſing his own life, or taking away that of his ſovereign, and occupying his place on the throne, and in her bed. He choſe the latter, ſtabbed the king in his ſleep, married the queen, and took poſſeſſion of the kingdom, over which he was permitted to reign in peace, after he had procured the ſanction of the Delphic oracle.

GYGOOGOO, in *Geography*, a village of Bootan, ſituated on the declivity of a hill, 12 miles from Buxadewar, conſiſting of five or ſix houſes, ſupported on bamboo props; the joiſts, beams, the matted walls, the connecting bands, and every part of the fabric, being made of bamboo, except the covering of the roof, which is compoſed of plantain-leaves doubled. The principal inhabitants are an old man, his daughter, and another female, who preſented captain Turner and his companions, in their embaſſy to Tibet, with vegetables, eggs, poultry, and the uſual offering of a pelong handkerchief, tea, and whiſky. Theſe people are ſtationed here by the Daeb Rajah, for the purpoſe of preſerving a quick and free communication with his poſſeſſions on the borders of Bengal, and of conveying, with expedition, letters and parcels to and from the capital. They cultivate a ſmall piece of ground, which furniſhes grain for their ſubſiſtence. Their herds of cows and ſwine ſeek their own food in the ſpontaneous paſture of the woods. Here were found two large peach-trees, ſome lime and orange-trees, and raſpberry-buſhes. At a ſmall diſtance flows the river Tehintchieu in a deep channel at the foot of the mountain. This river runs by Taſſiſudon, and being ſwelled by the united ſtreams of the Hatchieu, which paſſes near a place of the ſame name, and by the Patchieu, which takes its courſe near Paro, finds a paſſage between the mountains, from whence it is precipitated in tremendous cataracts, and ruſhing with rapidity between the high cliffs and vaſt ſtones that oppoſe its progreſs, deſcends at length into the valley a few miles E of Buxadewar, and finally joins the Berhampooter. Turner's Tibet, p. 47.

GYKOW, a town of the duchy of Holſtein; ten miles W. of Lutkenborg.

GYLIPPUS, in *Biography*, a Lacedæmonian commander, ſon of Clearchus, was ſent, about the year B.C. 414, through the influence of Lyſander, to the relief of Syracuſe, when it was beſieged by the Athenians. He obtained a great victory over Nicias and Demoſthenes, and obliged them to ſurrender. He accompanied Lyſander in his expedition againſt Athens, and was preſent at the capture of that city. After the fall of Athens, he was entruſted with the money that had been taken in the plunder, which amounted to 1500 talents. His avarice cauſed him to violate his truſt by a fraud: he unſewed the bottom of the bags in which it was contained, and ſecreted about 300 talents. His theft was diſcovered, and to avoid the puniſhment due to his guilt, he fled from his country, and was obliged to live in exile the remainder of his days. By this act of meanneſs the glory of all his former actions was tarniſhed, and his name has been tranſmitted to poſterity with the infamy it deſerves.

GYLONGS, an order of religious perſons, who inhabit Taſſiſudon in Bootan; they aſſemble in their chapels three times a day for the performance of their devotion, morning, noon, and evening. At the earlieſt dawn of day they chant their oriſons to the ſound of numerous inſtruments; at 12 they meet again to perform their devotion, and cloſe the evening with their prayers. The gates of the palace are then ſhut, as well for the ſake of tranquillity and ſafety, as to prevent a violation of their rigid rules of chaſtity. Fifteen hundred gylongs are contained within the walls of the palace, and not a female lodges under the ſame roof. The religious, from their firſt introduction into the order, are bound by its laws to celibacy, and are interdicted, by the ſevereſt penalties, from all connection with the female ſex; though ſome very pretty women are employed in carrying water into the palace. Sedentary as is the life of theſe gylongs, they appear fairer in their complexions, and more athletic, than the reſt of their countrymen. Accuſtomed to ablution, they reſort to a ſmall iſland at a little diſtance for the purpoſe of bathing in the Tehintchieu. Turner's Tibet, p. 83.

GYLPUT, in our *Old Writers*, the name of a court held every three weeks in the liberty or hundred of Pathbew, in the county of Warwick. " Inquiſit. ad quod damn." 13 Edw. III. Blount.

GYLTWITE, a compenſation or amends for treſpaſſes, &c. " Mulcta pro tranſgreſſione." LL. Edg. regis, anno 964. Terms of Law.

GYMNANTHERA, in *Botany*, from γυμνος, *naked*, and ανθηρα, the *anther*; becauſe thoſe parts are deſtitute of the beard obſervable on the anthers of *Periploca*, a genus nearly related to this. Brown. Aſclep. 47. Prod. Nov. Holl. v. 1. 464.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juſſ.

Eſſ. Ch. Corolla ſalver-ſhaped, with a crown of five awned leaves. Filaments diſtinct, inſerted into the mouth of the corolla; anthers prominent, beardleſs; maſſes of pollen granulated, four-fold, attaching themſelves to the dilated ſummits of the prominences of each ſtigma. Follicles cylindrical, ſmooth, widely divaricated. Seeds comoſe.

1. G. *nitida*. Native of the tropical region of New Holland. *Plant* ſhrubby, twining, ſmooth, milky. *Leaves* oppoſite, ſhining. *Flowers* greeniſh-white, beardleſs, on lateral, rather forked ſtalks. There are five notched ſcales, inſerted on the inſide of the ſinuſes of the calyx. *Brown.*

GYMNANTHES, from γυμνος, *naked*, and ανθος, *a flower*, Swartz. Prod. 95. Schreb. Gen. 656, is now reduced by its author to *Excoecaria*. His *G. elliptica* is *E. tinifolia*;

Fl. Ind. Occ. 1119, and *G. lucida* is *E. lucida*, 1122. They are trees or ſhrubs with ſimple, ſmooth, ſhining leaves, and axillary catkins, growing in the ſouthern parts of Jamaica. See EXCOECARIA.

GYMNARTHRIDIA, in the *Hiſtory of Inſects*, a ſeries or claſs of inſects, which have ſoft and naked bodies furniſhed with limbs.

Theſe have been generally called *zoophytes*, a term expreſſing creatures partly of an animal and partly of a vegetable nature; but as it is now well known that there are none ſuch, it is proper that the term zoophyte ſhould no longer be retained.

Under this claſs are comprehended the limax, or the naked ſnail, the lernea, meduſa, aphrodita, amphitrite, &c.

GYMNASIA, in *Ancient Geography*, a town of Aſia, in the Colchide. Diod. Sic. l. 14.

GYMNASIARCH, GYMNASIARCHA, compounded of γυμνασιον, and αρχη, *government*, in *Antiquity*, the maſter or director of a gymnaſium.

The Greeks did not rank the gymnaſiarcha among the number of magiſtrates; though his office was of great conſideration, as having the care of all the youth, who were truſted to him to be formed to exerciſes of the body.

He had two principal officers under him, who were to aſſiſt him in the government of the gymnaſium; the firſt named *xyſtarcha*, and the ſecond *gymnaſta*. The former was maſter of the *athletæ*, and preſided over the wreſtling. (See ATHLETÆ.) The latter had the direction of all the other exerciſes, taking care they were performed in due time and manner, that they were not too ſevere, that the youth attempted nothing beyond their ſtrength, and that nothing were done that might be injurious to their health.

Theſe had ſeveral ſubaltern officers or ſervants under them, for the ſervice and inſtruction of the youth committed to them.

GYMNASIUM, a place fitted for the performing exerciſes of the body.

This word is γυμνασιον, formed of γυμνος, *naked;* becauſe they anciently put off their clothes, to practiſe with the more freedom.

Among the ancients, gymnaſium was a public edifice deſtined for exerciſe, and where people were taught, and regularly diſciplined under proper maſters.

If we may credit Solon in Lucian's Anacharſis, and Cicero, De Orat. lib. ii. the Greeks were the firſt who had gymnaſia; and among the Greeks, the Lacedæmonians; after them the Athenians, from whom the Romans borrowed them.

There were three principal gymnaſiums at Athens; the academy, where Plato taught; the lyceum, noted for Ariſtotle's lectures; and the cynoſarges, allotted for the populace.

Vitruvius deſcribes the ſtructure and form of the ancient gymnaſia, lib. v. cap. 11. They were called gymnaſia, becauſe the champions performed *naked;* and palæſtræ, from *wreſtling*, which was one of the moſt uſual exerciſes there: the Romans ſometimes alſo called them *thermæ*, becauſe the baths and bagnios made a principal part of the building.

It appears that they did not perform their exerciſes quite naked, ſo early as the time of Homer, but always in drawers; which they did not lay aſide before the thirty-ſecond Olympiad. One Orſippus is ſaid to have been the firſt who introduced the practice: for having been worſted, by means of his drawers undoing and entangling him, he threw them quite aſide, and the reſt afterwards imitated him.

The gymnaſia conſiſted of ſeven members, or apartments. M. Burette, after Vitruvius, recites no leſs than twelve, *viz.* 1. The exterior *porticos*, where the philoſophers, rhetoricians, mathematicians, phyſicians, and other virtuoſi, read public lectures, and where they alſo diſputed and rehearſed their performances. 2. The *ephebeum*, where the youth aſſembled very early, to learn their exerciſes in private, without any ſpectators. 3. The *coryceum, apodyterion*, or *gymnaſterion*, a kind of wardrobe, where they ſtripped, either to bathe or exerciſe. 4. The *elæotheſium, alipterion*, or *unctuarium*, appointed for the unctions, which either preceded or followed the uſe of the bath, wreſtling, pancratia, &c. 5. The *coniſterium*, or *coniſtra*, in which they covered themſelves with ſand, or duſt, to dry up the oil, or ſweat. 6. The *palæſtra*, properly ſo called, where they practiſed wreſtling, the pugillate, pancratia, and divers other exerciſes. 7. The *ſphæriſterium*, or tennis-court, reſerved for exerciſes wherein they uſed balls. 8. Large unpaved alleys, which comprehended the ſpace between the porticos and the walls wherewith the edifice was ſurrounded. 9. The *xyſti*, which were porticos for the wreſtlers in winter, or bad weather. 10. Other *xyſtis*, or open alleys, allotted for ſummer and fine weather, ſome of which were quite open, and others planted with trees. 11. The *baths*, conſiſting of ſeveral different apartments. 12. The *ſtadium*, a large ſpace of a ſemicircular form, covered with ſand, and ſurrounded with ſeats for the ſpectators. For the adminiſtration of the gymnaſia, there were divers officers: the principal were, 1. The *gymnaſiarcha*, who was the director and ſuperintendent of the whole. 2. The *xyſtarcha*, who preſided in the xyſtus, or ſtadium. 3. The *gymnaſta*, or maſter of the exerciſes, who underſtood their different effects, and could accommodate them to the different complexions of the athletæ. 4. The *pædotriba*, whoſe buſineſs was mechanically to teach the exerciſes, without underſtanding their theory or uſe. Under theſe four officers were a number of ſubalterns, whoſe names diſtinguiſhed their different functions.

As to the kinds of exerciſes practiſed in the gymnaſia, they may be reduced to two general claſſes, as they depend either on the action of the body alone, or as they require external agents or inſtruments. The former are chiefly of two kinds, *orcheſtice* and *palæſtrice*.

The *orcheſtice* comprehended, 1. *Dancing*. 2. *Cubiſtice*, or the art of tumbling. 3. *Sphæriſtice*, or tennis, including all the exerciſes with pilæ, or balls.

The *palæſtrice* compriſed all exerciſes under the denomination *palæſtra;* as *wreſtling*, *boxing*, *pancratia*, *hoplomachia*, *running*, *leaping*, *throwing the diſcus*, the *exerciſe of the javelin*, and that of the *hoop*, denominated by the Greeks τροχος, which conſiſted in rolling an iron hoop five or ſix feet in diameter, beſet with iron rings, the noiſe of which appriſing the people to give way, afforded them alſo an amuſement. Both ſtrength and ſkill were requiſite in directing this hoop, which was to be driven with an iron rod.

To theſe muſt alſo be added the exerciſes belonging to the medicinal gymnaſtics, as, 1. *Walking*. 2. *Vociferation*, or ſhouting. 3. *Holding one's breath*.

The bodily exerciſes, which depend on external agents, may be reduced to *mounting* the horſe, *riding* in a chaiſe, or other wheeled vehicle: *rocking* in beds or cradles, and ſometimes *ſwinging:* to which may be added, the art of *ſwimming*. Hoffman enumerates no leſs than fifty-five ſorts of gymnaſtic exerciſes.

GYMNASTES, Γυμναστης, among the *Ancients*, an officer in the ancient *gymnaſium*, next in authority to the *gymnaſiarch* and *xyſtarch*.

GYMNASTERIUM, Γυμναστεριον. See GYMNASIUM.

GYMNASTICS, GYMNASTICE, or the GYMNASTIC

Art, denotes the art of performing exerciſes of the body, whether for defence, health, or diverſion.

The gymnaſtic art is divided into three ſpecies or branches; *military*, *medicinal*, and *athletic*, or *ſportive*.

Several modern writers have treated of this art; as Mercurialis, De Arte Gymnaſtica: Faber, in Agoniſtic. Joubert, de Gymnaſiis; Cagnatus, De Sanit. Tuend. Voſſius, De Quatuor Artib. Popular. Meurſius, De Orcheſtra; Fuller, in Medicina Gymnaſtica; and M. Burette, in ſeveral diſſertations on the ancient Dancing, Spheriſtics, Athletics, Wreſtling, Pugillate, Diſcus, &c.

M. Burette has given the hiſtory of gymnaſtics in the Memoirs of the Royal Academy of Inſcriptions. According to him, this art is coeval with the world. In reality, we can hardly ſuppoſe mankind to have ever been without ſome ſort of exerciſes of the body, which the defence of their perſons, the preſervation of health, and even recreation and mirth, would neceſſarily lead them to. See EXERCISE.

On the firſt eſtabliſhment of ſociety, men, being appriſed of the neceſſity of military exerciſes, for repelling the inſults of their neighbours, inſtituted games, (ſee GAMES,) and propoſed prizes, to animate their youth to combats of divers kinds. And as running, leaping, ſtrength and dexterity of arm in throwing the javelin, driving a ball, or toſſing a quoit, together with wreſtling, &c. were exerciſes ſuited to the manner of fighting in thoſe days, ſo the youth vied to excel in them, in the preſence of the aged, who ſat as their judges, and diſpenſed prizes to the conquerors; till what was originally only amuſement, became, at length, a matter of ſuch importance, as to intereſt famous cities, and entire nations, in its practice.

Hence aroſe an emulation and eagerneſs to excel, in hopes, one day, of being proclaimed and crowned conquerors in the public games, which was the higheſt honour a mortal could arrive at: nay, they went ſo far as to imagine, that even gods and demi-gods were not inſenſible of what men were ſo captivated with; and, in conſequence hereof, to introduce the greateſt part of theſe exerciſes into their religious ceremonies, the worſhip of their gods, and the funeral honours done to the manes of the dead.

Though it be hard to determine the preciſe epocha of the gymnaſtic art, yet it appears, from ſeveral paſſages in Homer, and particularly the twenty-third book of the Iliad, where he deſcribes the games celebrated at the funeral of Patroclus, that it was not unknown at the time of the Trojan war. From that deſcription, which is the earlieſt monument now extant of the Grecian gymnaſtics, it appears, that they had chariot-races, boxing, wreſtling, foot-races, gladiators, throwing the diſcus, drawing the bow, and hurling the javelin; and it ſhould ſeem, from the particular account Homer gives of theſe exerciſes, that even then the gymnaſtic art wanted little of perfection: ſo that when Galen ſays there was no gymnaſtic art in Homer's days, and that it began to appear no earlier than Plato, he is to be underſtood of the medicinal gymnaſtics only. This laſt, indeed, had its riſe later: becauſe, while men continued ſober and laborious, they had no occaſion for it; but when luxury and idleneſs had reduced them to the ſad neceſſity of applying to phyſicians, theſe, who had found that nothing contributed ſo much to the preſervation and re-eſtabliſhment of health as exerciſes, proportioned to the different complexions, ages, and ſexes, did not fail to refer them to the practice of gymnaſtics.

According to Plato, one Herodicus, prior a little time to Hippocrates, was the firſt who introduced this art into phyſic; and his ſucceſſors, convinced by experience of its uſefulneſs, applied themſelves in earneſt to improve it.

Hippocrates, in his book of Regimen, has given inſtances of it, where he treats of exerciſe in general, and of the particular effects of walking, with regard to health; alſo of the different ſorts of races, either on foot or horſeback; leaping, wreſtling, the exerciſe of the ſuſpended ball, called *corycus*, chironomy, unctions, frictions, rolling in the ſand, &c.

But as phyſicians did not adopt all the exerciſes of the gymnaſtic art in their practice, it came divided between them and the maſters of martial and athletic exerciſes, who kept ſchools, the number of which was greatly increaſed in Greece.

At length the Romans alſo caught the ſame taſte; and adopting the military and athletic exerciſes of the Greeks, they improved them and advanced them to the utmoſt pitch of magnificence, not to ſay extravagance. But the declenſion of the empire involved the arts in its ruin, and, among others, gymnaſtics and medicine; which laſt unhappily then relinquiſhed the title it had to the former, and has neglected to reſume it ever ſince.

The *five* gymnaſtic exerciſes, ſo much celebrated by all the writers of antiquity, and ſo accurately deſcribed by Homer, Pindar, Sophocles, and Pauſanias, began, 1. With the foot race, which is ſuppoſed to have been the moſt ancient, and which always retained the prerogative of diſtinguiſhing the olympiads by the name of the victorious racer. At firſt this exerciſe conſiſted in running naked from one end of the ſtadium to the other. The courſe was afterwards doubled, and at length the competitors were required to paſs the goal three, ſix, and even twelve times, before they could be entitled to the prize. Motives of utility introduced the race of men loaded with heavy armour; which rendered this exerciſe a conteſt of ſtrength as well as of ſwiftneſs. 2. The ſecond trial of agility conſiſted in leaping, the competitors endeavouring to ſurpaſs each other in the length, without regard to the height of their leaps. They carried in their hands weights of lead, through the perforations of which their fingers paſſed, as through the handle of a ſhield, and by theſe they poiſed, and impelled forwards their bodies. The perfection attained in this exerciſe muſt have far exceeded the experience of modern times, if we may believe what Pauſanias ſays of Phaulus of Crotona, that he leaped 52 feet. 3. The wreſtling of the ancients required equal ſtrength and agility. It was chiefly remarkable on account of the oil and ſand with which they rubbed their bodies, in order to ſupple their joints, to prevent exceſſive perſpiration, and to elude the graſp of their antagoniſts. The wreſtlers were matched by lot, and the prize was adjuſted to him who had thrice thrown his adverſary on the ground. 4. The following exerciſes tried chiefly the ſtrength of the arms; the firſt conſiſted in throwing a huge maſs of poliſhed iron, braſs, or ſtone, of a circular form, reſembling a ſhield, but without handle or thong. It was called the diſk, and thrown under the hand as the quoit is in England. The object of the competitors was to ſurpaſs each other in the length of the caſt. Akin to this was the art of darting the javelin, which, as that weapon was darted at a mark, required ſteadineſs of eye as well as dexterity of hand. 5. The laſt of the gymnaſtic exerciſes, both in order and eſtimation, was that of boxing. It was ſometimes performed by the naked fiſt, and ſometimes with the formidable cæſtus, compoſed of raw hides lined with metal. Before the victory could be decided, it was neceſſary, from the nature of that exerciſe, that one of the combatants ſhould acknowledge his defeat; a condition which ſeemed ſo inconſiſtent with the obſtinacy of Grecian valour, that few ventured to contend in this dangerous amuſement. The laws of Sparta abſolutely prohibited her citizens from ever engaging in it, becauſe a Spartan was taught to diſdain ſaving his life by yielding to an opponent. Another reaſon, no leſs remarkable, tended ſtill more to degrade the exerciſe of boxing. Beſides ſtrength and agility, the ſucceſs of the boxer, it was thought, depended on a certain ponderous fleſhineſs of arm, which unfitted him for engaging in any other conteſt. The regimen required for keeping up his corpulency, ſo neceſſary for the defence of his bones againſt the weight of blows, was altogether incompatible with the life of a ſoldier; a life of hardſhip and inequality, and continually expoſed to the want of reſt, of proviſions, and of ſleep. Theſe were the *five* gymnaſtic exerciſes, in which the Grecian youth were trained with ſo much care, and to which they applied with ſo much emulation. But beſides theſe ſimple ſports, there were two others formed of their various combination. The "Pancratium," which conſiſted of wreſtling and boxing; and the "Pentathlon," in which all the five were united; and to excel in ſuch complicated exerciſes required an education and mode of living not neceſſary to be obſerved by thoſe who contended in the ſimple feats of ſtrength and agility, and which was ſcarcely compatible with the ſtudy of any other than the athletic profeſſion. See each of the articles above-mentioned.

GYMNEMA, in *Botany*, from γυμνος, *naked*, and νημα, a *thread* or *ſtamen*; the ſtamens being deſtitute of the leafy crown, uſual in the tribe to which it belongs. Brown Aſclep. 22. Prod. Nov. Holl. v. 1. 461.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juſſ.

Eſſ. Ch. Corolla ſomewhat pitcher-ſhaped, five-cleft; its orifice moſtly crowned with five little ſcales or teeth, inſerted into its ſinuſes. Crown of the ſtamens wanting. Anthers terminated by a membrane. Maſſes of pollen erect, attached by their baſe. Follicles ſlender, ſmooth. Seeds comoſe.

The habit is ſhrubby, and generally twining. Leaves oppoſite, membranous, flat. Umbels cymoſe, between the leaf-ſtalks, not properly axillary.

Of this genus Mr. Brown has aſcertained four ſpecies.

1. G. *geminatum*. Mouth of the corolla crowned; tube ſlightly downy within. Umbels in pairs; their ſtalks ſhorter than the footſtalks. Leaves ovate, ſmoothiſh. Branches downy. Stem twining.—Native of the tropical part of New Holland.

2. G. *trinerve*. Mouth of the corolla naked. Umbels ſeſſile. Leaves oblong-lanceolate, three-nerved, downy. Stem erect.—Native of the ſame country.

The other two, of which we have no ſpecimens, nor have proper ſpecific differences, as contraſted with the above, been given, are the following.

3. G. *lactiferum*. (Aſclepias lactifera; Linn. Sp. Pl. 314. A. n. 111; Fl. Zeyl. 46.)—"Leaves ovate, pointed. Stem erect."—Native of Ceylon. *Herb. Hermann.* Very much like *Aſclepias Vincetoxicum*, except that the leaves are leſs heart-ſhaped. The umbels are oppoſite, ſcarcely longer than the footſtalks. *Linn.*

4. G. *ſylveſtre*. (Periploca ſylveſtris; Willd. Phytogr. faſc. 1. 7. t. 5. f. 3.)—"Leaves ovate, reticulated; downy beneath. Stem twining, downy. Umbels ſolitary, their ſtalks as long as thoſe of the leaves."—Native of Ceylon.

GYMNIA, in *Zoology*, a claſs of animalcules, containing ſuch as have neither tail, nor any viſible limbs. See ANIMALCULE.

GYMNIAS, in *Geography*, a large, rich, and well-peopled town of Aſia, in Armenia.

GYMNIC, GYMNICUS, ſomething belonging to the exerciſes of the body.

Gymnic games, *ludi gymnici*, are thoſe wherein the body is exerciſed; ſuch are wreſtling, running, dancing, the uſe of the lance, quoit-playing, &c.

Theſe made the chief diverſions of the Olympic, Nemean, Pythian, and Iſthmian ſolemnities; being called by the Greeks Πένταθλον, and the Latins *quinquertium*. See PENTATHLON.

GYMNOCARPI, in *Botany*, from γυμνος, *naked*, and καρπος, *fruit*, the ſecond of the two great ſections in Perſoon's ſyſtem of *Fungi*, and by far the moſt important and numerous, as comprehending, amongſt others, the moſt extenſive genus *Agaricus*. Its definition is, "*Fungi* of a fleſhy texture, bearing their ſeeds (ſparingly) in an open receptacle, called the *Hymenium*." It conſiſts of three ſub-diviſions; improperly termed orders, as the whole tribe of *Fungi* itſelf is but an order of the great claſs *Cryptogamia*.

1. *Lytothecii*. The fructifying membrane, or *hymenium*, finally reſolving itſelf into a jelly, as in *Clathrus* and *Phallus*.

2. *Hymenothecii*. *Hymenium* membranous, permanent, powdery with the minute ſeeds, as in *Agaricus* and its allies; alſo *Boletus*, *Clavaria*, *Helvella*, &c.

3. *Næmatothecii*. Fungi of a downy or fibrous habit, as *Dematium*, *Erineum*, *Racodium*, &c. This laſt diviſion is rather a ſweeping one, and comprehends various obſcure productions, whoſe natural orders are by no means agreed on. Some botaniſts call them *Byſſi*, others *Confervæ*, or *Lichenes*, according as they themſelves have choſen one tribe or another for their particular ſtudy.

GYMNOCLADUS, from γυμνος, *naked*, and κλαδος, a *ſlender branch*; ſo named by Lamarck, in alluſion to the naked, and ſeemingly dead, appearance of its branches in winter, which has induced the French ſettlers in Canada to call it *Chicot*, or Stump-tree. Lamarck. Dict. v. 1. 733. Illuſtr. t. 823. Schreb. 696. Juſſ. 346. (Bonduc; Duham. Arb. v. 1. 107. t. 42.)—Claſs and order, *Dioecia Decandria*. Nat. Ord. *Lomentaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth of one leaf, funnel-ſhaped; tube oblong, with 10 furrows, contracted at the mouth; limb in five deep, linear, acute, nearly equal, ſpreading ſegments, rather ſhorter than the tube. *Cor.* Petals five, lanceolate, bluntiſh, nearly equal, ſpreading, rather longer than the ſegments of the calyx, inſerted into the mouth of its tube. *Stam.* Filaments 10, thread-ſhaped, inſerted into the upper part of the tube, five of them rather the longeſt, all of them much ſhorter than the corolla; anthers ovate, erect. *Piſt.* ſcarcely any.

Female, *Cal.* and *Cor.* like the male. *Piſt.* Germen ſuperior, oblong; ſtyle ſhort; ſtigma obtuſe. *Peric. Legume* oblong, thick, pulpy, of ſeveral cells, divided by tranſverſe partitions. *Seeds* ſolitary in each cell, roundiſh, very hard.

Eſſ. Ch. Male. *Calyx* tubular, five-cleft. Petals five.—Female. Calyx and Corolla like the male. Stigma obtuſe. Legume of ſeveral cells. Seeds ſolitary.

1. G. *canadenſis*. Michaux. Bor. Am. v. 2. 241. t. 51. (Guilandina dioica; Linn. Sp. Pl. 546. Ait. Hort. Kew. v. 2. 56.)—A native of Canada, hardy in our gardens, where it has long been cultivated, though we have never heard of its bloſſoming. This is the only certain ſpecies, the *G. arabica* of Lamarck belonging to the genus *Hyperanthera*, along with the *Guilandina Moringa* of Linnæus. The *Gymnocladus*, or Hardy Bonduc, is a ſtraight handſome *tree*, with a fine leafy top in ſummer, but thin and unſightly when the foliage is gone. The *leaves* are very

large, doubly pinnate, their leaflets ovate, ſlightly ſtalked, an inch and half long, acute, entire, veiny, ſlightly downy. *Flowers* in terminal, denſe, rather compound bunches, whitiſh, minutely downy. *Legumes* four or five inches long, thick and fleſhy. *Seeds* very hard, requiring much moiſture, and a hot-bed, to make them vegetate. The tree, according to Duhamel, loves a dry ſoil, and will not grow in marſhy places. If cut down or removed, ſuch parts of the roots as happen to remain produce abundance of young plants.

GYMNOPÆDIA, a kind of dance, eſtabliſhed by Lycurgus, and in uſe among the ancient Lacedæmonians; performed, during their ſacrifices, by young perſons, who danced naked, ſinging at the ſame time a hymn in honour of Apollo.

The word is alſo written *gymnopædice*; it is compounded of γυμνος, *naked*, and παις, *child*.

Terpander is recorded as the inventor of the gymnopædia. Athenæus deſcribes it as a Bacchic dance, performed by youths ſtripped quite naked, with certain interrupted though agreeable motions and geſtures of the body; the arms and legs being flouriſhed and directed after a peculiar manner, repreſenting a ſort of real wreſtling.

GYMNOPODIA, among the *Ancients*, a kind of ſhoes which diſcovered the naked feet. They were worn by the Grecian women, who were very fond of them.

GYMNOPUS, in *Botany*, from γυμνος, *naked*, and πους, the *foot*, the third and largeſt ſection of the genus *Agaricus* in Perſoon, conſiſting of one hundred and thirty-ſeven ſpecies, which have a central ſtalk, deſtitute of a veil or ring.

GYMNOPYRIS, in *Natural Hiſtory*, the name of a genus of foſſils, the characters of which are theſe: they are of the claſs of the *pyritæ*, and are compound, inflammable, metallic bodies, found in detached maſſes, of no determinately angular figure; of a ſimple internal ſtructure, not ſtriated; and are naked, or not covered with any inveſtient coat or cruſt, in which they differ from the pyriplaces.

Of this genus there are only two known ſpecies.

GYMNOSOPHISTS, a claſs of Indian philoſophers, famous in antiquity; ſo denominated from their going barefoot. The word is formed of the Greek γυμνοσοφιστης, q. d. a ſophiſt or philoſopher who goes naked.

This name was given to the Indian philoſophers, whom the exceſſive heat of the country obliged to go naked; as that of *Peripatetics* was given to thoſe who philoſophiſed walking.

Laertius, Vives, &c. will not have Gymnoſophiſt to have been the name of any particular ſect, but a common name of all the philoſophers in the Indies; and hence they divide them into Brachmans and Germani.

Among the Germani, called alſo by Porphyry *Samanæi*, and by Clemens Alexand. *Sarmanæ*, ſome were called *Hylobii*, by Clemens Alexand. *Allobii*, as inhabiting the woods; which laſt ſeem to come neareſt to the notion of Gymnoſophiſts. Clemens relates, that theſe Allobii neither inhabit cities nor towns, are clothed moſtly with the leaves of trees, eat acorns and berries, and drink water out of their hands, abſtaining from marriage and procreation.

The Gymnoſophiſts believed the immortality and tranſmigration of the ſoul: they placed the chief happineſs of man in a contempt of the goods of fortune and the pleaſures of ſenſe, and gloried in having given faithful and diſintereſted counſels to princes and magiſtrates. It is ſaid, that when they became old and infirm, they threw themſelves into a pile of burning wood, in order to prevent the miſeries of an advanced age. One of them, named Calamus, thus burnt himſelf in the preſence of Alexander the Great.

The Indian Gymnoſophiſts were more diſtinguiſhed by ſeverity of manners than by the cultivation of ſcience, and they ſeem to have more reſembled modern monks than ancient philoſophers. Some of them, however, allowed themſelves a greater latitude of manners than others; but their general characteriſtics were rigid abſtinence, indolence, and the pride of independence. Of their high ſpirit Strabo relates the following inſtance: when Oneſicritus was commiſſioned by Alexander to invite a body of theſe philoſophers to viſit him, they refuſed to go, ſaying, that if Alexander had any buſineſs with the Brachmans, he might come to them. Their abſtinence and hardy endurance made a ſtrong impreſſion on the minds of the multitude, and gave them great influence in an age of ignorance and ſuperſtition; more eſpecially, as they arrogated to themſelves the whole buſineſs of foretelling future events, and appropriated to themſelves the regulation of religious concerns. Arrian Exp. Alex. l. vii.

Apuleius, Forid. lib. i. deſcribes the Gymnoſophiſts thus; "They are all devoted to the ſtudy of wiſdom, both the elder maſters and the younger pupils; and what to me appears the moſt amiable thing in their character is, that they have an averſion to idleneſs and indolence: accordingly, as ſoon as the table is ſpread, before a bit of victuals be brought, the youths are all called together from their ſeveral places and offices, and the maſters examine them what good they have done ſince the ſun-riſe: here one relates ſomething he has diſcovered by meditation; another has learned ſomething by demonſtration; and as for thoſe who have nothing to alledge why they ſhould dine, they are turned out to work faſting."

The great leader of the Gymnoſophiſts, according to Jerom, was one Buddas, called by Clemens Butta, who is ranked by Suidas among the Brachmans. That laſt author makes Buddas, the preceptor of Manes the Perſian, the founder of the Gymnoſophiſts.

Ptolemy aſſigns to the Gymnoſophiſts a ſituation in the north-eaſtern part of India, between the Hyphaſis and the Ganges; whereas the Brachmans, or Brahmins, a branch of the Gymnoſophiſts, were fixed by the ſame geographer in the ſouthern part of this region, between the So'enus and the Chaberus, two rivers not far from the ſea-coaſt, and by theſe different ſituations, he ſeems to have conſidered the latter as ſeparate and diſtinct from the former.

There were likewiſe African Gymnoſophiſts, who dwelt upon a mountain in Ethiopia, near the Nile, without the accommodation either of houſe or cell. Theſe did not form themſelves into ſocieties, like thoſe of India; but each had his private retirement, where he ſtudied and performed his devotions by himſelf. If any perſon had killed another by chance, he applied to theſe ſages for abſolution, and ſubmitted to whatever penances they enjoined. They pretended to an extraordinary frugality, and lived only upon the fruits of the earth. Lucian aſcribes to theſe philoſophers ſeveral new diſcoveries in aſtronomy. They performed the ſacred functions after the manner of the Egyptian prieſts; had diſtinct colleges and claſſes of diſciples, and taught their dogmas in obſcure and mythological language. They were remarkable for their contempt of death.

The morality of the Ethiopians, it is ſaid by Laertius, conſiſted in worſhipping the gods, doing no evil, exerciſing fortitude, and deſpiſing death. See Ethiopia.

GYMNOSPERMIA, in *Botany*, from γυμνος, *naked*, and σπερμα, *ſeed*, the firſt order of the Linnæan 14th claſs, *Didynamia*, conſiſting of ſuch plants of that claſs as have naked ſeeds, in which it differs from the ſecond order, or *Angioſpermia*. (See DIDYNAMIA and ANGIOSPERMIA.) The ſeeds are, except in two or three genera, which have ſolitary ſeeds, always four to each flower, and the permanent calyx performs the office of a ſeed-veſſel. Some writers contend that there is no ſuch thing in nature as a naked ſeed, which is perfectly true, inaſmuch as the internal eſſential parts of a ſeed muſt have one or more integuments, to contain their originally almoſt fluid ſubſtance, while it aſſumes a determinate configuration and ſtructure, and to afford it ſubſequent protection. Such integuments make an eſſential part of the ſeed itſelf, whether it be lodged in a pericarp or not, and ſuch only are found in the plants of the order in queſtion, which is nearly a natural one, including the labiate flowers, except thoſe which, having but two ſtamens inſtead of four, are neceſſarily referred to the claſs *Diandria*. This exception, however, conſtitutes a great objection to the Linnæan ſyſtem in the minds of thoſe who conſider it otherwiſe than an artificial one, and in ſome degree interferes with its convenience and accuracy; for *Verbena*, a natural genus, has ſome ſpecies with four unequal ſtamens, which refer it to *Didynamia* among its allies, while others have but two. Hence authors, according to their having examined more of the one or of the other, differ about its claſs.

All the plants, however, which properly belong to the *Didynamia Gymnoſpermia*, form a natural aſſemblage without any exception. Their qualities are aromatic or bitter, and there is no noxious herb amongſt them. The calyx is in ſome genera two-lipped; in others its ſegments are nearly equal; in both caſes they are, more or leſs diſtinctly, five in number. Moſt of the genera of this order, though ſo natural an one, are themſelves very naturally diſtinguiſhed by habit, and ſome one or more eſſential characters. See AJUGA, LAMIUM, MENTHA, &c.

GYMNOSTACHYA, from γυμνος, *naked*, and ϛαχυς, a *ſpike*. Brown. Prod. Nov. Holl. v. 1. 337. We preſume to alter the termination, becauſe *Stachys* being an eſtabliſhed genus, *Gymnoſtachys* is exceptionable.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Piperitæ*, Linn. *Aroïdeæ*, Juſſ.

Eſſ. Ch. Spatha minute, keeled. Spadix cylindrical, entirely covered with flowers. Perianth in four deep ſegments. Stamens inſerted into its baſe. Germen with one pendulous ſeed. Stigma ſeſſile, co-arctated. Berry naked. Seed with an albumen. Embryo inverſe.

1. G. *anceps*. Native of the country near Port Jackſon, New South Wales. *Herb* perennial, of a peculiar habit. *Root* with cluſtered ſpindle-ſhaped knobs. *Leaves* radical, graſſy, elongated, ribbed. *Stalk* two-edged, naked. *Spadixes* cluſtered in alternate order towards the top of the ſtalk, ſlender, ſtalked, each accompanied by a *bractea*, or *ſpatha*, (which is keeled, acute, ſcarcely longer than the partial ſtalk,) and very denſely covered all over with ſeſſile naked *flowers*. *Berry* blue. *Mr. Brown.*

GYMNOSTOMUM, from γυμνος, *naked*, and ϛομα, the *mouth*. Beardleſs-moſs. Hedw. Fund. v. 2. 87. t. 7. f. 31. Schreb. 758. Sm. Fl. Brit. 1158. Swartz. Muſc. Suec. 19. Turn. Muſc. Hib. 7. (Hedwigia; Ehrh. Crypt. 192. Hedw. Fund. v. 2. Anictangium; Hedw. Sp. Muſc. 40. Bryi ſpecies variæ; Linn. Hudſ.)—Claſs and order, *Cryptogamia Muſci*. Nat. Ord. *Muſci*.

Eſſ. Ch. Capſule without a fringe. Lid deciduous. Veil ſeparating entire from the baſe.

The orifice of the capſule, from which the lid ſpontaneouſly ſeparates entirely, being deſtitute of all fringe or teeth, ſufficiently characterizes the preſent genus. (See FRINGE of *Moſſes*.) The capſule moreover is ſtalked as in all other moſſes except *Sphagnum*, the only one beſides that has a naked mouth; but which is extremely peculiar for having the capſule not elevated above the original baſe of the flower, as obſerved by Weber and Mohr, and a veil that never ſeparates from that baſe, but ſplits all round as the fruit ſwells. Its anthers moreover are each bound with a vertical jointed ring; in all which characters it differs from *Gymnoſtomum*. The original *Hedwigia* of Ehrhart is diſtinguiſhed from *Gymnoſtomum* by having lateral, not terminal, female flowers, a diſtinction which Swartz and ſeveral other botaniſts have conſidered as not ſufficient in this caſe to form a generic difference, though the only one between *Bryum* and *Hypnum*. Swartz therefore uniting this *Hedwigia* to the genus before us, eſtabliſhed another; ſee HEDWIGIA. His deciſion is now reverſed on the continent, and, we are inclined to think, not without reaſon. But the *Hedwigia* of Swartz could not be aboliſhed, and therefore that of Ehrhart has received a new appellation, *Anictangium*, from ανοικτος, *open* or *ſpreading*, and αγγιον a *veſſel* or *capſule*, alluding not only to the nakedneſs of the mouth, but to its being uſually dilated alſo. See examples of this latter genus in *Engliſh Botany*, t. 1179, 2216 and 2237.

The general habit of *Gymnoſtomum*, properly ſo called, is either a very ſhort ſimple *ſtem*, with broadiſh *leaves*, and an annual *root*, the *fruitſtalk* being ſolitary and terminal, and the *capſule* ſwelling upward; or the *roots* and *ſtems* are perennial, the latter branched and forming level-topped tufts. In theſe the *leaves* are much narrower and more copious, and the *capſules* ſmaller.

Of the former tribe are G. *truncatulum*, Engl. Bot. t. 1975, a very minute plant, common on banks in the ſpring; G. *intermedium*, t. 1976; G. *obtuſum*, t. 1407; G. *ovatum*, t. 1889; the more rare G. *Heimii*, t. 1951; and G. *faſciculare*, t. 1245, which is the real *Bryum Ægypti* of Haſſelquiſt, found abundantly by him on the walls of Jeruſalem, and therefore preſumed, not improbably, to be what Solomon meant by the "Hyſſop that ſpringeth out of the wall;" hyſſop appearing to be a kind of comprehenſive word for herbaceous plants, and the minuteneſs of this forming a ſtriking contraſt to the cedar of Lebanon. G. *pyriforme*, t. 413, a frequent and conſpicuous moſs, is of this family.

Of the ſecond tribe are G. *viridiſſimum*, Engl. Bot. t. 1583; G. *æruginoſum*, t. 2200; G. *luteolum*, t. 2201; G. *curviroſtrum*, t. 2214, a ſingularly miſtaken and confuſed ſpecies, even with the greateſt muſcologiſts; and G. *ſtelligerum*, t. 2202.

Some very pretty and curious ſpecies which do not exactly come under the above heads are,

G. *oſmundaceum*, t. 2213. (G. pennatum; Hedw. Crypt. v. 1. 77. t. 29. Mnium oſmundaceum; Dickſ. Crypt. faſc. 1. 3. t. 1. f. 4. H. Sicc. faſc. 12. 21.) To this Ehrhart, thinking it a good genus of itſelf, gave the name *Dickſonia puſilla*, in his Crypt. n. 65. It is one of the moſt uncommon of plants, being found with us in Devonſhire only, in the road from Zele to South Tawton church, four miles from Okehampton, by the Rev. Mr. Newberry; but occurs in ſome parts of Germany. Its beauty is equal to its ſcarcity, the *ſtems* being elegantly pinnate, with two-ranked *leaves*, like a minute fern. The *flowers* are terminal, and dioecious. A great peculiarity having been obſerved in the *lid*, which is flat, tranſparent, and ſeparable into many parts, as if cut, Mohr has reſtored this moſs to the rank of a genus, by the name of *Schizoſtega*, for ſo doubtleſs it ought to be, from σχιζω, to *cut* or *ſplit*, and ϛεγη, a *cover*, though in his Index Muſei he has printed it *Schiſtoſtega!*

G. *Griffithianum*, t. 1938. (Bryum Griffithianum; Dicks. Crypt. faſc. 4. 8. t. 10. f. 10.)—Found on the eaſt ſide of Snowdon, near the ſummit, by Mr. Griffith, and on Ben Lawers by Mr. W. J. Hooker. This ſpecies, unknown out of Britain, is extremely peculiar for its ſucculent habit, and ſpatulate, reticulated, thick *leaves*. The *fruitſtalk* is thick and ſucculent. *Veil* curiouſly reticulated, as in the genus *Hookeria*.

G. *Donnianum*, t. 1582, found on a rock in Perthſhire by Mr. George Don, is one of the ſmalleſt of plants, and remarkable for having ſlender briſtle-ſhaped *leaves*, with a ſtemleſs habit, and probably an annual *root*. The minute *capſule* is ſingularly neat, as if turned out of box-wood, cup-ſhaped when the taper lid is fallen, and remarkable for the projecting central column, which, as far as we have obſerved, is a ſure indication of a genuine *Gymnoſtomum*.

G. *Davallianum*, found only by the late Mr. Davall near Orbe in Switzerland, and by no perſon elſewhere, is not quite ſo minute as the laſt, and differs from it in having lanceolate *leaves*, and a hemiſpherical *lid*.

G. *trichodes* of Mohr, a German moſs, has the habit and ſmall ſize of the two laſt, but the *capſule* is ſtriated and more oblong.

G. *japonicum*, with ſeveral other pretty exotic ſpecies, are figured in the earlieſt plates of Hedwig's *Species Muſcorum*, and in the following ones ſome ſpecies of *Anictangium*. Of the latter however *A. bulboſum*, t. 6. f. 1—5, is a miſtake, of which we ſhall ſpeak under the article Hookeria.

GYMNOSTYLES, ſo named by Richard and Juſſieu, from γυμνος, *naked*, and ϛυλος, or ϛυλη, the *ſtyle*, becauſe of the long, permanent, naked ſtyle, ſerving to form a ſort of awn to the ſeed, and belonging to florets which have no corolla. Juſſ. in Ann. du Muſ. d'Hiſt. Nat. v. 4. 258.—Claſs and order, *Syngeneſia Polygamia-neceſſaria*. Nat. Ord. *Compoſitæ diſcoideæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common Calyx* rounded, ſimple, of numerous, linear-oblong, equal ſcales, in a ſingle row. *Cor.* compound, diſcoid. Male florets in the centre, few, tubular, with three or four equal, ſpreading teeth. *Stam.* Filaments three or four, very ſhort; anthers united into a tube. *Piſt.* Germen very ſlender, thread-ſhaped, abortive; ſtyle one, rather exceeding the ſtamens; ſtigma capitate, imperfect. Female florets in the circumference, numerous, quite deſtitute of corolla and ſtamens. *Piſt.* Germen wedge-ſhaped; ſtyle awl-ſhaped, permanent, naked above; ſtigma acute, notched. *Peric.* none, except the permanent calyx. *Seeds* ſolitary, wedge-ſhaped, compreſſed, convex on one ſide, concave on the other, dilated, crenate, toothed or lobed at the edges, more or leſs hairy at the top, and crowned with the rigid permanent ſtyle. *Recept.* naked, convex, dotted.

Eſſ. Ch. Receptacle naked. Seeds toothed at the margin, crowned with the permanent ſtyle. Calyx of a ſimple row of numerous ſcales. Florets of the radius numerous, without any corolla.

Obſ. This genus ſhould be placed in the Linnæan ſyſtem next to *Hippia*, from which it is very diſtinct, having no corolla to its marginal or female florets, and the ſeeds being tipped with the long hardened ſtyle. The long hair crowning the germen in two ſpecies, and of which there are traces about the baſe of the ſtyle in the third, is peculiar, and as Juſſieu well obſerves, not a real *pappus* or ſeed-down.

Three ſpecies are deſcribed by the learned author juſt named, all of them in our poſſeſſion.

1. G. *anthemifolia*. Juſſ. Ann. du Muſ. v. 4. 262. t. 61. f. 1.—Leaves doubly pinnatifid. Flowers radical. Seed rounded at the top, corrugated on the concave ſide.—Sent to Linnæus from Mexico by the celebrated Mutis. It has alſo been found in New Holland, and introduced to the gardens of Europe, where it merits preſervation for its curioſity, though ſcarcely for its beauty. The *root* is fibrous and apparently annual, producing a tuft of ſhort, quite proſtrate, leafy, downy *ſtems*, ſpreading every way cloſe to the ground, but ſcarcely creeping. *Leaves* numerous, terminal, tufted, aſcending, two or three inches long, doubly and very deeply pinnatifid, ſomewhat lyrate, ſlightly hairy; their ſegments linear-lanceolate, acute, entire. *Flowers* radical, at the baſe of each ſtem, quite ſeſſile, hemiſpherical, prickly all over with the innumerable prominent ſtyles, whoſe baſes are immerſed in a profuſion of ſoft whitiſh down, conſiſting of the hairs that crown each ſeed. The *ſeeds* are rounded at the ſummit, marked with two longitudinal acute ribs on their convex ſide, and with tranſverſe marginal furrows or plaits on the other, which laſt, in Juſſieu's figure, *e*, too much reſemble teeth, whereas the margin is nearly, if not quite, entire.

2. G. *naſturtiifolia*. Juſſ. ibid. t. 61. f. 2.—Leaves pinnatifid; ſegments elliptical. Flowers radical or axillary. Seed toothed at the top, corrugated on both ſides at the margin.—Gathered by Commerſon at Buenos Ayres. This has the habit of the laſt, except that, though a much ſmaller plant in every part, the *ſtems* are more elongated, and repeatedly forked. *Leaves* ſimply pinnatifid only, about an inch long, ſomewhat ſtalked, ſlightly hairy, obtuſe, their ſegments elliptical, pointed, entire, or rarely a little notched, ſo that their figure and ſize reſemble *Lepidium alpinum*, and ſome others of that family. *Flowers* numerous, ſcarcely bigger than a large pea, hemiſpherical, downy, ſolitary at the root and at each diviſion of the ſtem, encompaſſed by ſeveral ſpreading leaves. The *ſeeds* have on each ſide a longitudinal wedge-ſhaped depreſſion, encompaſſed with numerous, tranſverſe, marginal corrugations, and the top is notched or toothed, crowned with ſoft hairs ſurrounding the ſtyle.—Our learned and ingenious friend Mr. Correa (ſee Corræa) has led M. de Juſſieu into a miſtake as to *Hippia minuta*, Linn. Suppl. 389, which, having ſeen in the Linnæan herbarium here, he by memory conſidered as the ſame with this *Gymnoſtyles naſturtiifolia*. Their leaves indeed very much accord, but the *Hippia* has a longer and not dichotomous ſtem, with flowers not a fifth part ſo large, on ſtalks an inch long, and we believe the proper fructification of its genus, nor is there any of the preſumed errors in the Linnæan deſcription, the plant having the cloſeſt generic affinity to *H. frutеſcens*.

3. G. *pteroſperma*. Juſſ. ibid. t. 61. f. 3.—Leaves doubly pinnatifid. Flowers axillary. Seed with four dilated wings, ſlightly hairy, and two briſtles at the top.—Gathered by Commerſon with the laſt, from which it differs in its greater ſize, much longer and more branching, though ſtill always proſtrate, *ſtems*, and bipinnate *leaves*, which greatly reſemble thoſe of the firſt ſpecies, though rather narrower and more hairy. Their baſe or footſtalk is alſo more dilated and membranous. The *flowers* are quite ſeſſile, ſolitary, at the root and at each fork of the ſtem, not ſo villous, but very remarkable for their long prominent ſtyles, which are fringed at their baſe. The *ſeeds* too are very peculiar, being not crowned with long hairs, but with an awl-ſhaped briſtle on each ſide, like the ſtyle, though ſmooth, and parallel to it, except when they are occaſionally reflexed. The margin of the ſeed is dilated on each ſide into a larger and a ſmaller wing-like membranous expanſion, and the whole is ſlightly downy. S.

GYMNOTHORAX, in *Ichthyology*, a genus of the Apodal order, eſtabliſhed by Bloch for the reception of thoſe ſpecies of the Linnæan and Gmelinian murænæ or eel family, which have no pectoral fin, and cannot therefore with propriety be referred to the ſame tribe as the eel, the conger, and others which have theſe fins.

The genus, according to Bloch, is diſtinguiſhed by being deſtitute of pectoral fins, to which material character it may be however added, that the body is anguilliform, viſcous, without ſcales, and variegated with very lively colours; the orifice of the ſpiracles or breathing organs ſtraight, inclining uſually to a ſomewhat oval form, and without either gill-cover or membrane; the mouth armed with ſtrong and ſharp teeth; noſtrils tubular; and the back and anal fin united with the tail. The ſpecies of this genus are not numerous.

Species.

MURÆNA. Brown, variegated with yellowiſh ſpots. Bloch. *Muræna Helena*, Linn.

This is the Roman eel, or muræna of the ancients, a fiſh of excellent flavour, and celebrated by their writers as one of the moſt luxurious articles of the table. The muræna is an inhabitant both of the freſh and ſalt waters, though, as Ariſtotle deſcribes, it lives principally in the ſea. Hirius was the firſt among the Roman epicures who conſtructed reſervoirs for the murænæ, but his example was ſoon followed, and became afterwards very general. In thoſe reſervoirs the murænæ were retained for amuſement or ſport, as well as uſe, and were, we are aſſured, rendered ſometimes ſo far docile, as to obey the ſignal of their maſter. The mention of theſe circumſtances naturally introduces to recollection, the well-known ſtory of Vedius Pollio, who, as Pliny relates, was in the habit of cauſing his offending ſlaves to be thrown into his reſervoirs of murænæ to be devoured; not, as that writer ſays, but there were wild beaſts enough on the land, but becauſe he took delight in ſeeing a man thus torn in pieces and eaten. This Vedius Pollio was one of the favourite followers of Auguſtus, notwithſtanding which, according to Seneca, the gratification of his cruel diſpoſition had nearly coſt him his life, upon its reaching the knowledge of that emperor: Auguſtus, it appears, one day honoured Vedius with his preſence at a ſplendid entertainment, when a ſlave happening to break a valuable cryſtal veſſel, the enraged maſter exclaimed, "away with him, caſt him to the murænæ!" And this ſavage order would, as uſual, have been executed, had not the poor youth thrown himſelf in a tranſport of deſpair at the feet of the emperor, and beſought that he might rather die by any death, than be the food of fiſhes. The emperor, aſtoniſhed at his requeſt, and being informed of this extraordinary mode of puniſhment, immediately directed all the cryſtal veſſels in the houſe to be broken before the face of Vedius, and his reſervoirs to be completely filled up, at the ſame time giving freedom to the ſlave, and only ſparing the life of the offender in conſideration of his former friendſhip.

The muræna inhabits many of the European and American ſeas, and abounds eſpecially on the coaſts of the ſouth of Europe. M. Cetti remarks that the muræna of Sardinia is covered with yellow ſpots. According to Cateſby there are two varieties in America, in one of which the ground colour is green, the other white, ſprinkled with black dots. In the drawings of Father Plumier, the prevailing colour is white, with yellow ſpots of large ſize, and the latter ſprinkled with ſmall black dots. It rarely exceeds the ſize of the common eel; the head ſmall, teeth large; and the bite dangerous; the uſual food polypes and fiſhes, and its appetite remarkably voracious.

CATENATUS. Brown variegated, with white chain-ſhaped ſpots or bands. Bloch. *Muræna ſeu conger Braſilienſis*, Seba. *Gymnothorax a bracelets*, Buff. *Marbled gymnothorax.*

About the ſize of a ſmall eel, the length being nearly twenty inches, and the thickneſs in proportion. The head is ſmall, as is likewiſe the opening of the mouth; the teeth ſmall, ſharp, and cloſe ſet; eyes ſmall and blue; ſnout furniſhed at the tip with two very ſmall ſetaceous beards; the breathing apertures very ſmall, and the lateral line ſcarcely perceptible. The ſpecies inhabits Surinam.

RETICULARIS. Whitiſh, banded with brown; ſides reticulated with brown; dorſal fin as long as the body. Bloch.

Reſembles the laſt in ſize; the head and mouth are ſmall; the eyes rather large, and ſituated near the upper lip; teeth diſtant and acute. A native of the Indian ſeas.

AFER. Fuſcous, marbled with white; gape wide. Bloch.

Bears a remote reſemblance to the Roman muræna. This ſpecies is found in the African ſeas, near the coaſts of Guinea. Iſert ſpeaks of it as a fiſh of good flavour and wholeſome, notwithſtanding which, the negroes will not eat its fleſh, conſidering the fiſh as a kind of marine ſerpent.

ZEBRA. Blackiſh brown, with tranſverſe linear white diſtant bands, meeting irregularly beneath. Shaw. *Serpens marina Surinamenſis fœmina murænis valde affinis*, Seba.

Length two or three feet; the body ſerpent-form and without fins; head rather large and tumid; mouth and eyes ſmall; tentacula none. Native of the American ſeas.

ECHIDNA. Head depreſſed; body varied with brown and black, and immediately behind the head very turgid. Ellis It.

Inhabits Palmerſton iſland; the length four or five feet; thickneſs ten or twelve inches. The general aſpect hideous, and much reſembling a ſerpent. The head ſmall; lips mucous; mouth horizontal, with two cirri near the noſtrils; eyes ſmall and vivacious; gape large; fleſh edible.

GYMNOTUS, a genus of the Apodal order, inſtituted by Linnæus, the character of which is thus deſcribed in the laſt edition of the "Syſtema Naturæ:" Head with lateral opercula; two tentacula on the upper lip; eyes covered with a common ſkin; gill-membrane with five rays; body compreſſed; beneath carinated by a fin. The eſſential character of the genus conſiſts, according to Bloch, in being deſtitute of a dorſal fin, and this opinion prevails with Lacépede and other continental authors, who only add that it wants the caudal as well as dorſal fin, and has the pectoral fin ſituated near the vent. In the adoption of this character, Lacépede was conſtrained to divide the Linnæan ſpecies of the Gymnotus tribe into two or more diſtinct genera, and this he has accordingly done, retaining to the firſt the term eſtabliſhed by Linnæus, and naming the two others he propoſes Apteronotus and Notopterus. The eſſential character of apteronotus is taken from the ſpecies albifrons, which differs from the reſt in having the tail furniſhed with a fin, and is the only ſpecies of its natural genus. Notopterus comprehends the two ſpecies notopterus and aſiaticus, both which, contrary to the Linnæan character of the Gymnotus, have a dorſal fin, beſides differing in ſome other material particulars. The ſpecies, excluſively of thoſe referred to the new genera laſt mentioned, amount to ſix in number.

Species.

* GYMNOTUS. *No Dorſal Fin.*

ELECTRICUS. Naked, blackiſh; tail obtuſe. Bloch, &c. *Gymnotus electricus*, Gronov. *Siddervis*, Act. Haarlem. *Gymnotus nigricans, cauda curta obtuſa*, Seba. *Electrical eel*, Hunter.

The length of this fiſh is from three to four or five feet; the head is ſhort and ſprinkled with perforated dots; the body blackiſh, with a number of ſmall annular bends or wrinkles; noſtrils two on each ſide, the firſt large, tubular, and elevated, the other ſmall, and not raiſed above the ſkin; the teeth ſmall; tongue broad, and with the palate warty.

The electric properties of this extraordinary creature have long rendered it an object of great curioſity among naturaliſts, the power it poſſeſſes in this reſpect ſurpaſſing even that of the torpedo. This animal was unknown to the philoſophers of Europe till about the year 1677, when an account of it was communicated to the French academy by M. Richer, one of the gentlemen deputed by the academy to conduct ſome mathematical obſervations in Cayenne, and in the rivers of which it appears to have been diſcovered for the firſt time by M. Richer. The ſciences not having at that period made any very conſiderable progreſs, the importance of this communication was not duly conſidered; nor indeed does it appear to have obtained that juſt ſhare of credit for veracity, to which it was unqueſtionably entitled, till nearly a century afterwards, when a full and general conviction of its accuracy was eſtabliſhed through the obſervations of Condamine, Ingram, and others. The experiments of Dr. Bancroft were not leſs ſatisfactory, as were alſo thoſe of Mr. Williamſon of Philadelphia, and Dr. Garden of Charleſtown, in South Carolina.

From the obſervations of Condamine and others, engaged about the ſame time in a ſeries of experiments on the Galvanic properties of this fiſh, it is clearly demonſtrated, that the power of this animal conſiſts in a kind of genuine electricity, being equally capable of being conducted or intercepted by the ſame means as electricity. Thus, on touching the fiſh with the fingers, the ſame ſenſation is perceived as on touching a charged phial, being ſometimes felt as far as the elbows; and if touched by both hands, an electric ſhock is conveyed through the breaſt in the uſual manner.

Fermin, during his reſidence in Surinam, had frequent opportunities of examining this animal, and he has demonſtrated by experiment, that fourteen ſlaves, holding each other by the hands, received the ſhock at the ſame time, the firſt touching the fiſh with a ſtick, and the laſt dipping his hand into the water in which it was kept.

This electric faculty of the gymnotus is apparently deſigned by nature to aſſiſt in the ſupport of its exiſtence, the ſmaller fiſhes and other animals which happen to approach it being inſtantly ſtruck motionleſs, and, dropping to the bottom of the water, become an eaſy prey. The ſhock this fiſh is capable of exerting is ſo powerful as to deprive, almoſt entirely of ſenſe and motion, thoſe who are expoſed to its influence, and is therefore much dreaded by thoſe who bathe in the rivers it inhabits. Some writers affirm even, that the violence of the ſhock given by thoſe of a larger ſize is ſo great as to occaſion inſtant death.

The moſt copious general hiſtory of this ſingular creature that has appeared, is that addreſſed by Dr. Garden to the celebrated Mr. Ellis, the leading points of which it may be ſatisfactory to repeat. The largeſt of theſe fiſhes examined by Dr. Garden, was three feet eight inches in length, and the circumference about the thickeſt part from ten to fourteen inches. The head large, broad, and flat, ſmooth, and impreſſed here and there with holes, as if perforated with a blunt needle, eſpecially towards the ſides, where they are more regularly ranged in a line on each ſide. The roſtrum is obtuſe and rounded. The upper and lower jaws are of an equal length, and the gape large. The noſtrils are two on each ſide; the firſt large, tubular, and elevated above the ſurface; the others ſmall, level with the ſkin, and placed immediately behind the verge of the roſtrum, at the diſtance of an inch aſunder. The eyes are ſmall, flattiſh, and blueiſh, and placed about three quarters of an inch behind the noſtrils, towards the ſides of the head. The body is large, thick, and roundiſh for a conſiderable diſtance from the head, and then grows ſmaller, but at the ſame time deeper, or becomes of an acinaciform ſhape to the point of the tail, which is rather blunt. There are many light coloured ſpots on the back and ſides of the body, placed at conſiderable diſtances in regular lines, but more numerous and diſtinct towards the tail.

When this fiſh was ſwimming, it meaſured ſix inches in depth near the middle, from the upper part of the back to the lower edge of the fin, and the back at that part was not more than two inches broad. The whole body, from about four inches below the head, ſeems to be clearly diſtinguiſhed into four different longitudinal parts or diviſions. The upper part or back is roundiſh, of a dark colour, and ſeparated from the other parts on each ſide by the lateral lines; which, taking their riſe at the baſe of the head, juſt above the pectoral fins, run down the ſides, gradually converging, as the fiſh grows ſmaller, to the tail, and make ſo viſible a depreſſion or furrow in their courſe, as to diſtinguiſh this from the ſecond part or diviſion, which may be properly called the body, or at leaſt appears to be the ſtrong muſcular part of the fiſh. The ſecond diviſion is of a lighter and more clear blueiſh colour than the upper part, and ſeems to ſwell out ſomewhat on each ſide from the depreſſion of the lateral lines, but towards the lower or under part is again contracted into a kind of carina. This carina is very diſtinguiſhable from the other two diviſions by its thickneſs, its apparent laxneſs, and by the reticulated ſkin of a lighter colour, more inclining to grey. When the animal ſwims gently in pretty deep water, the rhomboidal reticulations of the ſkin of this carina are very diſcernible; but when the water is ſhallow, or the depth of the carina is contracted, theſe reticulations appear like many irregular longitudinal folds. The carina begins about ſix or ſeven inches below the baſe of the head, and, gradually widening or deepening, reaches down to the tail where thinneſt; this carina, where it firſt takes its riſe from the body of the fiſh, is about an inch or an inch and a half in thickneſs, and is gradually ſharpened to a thin edge where the fourth and laſt part is ſituated.

The ſituation of the vent in this fiſh is ſingular, being placed underneath, and about an inch more forward than the pectoral fins. Theſe pectoral fins, two in number, are placed, one on each ſide, juſt behind the head, and over the foramina ſpiratoria, which are ſmall and generally covered with a lax ſkin, ſituated in the axillæ of theſe fins. Theſe fins are ſmall for the ſize of the fiſh, being ſcarcely an inch in length, and of a very thin delicate conſiſtence, and orbicular ſhape. They ſeem to be uſeful in ſupporting and raiſing the head of the fiſh when he wants to breathe, which he does every four or five minutes, by raiſing his mouth out of the water. The body, or rather the rugæ of the ſkin of the body, is divided by a number of ſmall croſs bands or annulations, which reach acroſs down to the baſe of the carina on each ſide, but thoſe that croſs the back ſeem to terminate at the lateral lines, where new rings take their riſe, not exactly in the ſame line, and run down to the carina. This gives the fiſh ſomewhat of a worm-like appearance; and indeed it ſeems to have ſome of the properties of this tribe, for it has the power of lengthening or ſhortening its body, to a certain degree, for its own convenience or inclination. Dr. Garden obſerves that the ſpecimen which meaſured three feet eight inches, could ſhorten itſelf to three feet two inches, and that beſides this power of extending or ſhortening its body, he could ſwim forwards or backwards with equal eaſe. When he ſwims forwards the undulations or wavy motions of the fin and carina begin from the upper part, and move downwards; but when he ſwims backwards, to the upper part of the body; and in either caſe he ſwims with equal ſwiftneſs. Every now and then the fiſh lays himſelf on one ſide, as it were to reſt himſelf, and then the four diviſions of the body before mentioned are very diſtinctly ſeen.

The power, ſays Dr. Garden, which it has of giving an electric ſhock to any perſon, or any number of perſons who join hands together, the extreme perſon on each ſide touching the fiſh, is its moſt ſingular and aſtoniſhing property. This writer ſpeaks of five which he examined at the ſame time; and theſe, he obſerves, poſſeſſed this power to a very great degree, and could communicate the ſhock to one perſon, or any number of perſons, either by the immediate touch of the fiſh with the hand, or by the intervention of any metalline rod. The keeper of theſe fiſhes told him, that, when firſt caught, they could give a much ſtronger ſhock, by means of a metalline conductor, than afterwards. The perſon who is to receive the ſhock muſt take the fiſh in both hands, at ſome conſiderable diſtance aſunder, ſo as to form the communication, or he will not receive it; at leaſt, ſays Dr. Garden, I never ſaw any one ſhocked from taking hold of it with one hand only, though ſome have aſſured me that they were ſhocked by laying one hand upon it. I myſelf have taken hold of the largeſt with one hand often, without ever receiving a ſhock; but I never touched it with both hands, at a little diſtance aſunder, without feeling a ſmart ſhock. The ſhock which our Surinam fiſh gives ſeems wholly electrical; and all the phenomena or properties of it exactly reſemble thoſe of the electric aura of our atmoſphere, when collected, as far as they are diſcoverable, from the ſeveral trials made on this fiſh. The keeper of theſe fiſhes informed Dr. Garden that he caught them in Surinam river, a great way up, beyond where the ſalt water reaches, and that they are freſh-water fiſhes only. He ſays they are eaten, and, by ſome perſons, eſteemed a great delicacy. They live on fiſh, worms, or any animal food, if it is cut ſmall, ſo that they can ſwallow it. When ſmall live fiſh are thrown into the water, they firſt give them a ſhock, which ſo ſtupifies them, that they can ſwallow them eaſily, and without any trouble. If one of theſe ſmall fiſhes, after it is ſhocked, and, to all appearance dead, be taken out of the veſſel where the electric fiſh is, and put into freſh water, it will ſoon revive again. If a larger fiſh than they can ſwallow be thrown into the water, at a time when they are hungry, they give him ſome ſmart ſhocks, till he is apparently dead, and then endeavour to ſwallow or ſuck him in; but after ſeveral attempts, finding he is too large, they quit him. Upon the moſt careful inſpection of ſuch fiſh, this attentive obſerver could never ſee any mark of teeth, or the leaſt wound or ſcratch upon them. When the electric fiſh is hungry, it is pretty keen after food, but is ſoon ſatisfied, not being able to contain much at one time; and it further appears that a fiſh of this kind, three feet or upwards in length, cannot ſwallow a ſmall fiſh above three inches and a half long. They are ſometimes found in the river Surinam upwards of twenty feet in length; and the ſtroke or ſhock of one of theſe is ſaid to prove inſtant death to the perſon who receives it.

The very elaborate deſcription of the gymnotus, by the late Mr. Hunter, would ſeem to form an appropriate concluſion to the hiſtory of this intereſting animal, as it tends to explain, in a material degree, the nature and origin of the electric powers with which this fiſh is endowed, at the ſame time that they afford a more ample elucidation of its internal ſtructure in general, than has appeared from the pen of any other writer. The deſcription alluded to is inſerted in the Philoſophical Tranſactions, (vol. lxv.) and is accompanied by three plates of the muſcles and nerves. But having already given that deſcription under the article *Electric Organs of* FISH, it will be ſufficient to refer to that article.

CARAPO. Naked, uniformly brown; lower jaw ſhorter; tail tapering to a point. *Gymnotus carapo*, Linn.

Length from one to two feet; the head of a compreſſed form; jaws with many ſharp teeth; eyes ſmall; front of the head marked, as in the former ſpecies, by a number of ſmall pores; body gradually tapering, and ending in a finleſs thread or filament. This fiſh is a native of the American ſeas, and is ſaid to be moſt frequent about the coaſts of Surinam. It is ſuppoſed to live chiefly on ſmall fiſhes, marine vermes, cruſtaceous animals, and inſects. Neither this, nor any other of the remaining ſpecies of gymnotus, ſeem to poſſeſs the ſame Galvanic properties as the firſt-mentioned kind.

FASCIATUS. Naked, tranſverſely ſtriped; lower jaw longer; tail tapering to a point. Linn. *Banded gymnote.*

Differs chiefly from the former in the ſhortneſs of the tail, and inferior ſize of the body; and is conſidered by ſome as only a variety of that fiſh. It inhabits the ſame ſeas.

ALBUS. White, back convex; lower jaw longer; upper lip on each ſide with a ſmall lobe before the angle of the mouth. Pallas. *White gymnote.*

Size and general aſpect of the laſt; the colour white or whitiſh. The ſpecies inhabits Surinam.

ROSTRATUS. Snout ſubulate; anal fin ſhorter than the tail. Seba, &c. *Snouted gymnote.*

Body ſpotted and ſomewhat acute. A native of Surinam.

ACUS. Naked; no ventral fins; anal fin with ſixty rays, terminating before the tip of the tail. Brunnich. *Needle gymnote.*

Inhabits the Mediterranean; the general figure long, tapering, compreſſed, and ending in a point; the colour whitiſh with reddiſh and brown ſpots, and varied with a bluiſh tinge.

** APTERONOTUS. *Tail furniſhed with a Fin.*

ALBIFRONS. Anterior part of the back ſnowy. *Gymnotus albifrons*, Pallas. *White-fronted apteronote.*

A native of Surinam, about a foot in length, ſharp, acute, and hoary, and the tail white covered with rounded ſcales. The head is very obtuſe, fleſhy, and ſprinkled with minute pores; mouth deep; upper lip very thick, and including the lower; pectoral fins black; anal beginning from the throat; tail compreſſed, flat, and oval; from the tip of the lower jaw to the middle of the back a ſnowy-white band.

*** NOTOPTERUS. *Back furniſhed with a Fin.*

ARGENTEUS. Silvery with a gilt hue; fins pale aſh. *Gymnotus notopterus*, Linn. *Le notoptere kapirat*, Boſc. *Silvery notoptere.*

This ſpecies is about eight inches; the head ſhort and obtuſe; eyes large; upper jaw with few ſmall equal teeth at the edge; thoſe in the lower jaw larger and more diſtant; gill-cover ſcaly, with membranaceous edge; vent near the throat; anal fin more fleſhy, and narrower on the fore part. This fiſh inhabits Amboyna.

ASIATICUS. Scaly; browniſh with deeper bands. *Gymnotus Aſiaticus*, Gmel.

A native of Aſia, and in length not exceeding a ſpan. The head depreſſed, ſmoothiſh, with five hollow dots, and a ſmall hole in the front; before the noſtrils two truncated tentacula; tongue ſmooth; gill-covers at the ſides with a large gape; body ſomewhat cylindrical, and compreſſed behind; the dorſal fin beginning at the nape and reaching to the tail; lateral line elevated, ſtraight, deſcending before the anus.

GYNÆCEUM, among the *Ancients*, the apartment of the women; or a ſeparate place, in the inner part of the houſe, where the women keep themſelves retired, employed in their ſpinning, out of the ſight of the men.

The word is compounded of the Greek γυνη, *a woman*, and οικος, *a houſe*.

Under the Roman emperors there was a particular eſtabliſhment of gynæcea, being a kind of manufactories managed chiefly by women, for the making of clothes, furniture, &c. for the emperor's houſhold. Mention is made of theſe gynæcea, in the Theodoſian and Juſtinian code, and by divers other authors.

In imitation of theſe, divers of the modern manufactories, particularly thoſe of ſilk, where a number of women and maids are aſſociated and formed into a body, are called gynæcea.

GYNÆCIARIUS, a workman employed in the gynæceum. In the ancient gynæcea there were men to weave and ſhape; the reſt, as ſpinning, &c. being performed by women.

Criminals were ſometimes condemned to ſerve in the gynæcea, much as now in the gallies; frequently, alſo, this was a kind of ſervice which princes exacted of their ſubjects or vaſſals, both men and women, whom they made to work for them in their gynæcea.

GYNÆCOCOSMI, Γυναικοκοσμοι, in *Antiquity*, Athenian magiſtrates, whoſe buſineſs it was to regulate the women's apparel, according to the rules of modeſty and decency. See GYNÆCONOMUS.

GYNÆCOCRATUMENI, an ancient people of Sarmatia Europæa, inhabiting the eaſtern banks of the river Tanais, near its opening into the Palus Mæotis; thus called, as authors relate, becauſe they had no women among them; or, rather, becauſe they were under the dominion of women.

The word is formed of γυνη, *woman*, and κρατουμενος, *vanquiſhed*, of κρατεω, *I overcome*, q. d. overcome by women.

F. Hardouin, in his notes on Pliny, ſays, they were thus called, becauſe, after a battle which they loſt againſt the Amazons, on the banks of the Thermodoon, they were obliged to have a venereal commerce with them, in order to get them children: "Et quod victricibus obſequantur ad procurandum eis ſobolem."

Hardouin calls them the huſbands of the Amazons, *Amazonum connubia*; for, as the author obſerves, the word *unde* muſt be retrenched from Pliny, having been foiſted into the text by people who were not maſters of the author's meaning, *unde Amazonum connubia*.

They who take the Amazons for a fabulous people, will conclude the ſame of the *Gynæcocratumenians*.

GYNÆCOCRACY, GYNÆCOCRATIA, a petticoat-government, or a ſtate where women have, or may have, the ſupreme command.

The word is formed of γυνη, γυναικος, *woman*, and κρατος, *authority*, *power*, *government*.

In this ſenſe, England and Spain are *gynæcocracies*: the French value themſelves, and think they are greatly happy, that their monarchy is not *gynæcocratic*.

GYNÆCOMASTOS, of γυνη, *woman*, and κομιζω, *I bear*; a term uſed by the ancients, to expreſs a man whoſe breaſts are large and turgid, like thoſe of women, and afford milk.

It was an obſervation among the ancients that ſuch men were naturally impotent. Paulus Ægineta obſerves, that the breaſts of men as well as women ſwell at the time of puberty, but that thoſe of women continue ſwelled, and thoſe of men ſubſide again, except in the caſe of the gynæcomaſtoi, where they remain turgid, and become in time more and more ſo, as the fat increaſes under them. As this ſwelling of the breaſts gave a ſuſpicion of impotency, thoſe who laboured under that deformity uſually had recourſe to a very painful operation in ſurgery to get rid of it. An inciſion was made in the form of a creſcent in the lower part of the breaſt, then the ſkin being drawn back, the fat was taken out, and the lips of the wound healed by means of a ſuture. When the breaſts were very large and hung down, they made two inciſions, one within the other, meeting at the extremities, and then ſeparating all the ſkin between them, they took out the fat: and finally, if the diſeaſe returned, or they had performed the operation imperfectly, leaving ſome behind, they repeated the whole a ſecond time.

GYNÆCON, in *Ancient Geography*, a ſea-port of Gedroſia. Ptol.

GYNÆCONOMUS, the name of a magiſtrate of Athens, who had the cenſure and inſpection of the women.

The word is compounded of the Greek γυνη, γυναικος, *woman*, and νομος, *law*.

There were ten gynæconomi; their buſineſs was to inform themſelves of the lives and manners of the ladies of that city, and to puniſh ſuch as miſbehaved themſelves, or tranſgreſſed the common bounds of modeſty and decency.

They had a liſt hanging out of the names of all thoſe whom they had cenſured, or condemned to any mulct, forfeiture, penance, or other penalty.

GYNÆCOPOLIS, in *Ancient Geography*, a town of Phœnicia. Steph. Byz.—Alſo, a town of Egypt. Strabo.

GYNÆSIA, a word uſed by the writers of medicine, ſometimes for the *menſtrua*, and ſometimes for the *lochia*.

GYNANDRIA, in *Botany*, from γυνη, *a woman*, and ανηρ, a *man*, alluding to the ſtamens being united with, or growing out of, the piſtil; the 20th claſs of the Linnæan artificial ſyſtem. Linnæus included in this claſs all plants of which the parts in queſtion were in any ſenſe united above the receptacle of the flower. Thus *Paſſiflora*, whoſe germen is elevated on a columnar baſis, and the ſtamens inſerted into the ſummit of the ſame part, juſt below it, was conſidered as Gynandrous. Such a principle is attended with great inconveniences, as in *Grewia*, ſome ſpecies of which have a conſiderable elevation of the germen, and others little or none. It is found therefore by far moſt convenient not to conſider ſuch inſertion or union at all, as the character of a claſs or order, unleſs it takes place upon or above the germen, or, in other words, unleſs the ſtamens grow out of the germen or ſtyle. Such is the caſe very decidedly in all the natural family of *Orchideæ*, as well as in *Forſtera* (ſee that article), and *Stylidium*. On theſe the claſs remains very firmly eſtabliſhed, and thus it conſiſts of three orders, diſtinguiſhed by the number of their ſtamens.

1. *Monandria*. Stamen one. This comprehends all the *Orchideæ*, except *Cypripedium*.

2. *Diandria*. Stamens two. Contains *Cypripedium* and *Forſtera*.

3. *Tetrandria.* Stamens four. Has only *Stilydium*, a curious New Holland genus, the *Ventenatia* of Sm. Exot. Bot. t. 66, 67. Its ſtyle is highly irritable, ſpringing over from one ſide of the flower to the other, on the ſlighteſt touch, by which its pollen is thrown with violence on the ſtigma.

The author of the preſent article has ſuggeſted, Introd. to Bot. 465, that this claſs might receive a reinforcement from the natural order of *Contortæ*, or *Aſclepiadeæ*; but he is happy to take this opportunity of retracting the hint. Whatever analogy there may be between ſome of that order, with reſpect to their anthers and pollen, and the Orchis tribe, and though they agree in their ſingular property of projecting the whole maſs of pollen, from each cell of an anther, entire on any extraneous body, they ſcarcely accord in any thing elſe. Mr. R. Brown has firſt underſtood this circumſtance in the *Aſclepiadeæ*, and has found that in them, as in the *Orchideæ*, the pollen is fully formed or ſecreted in the cells of the anthers, and, when ripe, is let go upon the glutinous points of the ſtigma deſtined to receive it, and on which it regularly ſticks in five double maſſes, looking exactly like anthers growing out of the ſtigma. But as the real ſtamens, which bear the ſecreting anthers, grow from the baſe of the flower as uſual, and not out of the germen, ſtyle, or ſtigma, in theſe *Aſclepiadeæ*, they muſt remain in *Pentandria*, whereas in the *Orchideæ* the anthers are really ſituated on the ſtyle, whoſe thick, columnar, oblique figure is altogether peculiar.

Vahl has referred the whole natural order of *Scitamineæ*, from *Monandria*, to which they truly and indiſputably belong, to *Gynandria*, merely becauſe he ſaw in one ſpecies of *Canna* a lateral coheſion between the flat ſtamen and ſtyle. But there is nothing of the ſort in genuine *Scitamineæ*, and it looks as if this ingenious author was rather led by a deſire to put off the evil day of arranging ſo difficult a tribe as long as he could, rather than by much knowledge of the ſubject. Since his death they have been clearly explained by Mr. Roſcoe, Tr. of Linn. Soc. v. 8. 330. t. 2 , ſo that no further doubts remain, concerning either their claſſical or generic characters.

Gynandria is alſo the name of an order of the claſſes *Monoecia* and *Dioecia* in Linnæus, founded on caſual abortion or imperfection of one or other of the organs of impregnation, and therefore untenable as well as paradoxical. S.

GYNDES, Forum-el Saleh, in *Geography*, a river of Aſia, E. of the Tigris, into which it diſcharged itſelf a little to the N. of Apamea.

GYNOPLEURA, in *Botany*, ſo named by Cavanilles, from γυνη, *a woman*, and πλευρα, the *ſide*, on account of the inſertion of the ſtyles, or female organs, into the ſides of the germen, not into its top. Cavan. Ic. v. 4. 51.—Claſs and order, *Pentandria Trigynia*. Nat. Ord. *Salicariæ*, Juſſ.?

Gen. Ch. *Cal.* Perianth inferior, tubular, of one leaf, ſomewhat inflated, with five upright marginal ſegments, coloured, permanent. *Cor.* Petals five, equal, inſerted into the rim of the calyx, alternate with its teeth. Nectary? of ten blunt ſcales, ranged within the baſe of the petals, alternately broader with three, and narrower with two teeth. *Organs* of fructification elevated on a ſhort column. *Stam.* Filaments five, equal, longer than the calyx, thread-ſhaped, inſerted into the column a little below the germen; anthers incumbent, ſomewhat heart-ſhaped. *Piſt.* Germen ovate, ſlightly triangular; ſtyles three, inſerted a little below the top of the germen, into the middle of each of its valves, thread-ſhaped, the length of the filaments; ſtigmas capitate, peltate. *Peric.* Capſule ovate-oblong, of one cell, burſting at the top into three valves, united at their lower part. *Seeds* numerous, ſmall, ovate, inſerted alternately and uprightly into a linear receptacle along the centre of each valve.

Eſſ. Ch. Calyx tubular, five-toothed. Petals five, inſerted into its rim. Styles lateral. Capſule of one cell, and three valves. Seeds numerous, ranged along the middle of each valve.

Obſ. By Cavanilles' own account this appears to be the ſame genus, and the firſt the ſame ſpecies, with *Maleſherbia* of the *Flora Peruviana*, notwithſtanding the differences he mentions in the deſcription of the latter. We have not the work in queſtion to examine, and therefore retain his genus, the name of which is certainly the moſt eligible of the two, both for ſound and ſenſe.

1. G. *tubuloſa*. Cavan. Ic. t. 375.—Leaves lanceolate, unequally toothed. Calyx-teeth very ſhort. Petals acute.—Native of dry ſituations in the country at ſome diſtance from Lima. Whether the *ſtem* be herbaceous or ſhrubby we know not, but its branches are round, full of pith, downy, leafy. *Leaves* numerous, ſcattered, two inches long; lanceolate, plaited, acute, unequally toothed, very hairy on both ſides. *Flowers* in the upper part of the branch, numerous, from the boſoms of ſmaller leaves, which they rather exceed in length. *Calyx* an inch and a half long, tawny-yellow, membranous, ribbed, downy, ſlightly inflated, its teeth ſmall and rather unequal. *Petals* ſtill ſmaller, acute, fringed. *Germen* ſlender and nearly cylindrical. It flowers in July.

2. G. *linearifolia*. Cavan. Ic. t. 376.—Leaves linear, entire, fringed. Calyx-teeth as long as its tube. Petals obovate, obtuſe.—Native of the mountains of Chili, bearing flowers and ſeed in March and April. *Stem* three feet high, alternately branched, hairy. *Leaves* alternate, ſeſſile, linear, or ſomewhat lanceolate, obtuſe, entire, fringed, downy, auricled at the baſe: the lower ones longer and minutely ſerrated. *Flowers* axillary and terminal. *Calyx* funnel-ſhaped, ribbed, downy, its teeth bluntiſh and as long as the tube. *Petals* yellowiſh-white.

GYNOPOGON, from γυνη, a *woman*, and πωγων, a *beard*, becauſe of the ſuppoſed bearded ſtigma. Forſt. Nov. Gen. 18. t. 18. Mr. Brown, who found the deſcription of this genus very erroneous, and its name falſe, there being ſcarcely any ſpecies, out of eleven which he has examined, that has really a bearded ſtigma, adopted for it, from the manuſcripts of ſir Joſeph Banks and Dr. Solander, the name of *Alyxia*, alluding probably to ſome dull or gloomy aſpect in theſe ſhrubs, or to their being worn on mournful occaſions, from αλυξι, *anxiety*.—Brown Prod. 469.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juſſ.

Eſſ. Ch. Corolla ſalver-ſhaped, naked at the mouth. Stamens included. Germens two, few-ſeeded. Styles imperfectly cohering. Stigma obtuſe. Drupas two, one of them occaſionally abortive, ſtalked, ſimple, ſingle-ſeeded, or elſe compound like a necklace, with an imperfectly two-celled coat. Seed half divided. Albumen eroded, horny. Embryo ſtraight.

The ſpecies are ſhrubby, ſmooth, milky. *Leaves* whorled or oppoſite, coriaceous, compact, evergreen. *Flowers* axillary or terminal, ſometimes ſpiked, among the ſmalleſt of their tribe, white, in many inſtances ſweet-ſcented. The eroded two-lobed albumen is conſidered by Mr. Brown as affording a very peculiar character.—Five ſpecies are defined

fined by this author as natives of the tropical part of New Holland. A. *ſpicata*, *tetragona*, *obtuſifolia*, *ruſcifolia*, and *buxifolia*.—Forſter mentions two; *ſtellata*, a native of Tonga Tabbu, which has ternate branches, and myrtle-like whorled leaves; and *ſcandens*, of Otaheité, whoſe leaves are larger and oppoſite.

GYPÆTI, in *Ornithology*, a diviſion of the genus *Falco*; which ſee.

GYPSARA, in *Geography*, a town of Mauritania Cæſarienſis; being a ſea-port between the great promontory and the town and colony of Siga: it was epiſcopal.

GYPSINE Stone, a name given by ſome writers to the *gypſum*, or foſſil ſubſtance, of which the powder called *plaſter of Paris* is made by calcination. There are in many parts of Arabia vaſt rocks of this ſtone: it reſembles alabaſter, but is ſofter, and of a more lax texture. It is found to be a very eaſy ſtone to form by tools, and therefore the Arabs build with it in ſome of the places in the neighbourhood of the quarries, but they are forced to make the walls very thick, as the ſtone is ſo ſoft and crumbly. The building called Arſoffa, or Arſoffa Emir, which ſeems the remains of a monaſtery, is built wholly of this ſtone; and when the ſun ſhines upon it, the walls give ſuch a luſtre, that they dazzle the eyes; but the ſoftneſs of the ſtone, and the redneſs of the mortar, have conſpired to make it a very ruinous pile at preſent, though of no great antiquity, the ſtones having ſplit and mouldered away in the walls, and the foundations failed in many places. Phil. Tranſ. N° 218, p. 150.

GYPSINUM Metallum, in the *Natural Hiſtory of the Ancients*, a name uſed for the common *lapis ſpecularis*, of which they often made windows as we do of glaſs. It was by ſome called *Cyprinum metallum*, becauſe frequently found in Cyprus.

GYPSOCHI, artiſts who work in plaſter. See Paradi-Gramaticæ.

GYPSOPHILA, in *Botany*, from γυψος, *lime*, or *plaſter*, and φιλεω, to *love*, becauſe the plants of this genus chiefly prefer a limeſtone or calcareous ſoil. Linn. Gen. 224. Schreb. 302. Willd. Sp. Pl. v. 2. 662. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 84. Sm. Prod. Fl. Græc. v. 1. 279. Juſſ. 301. Lamarck. Illuſtr. t. 375. (Saponaria; Gærtn. t. 130.) Claſs and order, *Decandria Digynia*. Nat. Ord. *Caryophyllei*, Linn. Juſſ.

Gen. Ch. *Cal.* Perianth inferior, ſimple, of one leaf, bell-ſhaped, angular, with five ovate ſegments, permanent. *Cor.* Petals five, obovate, obtuſe, ſcarcely ſpreading, nearly ſeſſile. *Stam.* Filaments ten, awl-ſhaped, ſlightly ſpreading; anthers roundiſh. *Piſt.* Germen nearly globoſe; ſtyles two, thread-ſhaped, ſeparate; ſtigmas ſimple. *Peric.* Capſule globoſe, of one-cell, with four or five valves united below. *Seeds* numerous, roundiſh.

Eſſ. Ch. Calyx of one leaf, bell-ſhaped, angular. Petals five, obovate, nearly entire. Capſule ſuperior, roundiſh, of one-cell.

Obſ. G. *paniculata* is diœcious. This genus differs from *Dianthus* in having no ſcales at the baſe of the calyx, and from that of *Saponaria* in the angular form of the calyx, and ſhorter rounder ſeed-veſſel. By theſe marks, and by the moſt ſtriking agreement of habit, *Saponaria Vaccaria* of Linnæus is neceſſarily removed hither in Prod. Fl. Græc. nor is it eaſy to account for its having been placed any where elſe. *S. cretica* and *illyrica* are alſo *Gypſophilæ*. There being no where a complete and correct account of the whole, we ſhall attempt it here.

1. G. *Vaccaria*. Prod. Fl. Græc. n. 940. (Saponaria Vaccaria; Linn. Sp. Pl. 585. Vaccaria; Dod. Pempt. 104. Ger. em. 492.)—Leaves ovate, claſping the ſtem, very ſmooth. Petals emarginate, eroded.—Native of corn-fields in Germany, France, Switzerland, and the Levant, very common in Greece, and the iſlands of the Archipelago, flowering in June and July. *Root* annual, ſmall. Whole *herb* ſmooth, of a pale glaucous green. *Stem* one or two feet high, round, leafy, repeatedly forked above, corymboſe and many-flowered. *Leaves* oppoſite, claſping the ſtem, ovate, acute, entire, with a heart-ſhaped baſe, and one ſtrong rib with ſeveral ſmall ſhort lateral ones. *Flowers* about the ſize of a cowſlip, pink, with a very angular calyx tinged with brown or dull purple, inodorous. This is a hardy annual, of eaſy culture, ſowing itſelf ſpontaneouſly, and not unornamental.

2. G. *graminea*. Prod. Fl. Græc. n. 941.—Radical leaves linear, tufted. Stem panicled, nearly leafleſs. Petals emarginate. Calyx downy.—Suppoſed to have been gathered by Dr. Sibthorp on mountains in the Morea. This is a ſmaller plant than the preceding, with a perennial *root*, crowned with tufts of numerous, graſs-like, bright-green *leaves*, whoſe edges are rough with minute prickles. *Flowers* roſe-coloured, half the ſize of the firſt ſpecies.

3. G. *repens*. Linn. Sp. Pl. 581. Jacq. Auſtr. t. 407.—Leaves fleſhy, lanceolate. Petals emarginate, longer than the ſtamens.—Native of the Alps of Auſtria and Switzerland, and of the Pyrenean mountains. *Root* perennial, creeping, many-branched at the top. *Stems* numerous, a ſpan high, aſcending, nearly ſimple, forked above. *Leaves* elliptic-lanceolate, fleſhy, ſmooth-edged, about an inch long, often curved, ſcarcely glaucous. *Flowers* few, ſmaller than the laſt, whitiſh, with green ribs to the calyx. *Stamens* almoſt as long as the petals; *ſtyles* much ſhorter.

4. G. *proſtrata*. Linn. Sp. Pl. 581. (Alſine caryophylloides anguſtifolia multiflora glabra purpuraſcens; Pluk. Phyt. t. 75. f. 2.)—Leaves linear-lanceolate, ſmooth. Stems diffuſe, much branched, many-flowered. Styles prominent.—Preſumed to be a native of the European alps, but it is only known in gardens. The perennial *root* bears many diffuſe ſlender *ſtems*, a foot or two in length, very much branched and forked at their extremities. *Leaves* longer, ſharper, narrower, and leſs fleſhy, than the laſt. *Flowers* ſmaller, white, the ſtalks of thoſe that grow from the forks of the ſtem divaricated, or turned upwards. *Stamens* ſhorter than the corolla.

5. G. *paniculata*. Linn. Sp. Pl. 583. Jacq, Auſtr. append. t. 1.—Leaves lanceolate; the lower ones rough. Stems very much branched, divaricated, many-flowered. Styles prominent. Calyx rounded, obtuſe.—Native of dry ſandy ground in Siberia, and in Hungary about Buda. The *root* is thick and perennial. *Stems* diffuſe, more divaricated than in the preceding, repeatedly forked, and bearing innumerable minute white *flowers*, whoſe calyx has very round blunt ſegments, and whoſe *ſtamens* are ſhort and abortive in ſome flowers, while the piſtil is ſo in others, which according to Linnæus grow from a ſeparate root. The *leaves* are lanceolate, long-pointed, ſmooth, except the lower ones, which are more or leſs rough on both ſides.

6. G. *viſcoſa*. Murray Comm. Gœtting. for 1783. p. 9. t. 3. Ait. Hort. Kew. v. 2. 85.—"Leaves ovate-lanceolate, ſmooth, heart-ſhaped at the baſe and embracing the ſtem. Branches viſcid between their joints. Petals abrupt."—Native of the Levant, from whence its ſeeds were received by the late Mr. Forſyth. It is ſaid to be a hardy annual. This is the only ſpecies we have not examined.

7. G. *adſcendens*. Murray in Syſt. Veg. ed. 14. 415. Jacq. Hort. Vind. v. 2. t. 138.—Leaves linear, ſlightly lanceolate. Stems proſtrate. Panicles erect. Calyx acute.

Corolla, ſtamens, and ſtyles of equal length.—The native country of this is unknown. Jacquin received the ſeeds from profeſſor Spielmann, and found the plant required a green-houſe in winter. The *root* is woody and perennial. *Stems* numerous, a foot long, proſtrate, red, leafy, aſcending only at the extremity, where they are forked and panicled. The *leaves* are ſmooth, near an inch long. *Flowers* white, the ſize of G. *repens*, with ſharp teeth and keels to the calyx. *Petals* emarginate.

8. G. *altiſſima*. Linn. Sp. Pl. 582. Prod. Fl. Græc. n. 942. (Lychnis caulibus dichotomis, corymbis faſtigiatis, foliis lanceolatis trinerviis; Gmel. Sib. v. 4. 143. t. 60.)—Leaves lanceolate, obſcurely three-ribbed. Stem erect. Calyx froſted. —Native of Siberia and Greece. *Root* perennial, tapering, long. *Stems* 18 to 24 inches high, erect, round, firm, leafy below, panicled and ſpreading above. *Leaves* from two to four inches long, and often half an inch broad, ſmooth, ſucculent; with three ribs, moſt viſible in a dry ſtate. *Flowers* corymboſe, crowded, ſmall, white, their calyx-ribs broad, obtuſe, green, froſted, the edges and interſtices broad and white. The *flower-ſtalks* are a little rough and clammy.

9. G. *arenaria*. Willd. Sp. Pl. n. 7.—Leaves linear, ſomewhat fleſhy, ſingle-ribbed, flat. Stem erect. Calyx ſmooth and naked.—Gathered in ſandy ground in Hungary by Meſſrs. Waldſtein and Kitaibel. As large as the laſt, and very like it in general appearance, but the *leaves* are ſmaller, and have no ſide-ribs. In our ſpecimen, ſent by the late Dr. H. A. Noehden from the Goettingen garden, they are all over minutely hairy, as is the panicle. The *flowers* are pale red, corymboſe. Their *calyx* ſmooth, ſcarcely at all downy or froſted, and its white edges far leſs conſpicuous than in *G. altiſſima*.

10. G. *Struthium*. Linn. Sp. Pl. 582. (Kali vermiculatum, albo globoſo flore; Barrel. Ic. t. 119.)—Leaves linear, fleſhy, ſemi-cylindrical; the axillary ones cluſtered.—Native of Spain. *Stem* erect, 12 or 18 inches high, woody below, leafy. *Leaves* crowded, an inch or more in length, linear, narrow, convex beneath, very ſucculent, glaucous, ſmooth, accompanied by ſhort, denſely-leafy, axillary branches. *Flowers* white, numerous, in denſe, rounded, panicled tufts. *Calyx* much as in *G. altiſſima*. *Petals* rounded, ſcarcely emarginate. This herb is ſaid to be uſed for ſcouring inſtead of ſoap, by the Spaniards at preſent, as it was by the ancients. It would be curious to enquire whether, like many ſucculent maritime plants, it contains foſſil alkali, and whether the reputed ſaponaceous quality of its near relative *Saponaria officinalis* be owing to the ſame cauſe, if indeed it really exiſts, which ſeems doubtful.

11. G. *faſtigiata*. Linn. Sp. Pl. 582. Ehrh. Phytoph. n. 85. (Lychnis, n. 41; Gmel. Sib. v. 4. 144. t. 61. Saponaria petalis ovatis, &c.; Rupp. Jen. ed. Hall. 117. t. 2.) —Leaves linear, obtuſe, ſmooth, ſucculent, obſcurely triangular, turned to one ſide. Flowers denſely corymboſe. —Native of rocks in Gothland, Germany, and Switzerland. *Root* woody, perennial. *Stems* a foot high, procumbent before flowering, which cauſes the *leaves* to turn upwards from the ground, and they, therefore, continue directed to one ſide. They are above an inch long, green, or purpliſh, narrow, fleſhy, and obtuſe. *Flowers* in denſe, corymboſe, forked tufts, with hairy *ſtalks*, membranous *bracteas*, a froſted bluntiſh *calyx*, and whitiſh rounded *petals*.

12. G. *perfoliata*. Linn. Sp. Pl. 583. (Spergula multiflora, foliis inferioribus ſaponariæ, ſuperioribus behen ſimilibus; Dill. Elth. v. 2. 368. t. 276.)—Leaves ovato-lanceolate, many-ribbed, half-claſping the ſtem. Flowers looſely panicled.—Native of Spain and the Levant. *Root* perennial. *Stems* two or three feet high, as thick as the little finger in their lower part, branched, leafy. *Leaves* two or three inches long, tapering, broad at the baſe, ſmooth or downy, the lower ones eſpecially many-ribbed, and moſt horizontal. *Flowers* the ſize of the laſt, pale red, copious, in looſe forked ſpreading panicles; their *calyx* ſmooth, but ſlightly membranous, or white at its edges. *Petals* entire.

A downy variety is the *G. tomentoſa*, Linn. Sp. Pl. 583, ſuppoſed to be what Barrelier figures, t. 1002, and alſo *Alſine altiſſima, folio plantaginis*; Buxb. Cent. 3. 32. t. 61. See Dill. Hort. Elth.

13. G. *muralis*. Linn. Sp. Pl. 583. Prod. Fl. Græc. n. 943. Ehrh. Herb. n. 154. (Betonicæ ſive Tunicæ minimæ ſimilis planta; Bauh. Hiſt. v. 3. 338. f. 1.)—Leaves linear, flat. Calyx without bracteas. Stem much branched throughout. Petals crenate.—On walls, rocks, and in ſtubble fields, in Sweden, Germany, Switzerland, and France. Dr. Sibthorp gathered it on the Bithynian Olympus.—A ſmall, biennial, upright, buſhy herb, with a ſlender, ſmooth, alternately branched, forked, panicled *ſtem*. *Leaves* oppoſite, very narrow, hardly an inch in length, ſometimes curved. *Flowers* copious, ſmall, pink, on ſlender ſpreading ſtalks an inch long, unaccompanied by any bracteas. *Calyx* very ſmooth, membranous betwixt the ribs. *Petals* ſlightly crenate, marked with fine reticulated veins.

14. G. *rigida*. Linn. Sp. Pl. 583. Prod. Fl. Græc. n. 944. (Tunica minima; Dalech. Hiſt. 1191. f. 2.)—Leaves linear, erect. Calyx accompanied by four equal ovate bracteas. Petals emarginate. Stems numerous, moderately branched.—Native of rocky dry places in the ſouth of Europe. Found on the Bithynian Olympus by Dr. Sibthorp. *Root* perennial, rather woody. *Stems* numerous, ſpreading, a ſpan long, leafy, ſimple below, a little branched alternately at the upper part, more or leſs downy. *Leaves* linear, or rather awl-ſhaped, erect, and nearly preſſed cloſe to the ſtem, ſhort, dilated, and membranous at their baſe; thoſe near the flowers ſhorter and more membranous. *Flowers* ſolitary, rarely in pairs, terminal. *Calyx* enveloped in four equal, ovate or obovate, membranous, rigid, pointed bracteas, rather ſhorter than itſelf. *Petals* pale purple, ſtreaked at the baſe of the border, emarginate at the point. *Stamens* unequal in length. *Styles* ſhort.

15. G. *ſaxifraga*. Linn. Sp. Pl. 584. Sm. Exot. Bot. v. 2. 61. t. 90. (Betonica coronaria, ſive Tunica minima; Bauh. Hiſt. v. 3. 337. f. 2.)—Leaves linear. Calyx accompanied by four unequal lanceolate bracteas. Petals emarginate. Stem very much branched.—Native of the ſouth of Europe, received by the late lady Amelia Hume from Spain. *Root* ſmall, fibrous, annual. *Stem* upright, ſlender, very much branched like that of *G. muralis*, with which this ſpecies agrees in habit, but is larger in every part, and eſſentially diſtinguiſhed by the four unequal lanceolate bracteas under the calyx, which have led ſome botaniſts, and even Linnæus originally, to make it a *Dianthus*. In this laſt reſpect it come ſo near the laſt, that few perſons know the one from the other, yet we believe the differences we have indicated are conſtant and ſufficient. The *petals* of *G. ſaxifraga* are emarginate, pale red, with three deeper ſtreaks. *Capſule* of four teeth or valves.

16. G. *dianthoides*. Prod. Fl. Græc. n. 945. (Lychnis orientalis, petalis albis, lineis cæruleis ſubtùs variegatis; Tourn. Cor. 24.)—Leaves linear. Flowers capitate. Bracteas crowded, pointed, dilated, membranous. Petals obtuſe, entire. Gathered by Dr. Sibthorp on the Sphaciotic or White mountains of Crete. The *root* is woody and perennial. *Stems* many, a foot high, erect, moſtly ſimple, leafy, ſmooth. *Leaves* ſhort, linear, blunt, ſmooth, rather glau-

eous, moſt numerous on the lower part of each ſtem. *Flowers* two, three, four, or five together in terminal heads, in the manner of *Dianthus prolifer*, Engl. Bot. t. 956; with pale, ſcarioſe, lanceolate *bracteas* about them, nearly equal to the *calyx*, which is ſometimes downy. *Petals* entire, white above with three purple lines at the baſe of each, moſt beautifully reticulated underneath, near the margin with purple veins. *Capſule* cylindrical inclining to ovate, opening by four teeth or half-valves.

A figure of this, as well as of all the following, is deſtined to appear hereafter in the Flora Græca.

17. G. *cretica*. Prod. Fl. Græc. n. 946. (Saponaria cretica; Linn. Sp. Pl. 584.)—Leaves awl-ſhaped, three-ribbed. Stem partly forked. Border of each petal lanceolate, ſpotleſs. Root tufted.—Native of the rocks of Crete. *Root* woody, perennial. *Stems* numerous, erect, about a ſpan high, leafy, ſubdivided, forked, and ſomewhat panicled, ſlender. *Leaves* lanceolate, keeled, ſharp-pointed, three-ribbed in their lower part. *Flowers* ſolitary, terminal, very numerous, ſmall, their calyx and ſtalks downy, without bracteas. *Petals* narrow, entire, white above, purpliſh underneath. *Capſule* ovate, of four valves.

18. G. *ochroleuca*. Prod. Fl. Græc. n. 947.—Leaves awl-ſhaped; the lower ones linear and flaccid. Stem forked, divaricated. Border of each petal ſpatulate, ſpotted at the baſe.—Diſcovered by Dr. Sibthorp on the famous mount Hymettus, near Athens. The *root* ſeems annual. *Stems* numerous, of various heights, erect, branched, and forked almoſt from the bottom, at moſt a foot high. *Leaves* graſs-green, narrow, acute, ſingle-ribbed. *Flowers* like the laſt, except their petals being more ſpatulate, and pale ſtraw-coloured, elegantly dotted and ſtreaked with purple at the baſe.

19. G. *illyrica*. Prod. Fl. Græc. n. 948. (Saponaria illyrica; Linn. Mant. 70. Willd. Sp. Pl. v. 2. 669. Arduin. Specim. 2. 24. t. 9.)—Leaves awl-ſhaped. Stem forked, level-topped, downy and viſcid, as well as the calyx. Border of each petal obovate, dotted at the baſe.—Native of Dalmatia, and of the Archipelago. Dr. Sibthorp found it, flowering in Auguſt, on the hills of the iſland of Amorgos. *Root* biennial, according to Arduino, whoſe figure of this plant is in all its parts too large, though on the whole too dwarfiſh. We have compared his ſpecimens with thoſe of Sibthorp, a caution the more neceſſary, as this ſpecies is known to very few perſons. The *ſtems* are a ſpan high, leafy; ſimple below, each terminating in a denſe, forked, cloſe, level, downy and viſcid tuft, of ſmalliſh *flowers*, whoſe narrow, blunt, white *petals* have three purple dots at the baſe of their border. *Capſule* ovate, opening by four teeth. *Anthers* blue. The *leaves* are very finely toothed.

20. G. *ocellata*. Prod. Fl. Græc. n. 949. (Lychnis græca pumila umbellifera, polygoni folio, flore albo cum circulo atro-purpureo; Tourn. Cor. 14. Cucubalus polygonoides; Willd. Sp. Pl. v. 2. 690?)—Leaves ſpatulate, downy on both ſides. Stems diffuſe. Flowers capitate. Borders of the petals ovate, marked with a purple ring.—Native of mount Delphi in the iſland of Negropont, where Dr. Sibthorp gathered it. The *root* is long, thick, woody and tufted. Whole *herb* downy, light green. *Stems* numerous, diffuſe, three or four inches long, leafy, branched at the baſe only. *Leaves* rather above half an inch in length, ſpreading, ſpatulate, acute. *Flowers* about ſix or ſeven in each ſolitary terminal tuft, accompanied by a few ſhort leaves or bracteas. The broad white *petals* are beautifully marked with a common purple ring, as in *Dianthus deltoides*. We preſume there is no doubt of Tournefort's ſynonym, nor does Willdenow's deſcription differ very eſſentially from our plant, except that the petals are not emarginate, nor are the ſtyles three, as they ought to be in *Cucubalus*.

21. G. *thymifolia*. Prod. Fl. Græc. n. 950.—Leaves ſpatulate, downy on both ſides. Stems diffuſe, ſomewhat forked. Borders of the petals obovate, rounded, ſpotleſs.—Gathered by Dr. Sibthorp on mount Parnaſſus. This has the habit of the laſt, but the *ſtems* are rather longer, more diſpoſed to be branched or forked. *Leaves* ſhorter and rounder. *Flowers* two or three in each tuft, rarely axillary and ſolitary. *Calyx* hairy. Borders of the *petals* broad, rounded, white, entire, without any mark or ſpot. *Capſule* ovate, ſhort, four-toothed. The lower part of the plant is woody, and even ſhrubby.

GYPSUM, in *Agriculture*, a ſubſtance formed by the combination of the ſulphuric acid with calcareous earth; and which has been ſaid to have been found beneficial as a manure in different places, as in Germany, America, &c. but has not yet been tried with much ſucceſs in this country. See Gypsum *infra*.

With reſpect to its uſe as a manure, it is aſſerted not to have been diſcovered until about the year 1768, at which period it was aſcertained to be beneficial in this intention by Mr. Mayer, a German clergyman.

It is ſuggeſted as probable, that it is the moſt advantageous on the drained clayey ſoils, being applied by ſpreading it out evenly, or ſowing it exactly over the ſurfaces of them in not too large a proportion about the month of February or the following one.

It ſeems probable alſo, that it is the moſt adapted to ſuch lands as are in the ſtate of ſward, though it may be employed on thoſe under tillage.

" In Maryland, in America, it is ſtated, in the ninth volume of the Agricultural Magazine, that comparative trials with this and other manures were made on rather a ſtony clay, mixed with a little loam, in order to aſcertain the beſt manure for wheat.

" A five-acre field (nearly a level ſurface) was divided into five equal parts, exactly an Engliſh acre each. They were equally well ploughed, and laid down in wheat, three Engliſh buſhels on each acre, after being manured as follows.

" On No. 1, was ſown ſix and a half buſhels of plaſter of Paris, or gypſum, pounded rather fine.

" On No. 2, was put a compoſt manure, which conſiſted of ſome lime. The bed of a freſh water river, common dung, &c.

" On No. 3, was cowpenned, as is uſual in America, by penning the cattle during night.

" On No. 4, was put ſtable-dung, only rather thin.

" On No. 5, lime was applied, in the uſual way, as in England and Ireland, with oyſter-ſhell lime.

" The produce of each acre was as follows:

" No. 1, produced full forty buſhels. N°. 2, thirty-ſix buſhels. No. 3, thirty-five buſhels. No. 4, thirty-three buſhels. And No. 5, thirty buſhels.

" It is obſerved that there was a want of rain in the ſpring, or they would have been greater. The ſeed-wheat was of the beſt Sicily grain, weighing 62lb. the Wincheſter buſhel, as imported into Virginia. The produce was a full round grain, weighing 63lb. the Wincheſter buſhel.

" The produce of No. 5, with the lime manure, was rather the fulleſt grain; and, as lime does not anſwer ſo well the firſt year, this acre will probably produce more hereafter.

" It appeared that dung, or organic matter, was the firſt food for wheat, as it is of plants generally; and although it muſt be repeated every three or four years, will, the writer thinks, turn out in the end the beſt manure.

" The plaſter of Paris, gypſum, and lime, will exhauſt land much more, and the plaſter of Paris more than lime."

And in other trials in America, it has been made uſe of for many years upon old lands, and thoſe in all ſtates of heart, in the quantity of from one to five buſhels the acre; but on high and ſandy ſoils, it was found the moſt beneficial. Its effects have been great when employed in the proportion of one buſhel to the acre annually. It has been found to have good effects on wheat, rye, barley, peas, potatoes, cabbage, clover, and all natural graſs-crops. Uſed in combination with other manures, it is ſaid alſo to be very beneficial to land.

With reſpect to the manner of preparing this ſubſtance, when the proper ſort is procured, which is ſuch as will not effervеſce with *aqua fortis*, nor ſtrike fire with ſteel; the large lumps ſhould be broken down into ſmaller ones; and theſe ſtill further reduced by means of a ſtamping-mill, when it may be brought into a powdery ſtate by a mill for the purpoſe; as the finer it is reduced, the more power it has of attracting and retaining the moiſture, and of courſe of proving more efficacious. After being thus reduced, it may be ſown over the land by the hand, as other top-dreſſings; or in any other manner. Experiments, detailed in the eighth volume of the Bath Papers, made by a Kentiſh farmer with this ſubſtance upon light loams, and poor calcareous ſoils, eſpecially of the chalky kind, in the years 1792, 1793, and 1794, afford the reſults of repeated trials, and ſhew its effects as a manure for ſaintfoin, cow-graſs, Dutch-clover, &c.

It is ſtated, that " all the perches were accurately meaſured by himſelf, and the contents, when ſufficiently dry, tied up in bundles, and weighed previous to their being threſhed in the field; each parcel of ſeed being then put in a bag, tallying with the number of the experiment." It is next obſerved, that " each contraſted perch was taken very near the line of partition, that no difference of the ſoil might affect their products. As the field was above 100 rods long, he ran the experiments in a ſtraight line throughout, at equal diſtances, which enabled him to compare the natural products with each other, and the relative effects of the gypſum, according as the ſtaple of the ſoil varied: No. 1 and 2, the ſoil a very light loamy earth, to the depth of three feet on chalk, which kept gradually riſing nearer the ſurface to the further end, where, at Nos. 7, 8, 9, the ſurface mould was not more than from two to four inches thick; hence, we may naturally account for the product of No. 1, ſo far exceeding that of No. 8; and it will alſo ſhew the immediate as well as permanent effect of gypſum on the two perches 7 and 9, the firſt gypſumed the 17th of May 1794, the latter in May 1792."

EXPERIMENTS.

No.	Groſs weight per perch 6*l*.	Groſs weight per acre.			Net weight, ſeed deducted.			Value thereof at 1*s*. 6*d*. per cwt.			Weight per perch.		Meaſure per acre, at 25lb per buſhel.			Value thereof at 40*s*. per quarter.			Total groſs value of the acreable produce in ſeed and ſtraw.		
		Cwt.	*qr.*	*lb.*	*Cwt.*	*qr.*	*lb.*	*£*	*s.*	*d.*	*lb.*	*oz.*	*qr.*	*bus.*	*gal.*	*£*	*s.*	*d.*	*£*	*s.*	*d.*
1	23	32	3	12	29	0	23	2	3	9½	2	9	2	0	2½	4	1	6	6	5	3½
2	37	52	3	12	47	2	3	3	11	7½	3	9	2	4	3	5	1	10	8	13	5½
3	31	44	1	4	40	2	24	3	1	0	2	8	2	0	0	4	0	0	7	1	0
4	24½	35	0	0	33	0	9	2	9	7	1	5½	1	0	4½	2	2	9	4	12	4
5	18½	26	1	20	24	0	8	1	16	0	1	8	1	1	4½	2	7	9	4	3	9
6	29	41	1	20	38	0	14	2	17	2	2	5	1	6	6	3	13	9	6	10	11
7	31	44	1	4	42	1	23	3	3	8	1	4½	1	0	1½	2	0	11	5	4	7
8	13	18	2	8	17	3	27	1	7	0	0	6½	0	2	4½	0	12	9	1	19	9
9	27½	39	1	4	37	2	0	2	16	3	1	4	1	0	0	2	0	0	4	16	3

However, " in order to aſcertain the ſuperior value of the gypſum products over the ſoot and natural ones, in a diſtinct and conciſe view, the writer adopts the following ſtatement of the total money, products, and balances:

	£	*s.*	*d.*
" No. 2. Gypſum, ſix buſhels per acre in April 1794 - - -	8	13	5½
1. Natural growth - - - -	6	5	3½
	2	8	2
Deduct the expence of ſix buſhels of gypſum, 2*s*. 9*d*. per buſhel - - - -	0	16	6
	1	11	8
No. 6. Gypſum, ſix buſhels per acre in April 1793 - - - - -	6	10	11
5. Natural growth - - -	4	3	9
Balance in favour of gypſum, the ſecond year after being ſown - - - - -	2	7	2.

Note. The gypſum expence balanced in the ſaintfoin crop of 1793.

No. 3. Gypſum, as before - - -	7	1	0
Deduct expence of gypſum - -	0	16	6
Profit by gypſum - - - -	6	4	6
No. 4. Twenty buſhels of ſoot per acre in April 1794 - - - - -	4	12	4
Deduct expence of ſoot - -	0	15	0
	3	17	4

N.B. The gypſum profit exceeds the ſoot by 2*l*. 7*s*. 2*d*. per acre.

	£	s.	d.
No. 9. Gypſumed in May 1792 - -	4	16	3
8. Natural growth - - - -	1	19	9
Balance in favour of gypſum the third year after it was ſown - - - - -	2	16	6
Note. The gypſum expence of No. 9. balanced in the crop of 1793.			
No. 7. Gypſum, 17th May 1794 - -	5	4	7
Deduct expence of gypſum - - -	0	16	6
Gypſum profit	4	8	1
No. 8. Natural growth - - - - -	1	19	9
Balance in favour of gypſum - - -	2	8	4
It is noted that the groſs amount of the five gypſum numbers together, is - -	32	6	2½
The average value per acre - - -	6	9	3
The groſs value of the three numbers of natural product, including the ſoot, No. 4. is - -	17	1	1½
The average value per annum - - -	£4	5	3

It is added, that he “ firſt entered upon theſe experiments with a view to his own private ſatisfaction and amuſement. The care and attention he beſtowed on them have been amply repaid, on finding the reſults ſo uniformly deciſive, and exceeding his expectations.”

And further, that “ having, during the progreſs of theſe experiments, remarked ſeveral circumſtances, which, though not bearing directly on the point in view, ſeem of too much importance to paſs unnoticed, he ſhall proceed to ſtate ſuch inſtances as appeared particularly ſtriking and intereſting. Upon comparing the ſeed value of each number, and the proportion it bears to the reſpective ſtraw product, the difference appears materially to depend on the depth of ſoil; and all the firſt ſix numbers (except the one ſown with ſoot) exceed their ſtraw value by one-half or one-third, or ſomething above par, while Nos. 7, 8, 9, ſink below par, in nearly the ſame proportions: thus,

		£	s.	d.
“ No. 1, gives—	Straw, value - -	2	3	9
	Seed - - -	4	2	6
	Total	6	6	3
“ No. 7, ———	Straw, value - -	3	3	8
	Seed - - - -	2	0	11
	Total	5	4	7

It is here aſked if this does not “ argue a defect of ſome peculiar fructifying principle (whatever it may be) in this ſhallow chalky ſoil, which even gypſum is not able to impart? The reſults at leaſt ſeem to point out the impropriety of feeding ſaintfoin on ſuch ſoils; but it may fairly be preſumed that had both the numbers in queſtion been mown for hay, No. 7 would have exceeded as much as it now falls ſhort of the value of No. 1. And here another intereſting matter occurs to him, which is, that he purpoſely reſerved half an acre of the poor chalk, out of which No. 7 was taken, to ſee what effect the gypſum would have had upon it, if ſown after vegetation had made ſome conſiderable progreſs. Accordingly, on the 17th of May, he had three buſhels ſown on that part, the ſaintfoin being then about ſix inches high, but looking very yellow and unpromiſing, whilſt the greater part of the field, which was gypſumed a month before, had now attained a deep healthy verdure and a vigorous ſhoot. He muſt own, he ſays, there appeared little probability of this late ſowing coming to any thing, as the powder hung upon the leaves almoſt two days, and the weather was apparently ſet in very dry. A gentle rain, however, falling the ſecond night, waſhed it all off, and, he ſuppoſes, ſet it to work; for, in five or ſix days, he could perceive the ſaintfoin gain colour conſiderably, and it continued making ſuch a rapid progreſs as to bid fair, by the middle of June, to outſtrip all the reſt. On the 10th of July he had the ſaintfoin mown, the ſeed being ripe, except the half acre, which was ſuffered to ſtand a week longer, in order to gain a proportion of ſeed equal to the reſt; but he found, at laſt, there was a great deal of light unripe ſeed, which in ſome meaſure accounts for No. 7 falling ſhort of No. 1 in that article more than half. As this laſt inſtance undoubtedly gives a moſt deciſive proof of the inſtantaneous and aſtoniſhing effects of gypſum on ſaintfoin, he ſhall here cloſe the experiments and remarks on that plant, and proceed to obſerve, that the lower part of the ſame field was laid down with cow-graſs, ſown upon wheat in March 1792; the ſoil a light loam, to the depth of ten or twelve feet, with a mixture of flints. This part was gypſumed at the times mentioned as above, and the ſame lines of diviſion for the ſoot; and intervals, where nothing was ſown, ran directly acroſs both parts.

“ The cow-graſs being mown for hay, on the 7th of July, he meaſured two ſquare perches, taken within a few feet of each other, juſt before they were carried to the ſtack, and weighed their contents, which were as follow:

	£	s.	d.
“ No. 1, weighed 42lb. per perch, per acre 60 cwt. at 2*s.* - - - - - -	6	0	0
Charges of ſix buſhels of gypſum at 2*s.* 9*d.* -	0	16	6
	5	3	6
No. 2. Natural growth, per perch 15lb. per acre 21 cwt. 1 qr. 20lb. at 2*s.* - -	2	2	10
Extra profit by gypſum	3	0	8

It is noted that “ this proved remarkably fine hay, and is now worth 4*l.* 10*s.* per load. This profit comes ſo entirely in uniſon with thoſe he has ſtated before, as to require no comment. He ſhall only ſtate, that the part of the field under ſaintfoin is worth 6*s.* per acre, and the cow-graſs part 10*s.* rent.”

The laſt experiment is now entered upon, “ which was upon a piece of Dutch-clover, ſown the preceding ſpring upon wheat. Having his doubts whether gypſum would operate with equal effect upon this plant, as upon the tap-rooted tribe, he only ſowed about half an acre with it, upon two diſtinct patches choſen where the ſoil varied moſt in quality; one part being a looſe mould four or five inches deep on chalk; the other a kindly ſtiffiſh loam to a conſiderable depth, with a ſlight mixture of pebbles. The whole piece of clover was about five acres, and, upon about three acres of it (the loamy part), there was in general a vigorous but thin plant, of ſelf-ſown wheat, which promiſed, in appearance, to yield from two to three buſhels per acre. This, he thought, added to the clover-ſeed, would help to make out a tolerable ſaving crop, conſidering the extreme dry ſummer. The ſequel will prove, however, how much he was miſtaken; for, by referring to the ſubſequent ſtatement of the two perches, A, B, both gypſumed alike, and having an equal plant of clover, it appears that by ſuffering the wheat to ripen on B, there was a deficiency on the clover-ſeed amounting to 7*l.* per acre (a material object, had the three acres of loam been gypſumed), merely to gain two buſhels per acre of wheat, worth 15*s.* which he found the wheat product of the perch amounted to, proportioned to the acre. He has been induced to mention this circumſtance, not from its being in any wiſe the effect of gypſum, but to ſuggeſt what uſeful hints will frequently preſent themſelves in the progreſs of the moſt ſimple experiments, and ſometimes indeed of as much importance as the main object in view.

" Previous to a particular ſtatement of the experiments, it may be proper to obſerve, that the gypſum was ſown at the rate of ſix buſhels per acre, on the 22d of May; the clover at that time, particularly on the chalky ſoil, looked very pale, and wanted ſap; in a fortnight the gypſumed part might be diſtinguiſhed at a conſiderable diſtance; and though we had no rain, yet it ſoon formed ſo thick a mat, as effectually defended it from the ſcorching ſun, which nearly burnt up the reſt, as may be ſeen by the ſcanty products of the two contraſted perches A and B: as under is the ſtatement of the experiments alluded to."

Straw Product of Dutch-Clover.

	Per perch.		Per acre.			Net product.			Value at 1*s.* 6*d.* per cwt.		
	lb.	*oz.*	*cwt.*	*qr.*	*lb.*	*cwt.*	*qr.*	*lb.*	*L.*	*s.*	*d.*
A. Gypſumed	15	8	22	0	16	19	1	14	1	9	0¾
a. none	5	8	7	3	4	7	1	5	0	10	11
B. Gypſumed	15	0	21	1	20	19	3	18	1	9	10
b. none	9	0	12	13	12	12	1	8	0	18	6

Seed Product.

	Seed per perch.		Seed per acre.			Value at 12*d.* per lb.			Groſs amount.		
	lb.	*oz.*	*cwt.*	*qr.*	*lb.*	*L.*	*s.*	*d.*	*L.*	*s.*	*d.*
A. Gypſumed	1	15	2	3	2	15	10	0	16	19	0¾
a. none	0	5½	0	1	27	2	5	10	2	16	9
B. Gypſumed	1	1	1	2	2	8	10	0	9	19	10
b. none	0	6	0	2	4	2	10	0	3	8	6

It is ſuppoſed that " the reſults of the gypſum perches ſufficiently prove that it operates as forcibly on this plant as upon ſaintfoin, with reſpect to groſs product; but the value of Dutch clover-ſeed being ſo ſuperior to that of ſaintfoin, has occaſioned the money value of the ſeed product A. to exceed the higheſt ſaintfoin-ſeed product No. 2, as 3 to 1; and, upon deducting the groſs natural product *a* from the gypſum product A, it will appear that there is an abſolute gain of 14*l.* 2*s.* 3*d.* per acre, at the expence only of 16*s.* 6*d.* for ſix buſhels of gypſum.

" The invariable reſults of the ſeveral experiments, which are faithfully, and, he truſts, correctly ſtated, do, he thinks, inconteſtibly prove that there is a moſt powerful and ſubtile principle in this taſteleſs ſtone; but by what peculiar agency or combination it is capable of forcing vegetation in ſuch an inſtantaneous and aſtoniſhing manner, is a myſtery which time reſerves for others to unfold. But until this period arrive, the practical and moſt cautious farmer will, he hopes, run no great hazard in venturing ſome ſmall trials on the credit of the above matters of fact, which he has faithfully and truly ſtated." But the trials of ſir R. Sutton, as detailed in the Annals of Agriculture, are not, however, by any means ſo favourable. It is noted that in the courſe of the month of February he dreſſed, in his home farm, ſix acres of ground with pounded plaſter, ſix hundred weight to the acre; two of theſe acres were young red-clover, two white clover and graſs-ſeeds, and two natural meadow.—The ſoil where the red-clover was, a good hazel mould, with a ſtrong loam underneath; the others a ſtrong loam, more inclined to clay. At the ſame time he dreſſed eleven acres of young graſs-ſeeds on his foreſt farm, the ſoil ſand and gravel, and ten acres more of oats and barley, as ſoon as they came up; all at the ſame rate of ſix hundred weight per acre. He allowed double the quantity recommended by Mr. Schubart, on account of his plaſter running in a narrow vein, being ſeldom above an inch and a half thick, which was tranſparent and ſparkling; but could not be got without a good deal of a dead white ſtone, and ſometimes of a reddiſh ſtone clinging to it; the ſtrips were all choſe in the middle of fields, and accurately ſtaked out. Upon inſpection, at ſeveral different times during the growth of the crops, and at harveſt, no advantage could be perceived over the adjoining crops; his farmer, indeed, thought ſome had ſuffered by it; but in this he might be prejudiced. He calculated the expence of getting, carrying, grinding, and ſpreading the eight tons laid on twenty-ſeven acres, at 6*l.* 9*s.* By another trial, where it was laid on the proportion of 250 cwt. nearly on ſeven acres of his land, which is a ſtrong red loam, and thirteen acres of foreſt farm, ſand and gravel; it was laid on ſtrips amongſt the land, not dreſſed, and all on clover and graſs-ſeeds; and, upon inſpection, by ſeveral perſons, not the leaſt difference was perceived, either during any time of the growth, or at mowing; the plaſter was brought from Newark, of the beſt kind: he thinks he muſt infer from this, that the common plaſter is of a very different quality. The expence was as follows:

Statement.

On ſeven acres at Norwood.

	£.	s.	d.
One-third of the carriage - - -	0	4	0
One ditto of grinding - - -	0	16	8
Carrying out and ſowing - - -	0	5	0
One-third of 50 cwt. of plaſter - -	0	4	2
	1	9	10

Or 4*s.* 3*d.* an acre, with a fraction: 5*s.* more ſhould be added for carriage, five and a half miles, and to the farm-field, or a little above, 4*d.* an acre.

In a further trial made with French gypſum, the reſult was nearly the ſame. On the 29th of April laſt, one buſhel was ſown upon a rood of land, meaſured and ſtaked out in the middle of a three-acred piece of red-clover, at his home farm, the ſoil a good loam; and the other, the ſame day, on the like quantity of land, likewiſe meaſured and ſtaked out in the middle of a piece of fifteen acres of white clover and graſs-ſeed, in his foreſt farm, the ſoil a poor ſand. During the whole day following, there fell a gentle ſoaking rain. However, being viewed at many different times during the growth, whilſt in ſwarth, and in after-graſs, there was not the leaſt perceivable advantage over the other lands, which had no dreſſing at all.

In Norfolk. according to the Survey of that diſtrict, lately publiſhed, "Mr. Allen tried this manure, very carefully, at Stanhow, on clean clover.

"March 31. No. 1 and 4. No manure; produce average of the two, 38lb. 6oz.

"2. Four quarts ſifted coal-aſhes kept dry, 50lb.

"3. Gypſum, one quart, 54½ lb.

"The aſhes, therefore, gave an increaſe of 11lb. 10oz. and the gypſum of 16lb. 2oz."

But more numerous and correct trials, made with greater attention to particular circumſtances, would ſeem to be neceſſary to aſcertain in what ſort and ſituation of land this ſubſtance may be employed with the moſt beneficial effects in producing crops.

In America, a late writer has found this ſubſtance to be only uſeful where the land was of the drier kind, and made rich by dung; and, not "to have been of any utility, except in clover." From the ſmallneſs of the quantity employed, he ſeems to think it improbable, that it contains any thing of the food of plants. He conſiders the principal uſe of it, to be that of attracting moiſture from the atmoſphere, and thereby hindering the heat of the ſun from affecting the ſoil to ſo great a depth, and the preventing of exhalation, as was evident from the darker appearance of the ground. It was in theſe ways, and that of defending the young plants from the ſcorching heat of the ſun, that it became ſo beneficial to turnips in his trials. "It covers the ſoil, and keeps the ground moiſt and cool all the ſummer." It is ſtated that it had a ſurpriſing effect on four rows of turnips in his firſt trial, which induced him to get a buſhel more, and ſow it upon another ſquare near a road, when, in twenty-four hours, he could diſcern the crop to be of a much deeper green; and, in forty-eight, ſo much ſo, as to have induced a belief of the ſoil being there of a ſuperior quality. He afterwards ſowed another buſhel of it on two rows, and miſſed two rows; the turnips grew to a much greater ſize where the gypſum was ſown, than in the reſt of the field, as in the proportion of about two to one in weight, where the two firſt buſhels were applied, and about three to two where the laſt buſhel was laid on; beſides being much more juicy and better in their kind. And, on the whole, he is not of opinion, that gypſum would anſwer ſo often, or ſo well, here as in America; but he doubts not of its being of great ſervice, and eſpecially on turnips in hot dry ſeaſons. This has, however, not yet been proved by actual trials made in this country.

It is ſuppoſed two buſhels will ſuffice for an acre in drills. French and Nova Scotia gypſum were uſed, being firſt ground fine. In this country, from ſix to eight buſhels have been employed per acre. The ſucceſs has, however, been very far from what might have been expected from the accounts that have at different times been publiſhed concerning it.

Gypsum, in *Mineralogy*, ſulphate of lime; *gyps* in German and in moſt other languages, from the Greek Γυψος. A combination of lime with ſulphuric acid.

This ſpecies may be divided into earthy, compact, fibrous, foliated, and ſparry gypſum or ſelenite; the laſt of which is introduced by Werner as a *ſpecies*, while by other mineralogical writers it is conſidered as a ſub-ſpecies, or variety only. It matters little what appellations we give to ſuch ſub-diviſions: mineralogiſts will ever differ reſpecting the true principle of ſpecification; but fortunately the general arrangement of mineral ſubſtances is not materially influenced by this diſagreement. We ſhall conſider the above ſub-diviſions ſeparately.

1. *Earthy gypſum, gypſeous earth, mealy, farinaceous gypſum,* Engl. *Gyps-erde, gyps-mehl, gyps-guhr, Himmels-mehl,* &c. Germ. *Gyps-lera, Himmels-mjol,* Swed. *Gornaja gips,* or *gipſowaya muka,* Ruſſ.

Its *colour* is yellowiſh or greyiſh, and alſo reddiſh-white; the red and brown colour it ſometimes exhibits is moſtly owing to admixed iron-ochre.

It is compoſed of looſe, and ſlightly cohering duſt-like particles, and like chalk, rough and meagre to the touch. It is light.—Spec. grav.—

Among the *chemical characters* of the earthy gypſum, is its infuſibility, without addition, before the blow-pipe; it intumeſces only in a ſlight degree, and aſſumes a perfectly white colour; but with the addition of borax it melts with ebullition. When not perfectly ſaturated with ſulphuric acid, it effervesces with nitric acid, and is diſſolved in it.

It *occurs* in Thuringia; in Saxony, in the circle of Neuſtadt, between Krölpa, Zella, Oepitz, and near Frankenhauſen; at Saltzburg, particularly at the Gypſberg, near Golling; in Bohemia, in Tranſylvania, in Norway. According to Brochant it has alſo been found at Mont-Martre, near Paris. This is, perhaps, the variety called by Haüy chaux ſulfatée *niviforme*: it is compoſed of cloſe grains of a white colour, with pearly luſtre, and occurs in maſſes appearing like ſnow-balls, and eaſily reducible into a ſoft powder; it is generally mixed with carbonate of lime. In Ruſſia it is found in the grottos of alabaſter on the banks of the Wolga, and the other rivers that unite with it.

Of its *geognoſtic ſituation* little is to be ſaid; it occurs as a rare mineral ſubſtance in the hollows of gypſeous mountains, where it is probably formed under ſimilar circumſtances as mountain-milk is in lime-ſtone rocks: it frequently originates by a ſolution of gypſum in water, whence, in the gypſum-countries, it is found more copiouſly in wet than in dry ſeaſons; and its occurring in the fiſſures of rocks of various nature likewiſe beſpeaks that origin.

At Frankenhauſen it has been ſeen by Mr. Freieſleben on the top of a gypſum-mountain, where it formed a ſuperficial ſtratum of about one foot and a half in thickneſs; it was not yet conſolidated, but was penetrated by a portion of water.

At Stemnitz, according to Shlotheim's obſervations, is occurs in earthy bituminous wood.

The *uſe* to which gypſum-earth is applied, in the Neuſtadt circle of Voigtland, is that of manuring and fertilizing barren land; as alſo that of white-waſhing walls. It it a melancholy circumſtance that dire neceſſity, together with the deſire of beguiling, if not the ſtomach at the leaſt the eye, ſhould have induced men to reſort to this moſt unpromiſing ſubſtance for nouriſhment. In Ruſſia it has been often employed as an admixture to flour in times of ſcarcity; a practice probably as deſtructive in its conſequences as famine itſelf!

2. *Compact Gypſum. Dichter gyps,* Germ. *Chaux ſalfatée compacte,* Haüy. *Geſſo compatto, alabaſtro,* Nap. *Calcareus gypſum denſum,* Wern. &c.—*Alabaſter, maſſive gypſum,* &c.

It is generally found of a yellowiſh and greyiſh-white, ſometimes nearly ſnow-white, leſs frequently of reddiſh-white colour; beſides which, we have the ſhades of greeniſh, bluiſh, honey-yellow, and browniſh-red. Several of theſe colours are ſometimes ſeen united as waved ſtripes, ſpots, veins, &c.

It occurs maſſive and diſſeminated.

Internally it is dull or faintly glimmering, and its fracture is even, partly ſplintery, ſometimes paſſing into fine foliated and granular: fragments indeterminately angular, blunt edged, and more or leſs tranſlucent, ſometimes only on the edges.

It is very ſoft (ſcratched, like the following, by cryſtallized carbonate of lime); mild, eaſily frangible, meagre and cold to the feel. Sp. gravity 1.872—2.288, Kirw.—2.256, Gerh.—1.300, James.

The proportion of the *conſtituent parts* is ſtated by Mr. Gerhard to be the following,

Lime	36 00
Sulphuric acid	48.00
Water	16 00
	100.

It is found in England, in Derbyſhire, &c.; in Lower Saxony, at Lüneburg, &c.; in Mansfeld; in Thuringia; in Poland, at Wielitzka, &c.; in Würtemberg, at Tübingen; in Suabia, at the abbey of St. Blaſius; in Sileſia, at Neuland, Freiburg, &c.; in Bavaria, at Hohenſchwangen, in Tyrol; in Salzburg, on the Flachenberg, at Durenberg, &c.; in Auſtria, at Shottwein, Hallſtadt, &c.; in Hungary, at Samberg, Herrengrund, &c.; in Tranſylvania, at Torda; in Switzerland; in France, Italy, Spain; in Ruſſia, at Riga; in Siberia, at Catharineburg; in Perſia, &c.

Compact gypſum *occurs* in conſiderable ſtrata, generally in company with the other ſub-ſpecies of gypſum, forming together particular fletz mountains. It is not unfrequently mixed with granular and foliated gypſum, into which it is ſometimes ſeen to paſs.

This ſub-ſpecies is made *uſe* of in ſculpture and architecture; it is (together with ſome modifications of foliated gypſum) the alabaſter of modern mineralogiſts; the ancients applied the ſame term promiſcuouſly to the gypſum, and to ſeveral of the coloured and pellucid varieties of ſtalactitical carbonate of lime. With regard to many of the productions of ancient art mentioned as being of alabaſter, it is therefore impoſſible, from the mere imperfect deſcriptions we have of them, to determine to which of the two ſubſtances they ſhould be referred. The white *Vaſa unguentaria* of the ancients, to which alſo the name of alabaſtrites was given, were probably in part made of the white gypſeous alabaſter. The walls of the temple of *Fortuna Seia* were of a ſtone which we have reaſon to ſuppoſe was likewiſe compact gypſum; the interior of that edifice, though without windows, was rendered ſufficiently light by the rays tranſmitted through its ſemi-pellucid walls. The Phengites of the ancients is ſuppoſed to be the ſame ſubſtance. At Florence the gypſeous alabaſter of Volterra is manufactured into vaſes, &c. that are remarkable for their tranſlucidity; ſo that if a lamp be placed in them, a pleaſing faint light is diffuſed over the room where they are kept.

The following varieties of gypſeous alabaſter are mentioned as ſuſceptible of taking a good poliſh.

White gypſeous alabaſter of the Pyrenees: its colour is perfect ſnow white; fracture granular; the grain fine and cloſe.

Milk-white alabaſter of Boſcadon, near Embrun, in the department of the High Alps. This, too, is of a fine cloſe texture, and therefore ſuſceptible of a good poliſh. The ſtatues and baſſo-relievos of the ſuperb mauſoleum of the connétable de Lesdiguières, in the cathedral of Gap, is conſtructed of it.

The alabaſter of the river Niſo, in Sicily, is of a light-grey colour, diverſified with green and yellowiſh ſpots. Another good Sicilian gypſeous alabaſter is that found at Toarmina, in the Val Demona, on the ſea-coaſt; it is marked with red and deep yellow waved ſtreaks.

The whitiſh alabaſter of Riquevire, in Alſace, is found in rounded maſſes mixed with other coloured varieties of compact gypſum, to which latter it is preferred, by the artiſts employed in working them.

The alabaſter of the iſland of Goza, near Malta, is of a light yellow colour, with white waved ſtreaks, and ſtrongly tranſlucid.

The alabaſter of Lagny, near Paris, is of a yellowiſh-white colour, tranſlucid, and of coarſe granular fracture, which makes its fragments appear as if they were full of cracks; notwithſtanding this, it is very firm and durable. It is alſo often traverſed by blackiſh-grey veins. This alabaſter, which takes a fine poliſh, is frequently employed at Paris for vaſes, ſlabs for tables, &c. There are ſome fine white varieties of white alabaſter in Derbyſhire, and other parts of England.

3. *Fibrous gypſum, Faſriger gyps, and calcareus gypſum fibroſum*, Wern. *Chaux ſulfatee fibreuſe*, Hauy. *Geſſo fibroſo*, Napion. *Stral-gyps*, Swed. *Feder-gyps, Federſpath*, &c. Germ. *Striated or fibrous gypſum*, &c. Engl.

This ſub-ſpecies preſents a conſiderable ſuit of colours. It occurs of ſnow-white and of greyiſh, yellowiſh, reddiſh, and greeniſh-white colour; beſides which it has been obſerved aſh-grey and light yellowiſh and greeniſh-grey, fleſh, hyacinth, tile, and browniſh-red; likewiſe honey and wax-yellow and oil-green. Several of theſe colours are often combined in ſpots, ſtripes, and veins in the ſame manner as in the compact gypſum.

It occurs maſſive, but generally only in thin layers: alſo dentiform, and in fancifully curled fibrous or plumoſe excreſcences, ſometimes reſembling the head of a croſier, in Derbyſhire and ſome other parts of England, in the Hartz, at Schemitz in Hungary, &c.

Its internal luſtre varies from gliſtening to ſhining and ſplendent; it is often like the luſtre of ſattin and mother-of-pearl.

Its fracture is moſtly parallelly fibrous; fibres of various degrees of thickneſs, (from very delicate, bordering on compact, to coarſe fibrous,) ſometimes ſtraight, at other times curved, ſeldom radiately diverging. There is a ſcarce variety, the longitudinal fracture of which is fibrous, while the tranſverſal fracture is foliated.

Fragments indeterminately angular, moſtly approaching to long-ſplintery; they are moſtly ſemi-tranſparent.

It is very ſoft; and eaſily frangible. Specific gravity, according to Kirwan, 2.300.

The *localities* of fibrous gypſum are the ſame with thoſe of the preceding ſub-ſpecies, but it is leſs frequently met with. The variety mentioned above, as having a double fracture, is found at Wimmelburg, near Eiſleben, in Saxony; the oil-green variety occurs at Nabra, in Thuringia. A fine ſattin gypſum is found on mount Salève, near Geneva.

This ſub-ſpecies belongs for the greateſt part to the newer formation of gypſum. Beſides in thin layers, alternating with granular gypſum, it occurs alſo in the ſhape of ſmall veins on ſtrata of coal, &c.

It is ſometimes *uſed* for ornamental purpoſes, and is manufactured into ſmall boxes,,&c. When cut *en cabochon*, and poliſhed, it preſents ſomething like the locomotive light of the cat's-eye, under which name ſuch poliſhed pieces are ſometimes ſold.

4. *Foliated gypſum, blättriger gyps, calcarcus gypſum lamello-*

ſum ſ. granulare, Wern. *Körniger gyps*, Karſt. *Granularly foliated gypſum*, Kirw. *Gypſe lamelleux*, Broch. *Geſſo lamellare*, Napion. *Fjällig gyps*, Swed.

The ſuit of colours of foliated gypſum is, upon the whole, the ſame as that of the preceding ſub-ſpecies; white, grey, yellow, and red being its principal colours: the grey preſents yellowiſh, blueiſh, and greeniſh tints; the yellow occurs as wine, honey, and wax-yellow, the red as fleſh, tile, and blood-red; of the darker colours we have olive-green, hair-brown, and greyiſh-black. All theſe colours occur ſometimes variouſly blended in the ſame fragment, in ſpots, veins, and ſtripes.

It is generally found maſſive and diſſeminated in blunt-edged, roundiſh, and kidney-ſhaped pieces; ſeldom in the ſhape of imperfect lenticular cryſtals, and ſimilar to one of the modifications of ſparry gypſum or ſelenite.

Internally its luſtre varies from ſhining to glimmering, and it is moſtly pearly.

Fracture foliated, generally rather curved, with ſingle cleavage; ſometimes the fracture appears ſtellularly diverging, with ſhort broad radii (ſtarry gypſum). Fragments indeterminately angular, rather blunt-edged.

It generally occurs in granular diſtinct concretions of various ſize, from coarſe to very fine granular: the ſmall and fine granular varieties have often ſo ſlight a coherence, that they can be eaſily reduced to ſand by the fingers, whence they have obtained the name of "Sandy Gypſum." The variety with radiated fracture often ſhows priſmatic diſtinct concretions.

It is more or leſs tranſlucent, ſeldom ſemi-tranſparent.

It is very ſoft, mild, eaſily frangible, and not particularly heavy. Specific gravity 2.274 to 2 310, Kirwan.

To the *localities* which the foliated gypſum has in common with the fibrous, the following may be added; Saxony, Freiberg; Luneburg; Thuringia, Dürrenberg, Nordhauſen, Weiſſenſee, Naumburg, &c.; Upper Bavaria, Oberau, Kolhel, &c.; Polonia, Krakau, &c.; France, Montmartre; England, Derbyſhire, Nottinghamſhire, &c.

The foliated or granular is the moſt common of the ſubſpecies of gypſum: it occurs in all the formations, but more particularly in the oldeſt. The primitive gypſum belongs partly to this, though it is alſo ſeen as compact gypſum: both theſe ſub-ſpecies often occur together. It is not ſeldom porphyritically mixed with compact gypſum and ſelenite, with compact and granular lime-ſtone, quartz, arragonite, boracite; and is alſo, particularly in the newer formations, accompanied by clay, native ſulphur, and celeſtine. It alſo occurs with fetid carbonate of lime or ſtinkſtone, ſometimes in alternating layers, forming parallel ſtripes; ſuch as at Bottendorf in Saxony, and below the ſtink-ſtone at Frankenhauſen, and between Roſsleben and Wendelſtein in Thuringia. It is now and then ſo intimately mixed with ſtink-ſtone, that, on ſcratching a fragment, it emits the well known urinous or hepatic odour, whence in Gallicia it is termed Leber-ſtein or Leber-ſpath; names which are alſo given to foliated gypſum or ſelenite impregnated with aſphaltum, and to ſome other mineral ſubſtances.

The above-mentioned ſtellated variety is found in ſeveral parts of Germany; alſo at Durham, &c.

5. *Sparry gypſum* or *ſelenite*. *Spathiger gyps*, Karſten. *Broad-foliated* or *ſpecular gypſum*, Kirw. *Fraueneis* and *calcareus ſelenites*, Werner. *Gypſe ſpathique ſelenite*, Broch. *Chaux ſulfatée criſtalliſée*, Haüy. (Vulg. *marienglas*, Germ.; *Talc, pierre ſpeculaire, miroir d'Ane*, Fr. &c.)

The colour of ſparry gypſum is principally white, *viz.* ſnow, greyiſh and yellowiſh-white, alſo ſmoke and aſh-grey, and yellowiſh-grey paſſing into wax and honey-yellow, and this into yellowiſh and clove-brown. It occurs alſo, though rarely, of blood and of fleſh-red, and of a browniſh-black colour: the red colour is generally produced by iron ochre.

It is found maſſive and diſſeminated, ſeldom as coating, botroidal or ſmall reniform: moſt frequently it occurs cryſtallized.

All the *cryſtals* of this ſubſtance we are acquainted with may be conſidered as derived from a low priſm, having for its baſe a rhomb, whoſe angles are about 127 and 53°. The following are the principal modifications.

1. The moſt common and ſimple is that which appears as a tabular ſolid, the broad planes of which are rhombs bevilled on the four edges by trapezoidal planes, two oppoſite pairs of which meet under an angle of 144°, the two others under that of 111°. This is the *Chaux ſulfatée trapèzienne* of Haüy. (Pl. 33. fig. 96.) By Werner it is conſidered as a ſix-ſided priſm, having two oppoſite planes larger and four oppoſite ſmaller, and bevilled on both extremities, the bevilling planes ſet obliquely but parallel to each other on the broader lateral planes. This ten-ſided rhombic cryſtal is ſometimes enlarged parallelly to the planes that meet under an angle of 144°, ſometimes to thoſe that meet under an angle of 111°, by which the cryſtal is either widened or elongated. Sometimes, too, the planes that meet under an angle of 144° are exactly of the ſame width as the two rhombic planes, when the tabular is loſt in the columnar form.

This modification occurs alſo as twin cryſtals or macle, (Chaux ſulfatée trapézienne hémitrope,) in which at one end a re-entering angle of 106° 5′ 36″ is formed, and one of the ſame value, but which projects its point outward, on the other end. Tranſparent cryſtals thus macled, when held between the eye and the light, generally exhibit the plane of the junction as a delicate ſtraight line.

2. The preceding modification, in which the acute ſolid angle formed at each end of the cryſtal by the meeting of four of the trapezoidal planes, is replaced by two equally trapezoidal planes, which meet under an angle of about 139°. This is the Chaux ſulf. *équivalente* of Haüy. (Pl. 33. fig. 98.) In the Wernerian manner of conſidering this modification, it is the ſame flat ſix-ſided priſm as the preceding, but acuminated on both ends by four planes ſet on the lateral edges that bound the two larger planes.

3. Another, but rare modification, is that called by Haüy Chaux ſulfatée *prominule*. It is a kind of macle, exhibiting the form of an eight-ſided priſm, very flatly acuminated by four planes. (See Haüy ii. p. 272. Pl. 34. fig. 99.) Sometimes in the cryſtal, No. 1, thoſe trapezoidal planes that meet under an angle of 144°, and the acute ſolid angle at each extremity of the cryſtal, are rounded off, while the other trapezoidal planes, meeting under an angle of 111°, remain perfect: this forms the paſſage into the

5. Lenticular cryſtals. Theſe are either ſolitary or columnarly aggregated, and confuſedly grouped together with the ſharp edges uppermoſt, (coxcomb ſelenite, gypſe en crête de coq,) or circularly arranged like the petals of a flower (gyſpe en roſe); or two and two are united near part of the edges, ſo that they form, on one ſide, a re-entering angle, and a prominent one on the other: if two lenticular cryſtals thus connate are broken in the direction of the large planes of the laminæ, and at the ſame time in ſuch a manner that the fragments remain cohering, theſe latter often exhibit ſomething like the form of the head of an arrow, and have been erroneouſly conſidered as a diſtinct variety, under the name of *gypſe en fer de lance*, or *gypſe cuneiforme*. Laſtly, the lenticular cryſtals are ſometimes diſpoſed in pairs, elevated one above the other, in ſuch a manner that each pair

inſinuates itſelf, by its prominent angle, into the re-entering angle of the one immediately under it. Many of theſe lenticular combinations are found in great variety at Montmartre.

All the cryſtals of this ſubſtance have a remarkable tendency to altering their figure by exfoliation. Some will ſplit into diverging laminæ to a certain extent only: they are compared to, and alſo go by the name of, Lions' paws, in ſome parts of England. For the theory of the various alterations which theſe cryſtals undergo, by their tendency to aſſume a rounded form, ſee Haüy's Traité, vol. ii. p. 274. ſeq.

The rhomboidal, columnar, and acicular cryſtals are frequently ſeen grouped together in various manners, ſometimes croſſing each other in all directions, alſo in faſcicular and ſtellular aggregations, and in druſes. Sometimes ſmall cryſtals are inſerted in, and traverſe larger cryſtals.

With regard to their ſize, the cryſtals vary from exceeding large (not only lenticular, but alſo perfect cryſtals have been found of above a foot in length, but they are ſcarce,) to very ſmall.

The trapezoidal planes of the cryſtals are generally longitudinally ſtriated, owing to the direction of the laminæ, the the two others perfectly ſmooth: they are generally more or leſs ſplendent.

Internally the ſparry gypſum is ſpecular-ſplendent. Its fracture is generally ſtraight, ſometimes curved foliated; this is the perfect cleavage, which is eaſily obtained: but there are two others leſs perfect ones, which, with the former, produce the rhombic ſolids already mentioned as repreſenting the primitive form.

When maſſive it generally preſents itſelf in large, and coarſe grained, and ſometimes in imperfectly thick cuneiform and columnar diſtinct concretions.

It is generally completely tranſparent, very ſoft and mild, flexible in a low degree, when divided into thin plates, rather tenacious, the laminæ preſerving the curvature given them by means of an imperfect rupture of their parts; it is not particularly heavy, its ſpecific gravity being ſtated as 2.311 by Kirwan, as 2.322 by Muſchenbroeck, but only as 1.761 (that found at Naumburg) by Gellert.

The component parts of ſparry gypſum, according to Bergmann, are

Lime	32.00
Sulphuric acid	46.00
Water	22.00
	100 Bergm. Opuſ. vol. i. p. 135.

Its *localities* are in general thoſe of the other ſub-ſpecies of gypſum; the following deſerve particular mention: France, particularly in the neighbourhood of Paris; England, Oxfordſhire, Iſle of Sheppey, &c.; Thuringia; in the fletz mountains at Frankenberg, Bottendorf, Wendelſtein, Nebra, Weiſſenfels, Naumburg, &c., Saxony; in Upper Luſatia, at Muſkau, and Wehrau; Bohemia; particularly in the Leutmeritz and Saatz circles; Upper Auſtria, Iſchel, Hallſtadt; Hungary, Herrengrund at Neuſohl, Schemnitz, &c.; Tranſylvania, Felſobanya, Vizakna, &c.; Saltzburg; in the Durenberg; Tyrol, Hall, &c.

Sparry gypſum, or ſelenite, is chiefly met with in the oldeſt gypſum formation; partly in more or leſs conſiderable maſſes, partly in ſtratification; as likewiſe in detached cryſtals in beds of clay; alſo with calamine, and in beds of bituminous wood, and alum earth. It is ſometimes found, moſtly as the neweſt foſſil, in veins, for inſtance, of copper and lead: at Herrengrund, near Neuſohl, it occurs in veins of copper pyrites, and grey copper ore, and near Tetſchen, in Bohemia, in veins of galena. It has alſo been found with native gold, and, by Patrin, in the Smenovſky ſilver mines in the Altaic mountains, where it occurs in ſchiſtus. Nor is it unfrequently ſeen in the form of beautiful acicular cryſtals, in old neglected mines, on old hillocks of pits, &c., as a ſubſtance of very recent formation. In volcanic countries it occurs in acicular cryſtals, on native ſulphur, and is generally met with in abundance near depoſitions of rock-ſalt, ſuch as in thoſe of Saltzburg and Upper Auſtria.

When mixed with clay it ſometimes exhibits the luſtre called *chatoyant;* to this variety the name of Schiller-gyps has been given by miners in Germany. When intimately mixed with ſtink-ſtone it has a ſmoke-grey colour, and on being rubbed emits the peculiar odour of that ſubſtance.

Geognoſtic Relation of Gypſum in general.—Werner diſtinguiſhes three diſtinct formations of gypſum.

1. The *oldeſt gypſum*.—It occurs in primitive mountains, and is therefore called primitive gypſum. It has been obſerved at Belinzona or Belentz, as alſo at Airolo in the Levantine or Livener valley, on the ſouthern part of mount Gothard, in a micaceous ſchiſtus, by Freieſleben, and others; and at Cogne in the High Alps (*Grandi Alpi* of the Italians,) by Daubuiſſon, whoſe account of it we ſubjoin the more readily, as the period of the formation of the firſt mentioned gypſum has been doubted by ſome geologiſts. The ſouthern part of the Alps, from Mont Blanc to Mont Roſe, belongs almoſt excluſively to the formation of micaceous ſhiſtus. Here this primitive rock frequently includes ſtrata of primitive lime-ſtone, ſerpentine, chlorite, magnetic iron, &c.: ſometimes it paſſes into argillaceous ſhiſtus, but oftener into gneiſs and granite. About 15,000 metres ſouthward from the town Aoſte, and eaſtward from Cogne, a mountain is ſeen, which conſtitutes part of the chain that ſeparates the valley of Cogne from that part of Fenes; this mountain is terminated by a ſharp edge, elevated more than 2100 feet above the level of the valley, and conſiſts of micaceous ſhiſtus in nearly horizontal ſtrata: in its upper part this rock is mixed with lime-ſtone in gradual proportions till, in ſome parts, it exhibits itſelf as a white granular lime-ſtone only, containing here and there ſome particles of mica. It is nearly 62 feet below the moſt elevated part of the ſummit of this mountain, that the *primitive gypſum* is ſeen. There it is viſible only for the length of about twenty-three feet, its thickneſs being rather more than three feet: all the reſt of its extent is hidden by a great quantity of boulders and maſſes of rock, that, being rolled from the ſummit, have covered the ſides of the mountain, ſo that nothing poſitive can be ſaid reſpecting its extent in length and thickneſs, nor reſpecting the circumſtances of its ſuper-poſition; Daubuiſſon has, however, ſeen traces of it at more than 150 feet diſtance from the place where it is laid open for the purpoſe of working quarries. Its thickneſs cannot be conſiderable, for at the place of the quarries, the rock in which it occurs (which is a deep grey micaceous and calcareous ſhiſtus, traverſed by veins of calcareous ſpar and quartz,) makes its re-appearance at the depth of ſome yards. Theſe quarries the workmen have advanced about ſeven feet under the ſhiſtus, ſo that this work now forms a kind of roof, beneath which the work is carried on. In this place it clearly appears, that the ſhiſtus is reſting on the gypſum: they both appear in perfectly parallel ſtrata; thoſe of the gypſum are not many inches in thickneſs, and are often ſeparated from each other by a greeniſh talcoſe coating.

This primitive gypſum is of a beautiful white colour, ſometimes with a ſlight tint of roſe-red; its grain is cryſtal-fine, very fine, and ſimilar to that of Carrara marble ; it is very tranſlucid and mild. If it could be obtained in ſufficiently large pieces without fiſſures, it might paſs for a fine alabaſter ; but at preſent it is employed only for maſonry, and it yields a good cement.

It includes much talc in detached pieces, generally of a lenticular form and of various ſizes, from very ſmall to the ſize of a hazel-nut : theſe are almoſt always diſpoſed with their flat ſides downwards, and parallelly with the ſtratification ; their colour is a very fine green. Sometimes the laminæ of the talc are in ſo cloſe contact among each other, that a compact maſs, like that of ſteatite, is produced ; at other times their laminæ are very narrow and reſemble fibres ; and ſuch fibres are now and then ſeen diſſeminated through the gypſum in ſmall groups, which being of a fine light green colour, might eaſily be miſtaken for amianth.

What has been ſaid reſpecting the paralleliſm of the ſtratification of the gypſum and micaceous ſhiſtus, as well as reſpecting the preſence of the talcoſe or ſteatitic ſubſtance in thoſe two rocks, places their ſynchroniſm beyond a doubt ; both the nearly horizontal poſition of the ſtrata from the foot to the ſummit of the mountain, and the identity of the rock which forms the roof and the ſides of the ſtratum of gypſum, do not leave room for the idea, that, by the effects of a revolution, a portion of ſecondary gypſum, depoſited on the mountain poſterior to its formation, might have been covered by a maſs of ſhiſtus. In this caſe the gypſum is actually a component part of the mountain, and, indeed, one of anterior origin to ſeveral other primitive rocks placed above it.

2. *Tranſition gypſum*, deſcribed by Mr. Von Buch, who obſerved it at Leogang, in Salzburg, in greywacke ſlate. It is of a cloſe texture, and has a fine cryſtalline grain. Its ſtrata are inconſiderable, bent in various directions, and mixed with coloured clay. It affects ſeveral colours. M. Brongniart refers to this formation the gypſum which he has obſerved between Bayonne and St. Jean-de-Luz, at the foot of the Pyrenees ; that of Vizille, near Grenoble ; that of Deſſiſes, in the department of the Cote-d'Or ; that of the Salines of Bex, in Switzerland, &c.

3. *Fletz-gypſum.*—Werner adopts two diſtinct formations of fletz-gypſum ; the *firſt*, reſting on the firſt fletz-limeſtone, and covered by the variegated ſandſtone, runs through great part of Germany. It firſt appears in Holſtein, forms a gypſeous tract at Luneburg (where it contains boracite cryſtals), in Thuringia (where it includes quartz cryſtals), in Anſpach, Bavaria, Sileſia ; alſo in Switzerland (where ſulphur, both maſſive and cryſtallized, is often found in it), in the ſouth of France, at Arragon in Spain (where arragonite occurs in it). The great depoſition of gypſum on the banks of the Wolga alſo belong to this formation. On the relationſhip in which the rock-ſalt and ſalt-ſprings ſtand to fletz-gypſum, ſee Rock-Salt.

The *ſecond* fletz-gypſum is ſuper-impoſed on the variegated ſandſtone, and is covered by the ſecond limeſtone. It is not known to occur porphyritic by means of imbedded cryſtals of boracite, arragonite, quartz, &c. like the firſt formation, nor is it equally abundant. It forms, however, conſiderable ſtrata in Saxony, Sileſia, Bavaria, in France, near Toulon, at Aix, and alſo occurs in Cumberland and Cheſhire : as to the gypſum of Derbyſhire, we have it obſerved by Mr. Jameſon, that the formation to which it belongs is unknown, " as no well educated geognoſt has ever communicated any obſervations regarding it." This ſecond formation appears to contain foſſil remains. The occurrence of fibrous gypſum is particularly characteriſtic of it.

Beſides theſe two principal and well-determined formations of fletz-gypſum, there are two others whoſe nature is not ſatisfactorily aſcertained, *viz.* the gypſum of Sparenberg, in the Mark Brandenburg, and that of Neuland, near Löwenberg, in Sileſia. To theſe may be added the gypſum of the neighbourhood of Paris ; but not as a dubious one, for the obſervations lately made upon it by Cuvier and Brongniart, with an account of which we ſhall conclude this part of the preſent article, have proved it to belong to a formation very diſtinct from, and of more recent date than, thoſe already mentioned.

The gypſeous formation of Paris is not compoſed of gypſum alone, but ſtrata of it alternate with argillaceous and calcareous marle : they follow the ſame order of ſuperpoſition in the whole gypſeous tract, from Meaux to Triel and Griſy, and though in a few diſtricts ſome ſtrata are wanting, yet thoſe that remain conſtantly affect the ſame relative poſition. The gypſum is placed immediately above the limeſtone. The gypſeous hillocks and elevations have a particular appearance by which they may be diſtinguiſhed at a diſtance, being always placed on the limeſtone ; they form, as it were, another ſet of elongated or conical, but always diſtinct hills, reſting on the calcareous eminences.

Montmartre, as well as thoſe hillocks that appear to be a prolongation of it, exhibit three diſtinct maſſes of gypſum ; the lowermoſt is compoſed of alternate and not very thick ſtrata of gypſum (frequently paſſing into ſparry gypſum), of ſolid calcareous and of very foliated argillaceous marles. It is in the former of theſe in particular that the large yellow lenticular cryſtals of ſparry gypſum are found : the foliated argillaceous marle (or adheſive ſlate), contains the variety of ſilex called menilite. No foſſil ſubſtances have as yet been found in the third gypſeous maſs.—The ſecond, or intermediate maſs, differs from the preceding only in this, that the beds of gypſum are thicker, and that the ſtrata of marle are leſs numerous. It is chiefly in this maſs that foſſil fiſhes have been diſcovered ; alſo celeſtine (ſulphate of ſtrontian), has lately been found in it in kidneys towards the baſe of a ſtratum of a compact grey marbled variety of marle belonging to this ſecond maſs.—The ſuperficial maſs of gypſum, which the workmen call the firſt, is, in every reſpect, the moſt remarkable, and the moſt important. It is, beſides, much thicker than the reſt, having in ſome parts no leſs than about 82 feet in thickneſs ; it is interrupted only by a ſmall number of marley ſtrata, and, in ſome places, as at Dammartin and Montmorency, it is ſituated almoſt immediately under the vegetable mould.—The lowermoſt beds of this firſt maſs contain flints that appear to paſs over into, and to be penetrated by, the gypſeous matter. The intermediate beds have a tendency to ſeparate into large priſms with ſeveral planes that are well deſcribed and figured by M. Deſmareſt. Laſtly, the uppermoſt beds of this firſt maſs are penetrated by marle ; they have but little thickneſs, and alternate with ſtrata of marle.

More particularly intereſting are the obſervations that have been made by the ſame ingenious naturaliſts on the ſecondary foſſils contained both in this maſs and in the marle that covers it. It is in this firſt gypſeous maſs that are found ſkeletons of unknown birds and quadrupeds. To the northward of Paris they occur in the gypſeous maſs itſelf ; here they have preſerved their ſolidity, and are only coated by a very thin layer of calcareous marle ; while in the quarries to the ſouthward they are often found imbedded in the marle that ſeparates the ſtrata of gypſum ; they have there a high degree of friability. Alſo bones of tortoiſes, and ſkeletons of fiſhes, have been found in this maſs.—On the circumſtances under which theſe remains of birds, &c. are found in this maſs of gypſum, the determination of the ſpecies to which they belong, &c. very intereſting memoirs have been given by Cuvier, in the Annales du Muſeum d'Hiſtoire Naturelle.

But a circumſtance on which great ſtreſs is laid by Meſſrs. Cuvier and Brongniart, is, that in the gypſeous bed in queſtion freſh-water ſhells have been diſcovered. Theſe ſhells are, indeed, of rare occurrence ; but a ſolitary one would, in the opinion of the above-mentioned naturaliſts, ſuffice to demonſtrate the truth of what has been aſſerted by Lamanon and others, namely, that the gypſum of Montmartre, and of other hillocks of the baſin of Paris, have originated by cryſtallization in freſh-water lakes. Another eſſential character of this uppermoſt maſs of gypſum, is the preſence of ſkeletons of mammiferous animals, no traces of which have been diſcovered in the lower maſſes.

On this uppermoſt maſs of gypſum reſt ſtrong ſtrata, both of calcareous and argillaceous marle. It is in the lowermoſt of theſe beds, in a white, friable, calcareous marle, that petrified trunks of palm-trees have been found : they were all of a conſiderable ſize, and appeared in a horizontal poſition. In the ſame ſeries of ſtrata (but only at Romainville) have been found ſhells belonging to the genera of lymnea and planorbis, and theſe appear not to differ in any reſpect from the ſpecies ſtill exiſting in the marſhes of France. This appears to prove that theſe marles, as well as the gypſum on which they reſt, are the productions of freſh water. Above theſe white marles are ſeen a great number of other ſtrata of argillaceous and calcareous marle, in which, however, no foſſils have as yet been diſcovered. The next is a ſmall ſtratum, about four and twenty inches thick, of a yellowiſh foliated marle, which, towards its lower ſurface, contains nodules of earthy ſulphate of ſtrontian, and, a little above, a thin layer, or ſmall lengthened tellinæ, lying flat, and preſſed cloſely againſt each other. This ſtratum is remarkable on account of its conſiderable extent, combined with extraordinary thinneſs ; and alſo becauſe it ſerves as a limit to the freſh-water formation, and indicates the ſudden commencement of a new marine formation. Indeed, all the ſhells found beneath this bed of tellinæ are alſo marine. This is immediately and regularly ſucceeded by a ſtratum of a greeniſh clayey marle, which may be recognized at a great diſtance by its thickneſs, colour, and continuity. It ſerves as a guide to arrive at the tellinæ ; for it is beneath it that theſe ſhells are found. No foſſils are diſcovered in it but argilo-calcareous geodes and nodules of ſulphate of ſtrontian. The four or five beds of marle that ſucceed the green clays are not thick, nor do they appear to contain any foſſils ; but theſe beds are immediately covered by a ſtratum of a yellow clayey marle, mixed with fragmentary remains of ſhells, the prototypes of which belonged to the genera cerites, trochus, mactra, venus, cardium, &c. Alſo fragments of the palate of a ray analogous to the ſea-eagle are found here. Almoſt all the beds of marle that ſucceed the latter exhibit foſſil ſea-ſhells, but they are bivalves only ; and the laſt ſtrata, namely, thoſe that are immediately below the clayey ſand, contain two pretty diſtinct oyſter beds : the firſt and lowermoſt of them is compoſed of large very thick oyſter-ſhells. This is ſucceeded by a ſtratum of a whitiſh marle without ſhells, after which comes a ſecond very thick oyſter-bed, but ſubdivided into ſeveral diſtinct beds. Theſe oyſters are brown, much ſmaller, and of a thinner texture than the preceding ones. The formation of gypſum is often terminated by a maſs, more or leſs thick, of clayey ſand, which is without ſhells.

Such are the ſtrata that generally compoſe the formation of gypſum in the neighbourhood of Paris. The authors of the memoir, of which the above is extracted, were inclined to divide them into two, and to ſeparate the hiſtory of the marine marles of the top from thoſe of the freſh-water marles and gypſum at the bottom ; but the ſtrata are ſo ſimilar to each other, and accompany each other ſo conſtantly, that they preferred merely to point out this diviſion, without really making it. The principal differences preſented by the hillocks that belong to the gypſum formation of Paris, according to the ſame authors, are the following : The gypſeous hillocks form a kind of long and broad zone, directed from the ſouth-weſt to north-eaſt, over a breadth of about ſix leagues. It appears, that in this zone it is only the eminences of the centre which exhibit diſtinctly the three maſſes of gypſum ; thoſe of the edges, ſuch as the plaſter-quarries at Clamart, Bagneaux, Antoni, Mont-Valerian, Griſy, &c. and thoſe of the extremities, ſuch as the plaſter-quarries of Chelles and Triel, ſhew a ſingle maſs only. This maſs ſeems to be analogous to that which the workmen call the firſt, (namely, the moſt ſuperficial,) becauſe the characteriſtic foſſil-remains of mammiferæ are found in it ; and becauſe its marles are without thoſe large and numerous lenticular cryſtals of gypſum which are obſerved in the marles of the ſecond and of the third maſs. Sometimes the marles above are almoſt entirely wanting ; ſometimes the gypſum itſelf is totally wanting, or reduced to a thin bed. In the former caſe, the formation is repreſented by the green marles, accompanied with celeſtine ; the gypſeous formations of the park of Verſailles, near St. Cyr ; thoſe of Viroflay are in the former predicament ; thoſe of Meudon, of Ville d'Avray, are in the latter. From all that has been ſaid, it appears, that the formation of gypſum, of the environs of Paris, is a depoſition diſtinct from the two formations of fletz gypſum deſcribed by Werner. It approaches neareſt to the ſecond fletz gypſum of this naturaliſt, but differs principally by its reſting on the ſecond lime-ſtone, inſtead of being covered by it, and its not being placed on, or alternating with, the variegated ſand-ſtone. M. Brongniart is inclined to refer alſo the gypſum of Aix to the Paris gypſum-formation ; though, as he obſerves, the foſſil fiſhes of the quarries of Aix are found in bituminous marle, and not in the gypſum. M. Gillet Laumont thinks that of Aigue-perce, in the department of Puy-de-Dôme, likewiſe comparable to the gypſum formation of Montmartre.

The *chemical character* of gypſum is, generally ſpeaking, the ſame in all the ſub-ſpecies. When expoſed to heat, it loſes its water of cryſtallization, becomes opaque, and falls into a white powder (termed plaſter), which abſorbs water rapidly, and ſoon becomes hard. It is almoſt infuſible without addition, but the ſparry gypſum or ſelenite appears to undergo partial vitrification, when expoſed to the intenſe heat of the blow-pipe. We are told by Macquer, that to effect this purpoſe, it is neceſſary to apply the point of the flame in the direction of the laminæ, inſtead of cauſing it to act perpendicularly on their ſurface. Haüy accounts for this circumſtance by obſerving that the integrant molecules, being priſms whoſe length exceeds the dimenſions of the baſe, adhere ſtronger by their lateral planes than by their baſes ; and hence their ſeparation, both by mechanical means and the action of caloric, will be more difficult in the direction of their lateral planes than in that of their baſes.

In a ſtill more intenſe heat, (ſuch as that produced by a ſtream of oxygen-gas, and in the ſtrongeſt concentrated ſolar light) it appears to loſe great part of its ſulphuric acid, the ſeparation of which from the lime is manifeſted by a penetrating ſmell. Under theſe circumſtances, it fuſes into a white glaſs, which, however, is ſaid ſoon to fall into a white powder.

In the charcoal crucible, according to Klaproth's experiments, the ſparry gypſum had turned white and very friable, with the loſs of 60 *per cent.* of its weight; but in the clay crucible it had melted into a clove-brown glaſs, with large ſpherical veſicles.

Sulphate of lime is ſoluble in water; but it requires not leſs than five hundred times its weight of water, and a mean temperature. It does not effervefce with acids, nor is it decompoſed by any of them; it may be diſſolved by the ſulphuric acid, but the ſolution is decompoſed by water. Its decompoſition may, however, be effected by barytes and the fixed alkalis, when boiled with them in water: it is decompoſed, alſo, by a double affinity, when boiled in a ſolution of the alkaline carbonates.

The *uſe* made of the ſeveral ſub-ſpecies of gypſum for economical purpoſes is of conſiderable importance. They poſſeſs the quality of improving, by a chemical combination not perfectly underſtood, the quality of the ſoil, eſpecially when too ſtiff and clammy, and are, therefore, frequently employed for the manuring of land, both in Europe and America.

Gypſum, when deprived of its water of cryſtallization by heat, is called plaſter. Of this the coarſer ſorts are employed, with the admixture of common lime-ſtone, for cements. The gypſum, which naturally contains carbonate of lime, makes very good cement; but that which has an admixture of clay and ſand, affords a cement of an inferior quality.

The kilns in which the plaſter-ſtones are burnt are generally of a very ſimple conſtruction; often they are built of gypſum itſelf. The fragments to be calcined are looſely put together, in ſuch a manner as to form a parallelopipedic heap, below which are vaulted pipes or flues, for the application of a moderate heat. The calcination muſt not be carried to exceſs, ſince in this caſe the plaſter will be deprived of its quality of forming a ſolid maſs when mixed with a certain portion of water. During the proceſs of calcination, the water of cryſtallization riſes as a white vapour, which, if the atmoſphere be dry, is quickly diſſolved in air.

On the river Wolga, in Ruſſia, the burning of gypſum conſtitutes one of the chief occupations of the peaſantry. They calcine all kinds of gypſum promiſcuouſly, on grates made of wood, they then reduce the plaſter to powder, paſs it through a ſieve, and form it into ſmall round cakes, which they ſell at from 1 to 1½ ruble per thouſand.

In order to make uſe of the plaſter, water is added to the powder, which is produced by pounding the calcined fragments; an operation performed either in mills conſtructed for the purpoſe, or by the hands of men, whoſe health is much impaired by the pernicious effects which the duſt of this ſubſtance has upon the lungs.

The leſs the gypſum intended for plaſter is mixed with other ſubſtances, the better it is qualified for the purpoſe of making caſts, ſtucco, &c.; the ſparry gypſum or ſelenite, which of courſe is the pureſt of all, is employed for taking impreſſions from coins and medals (ſee IMPRESSIONS); and for thoſe beautiful imitations of marble, granite, and porphyry that are known by the name of *Scagliola*, derived from the Italian word *ſcagli*, or laminæ of ſelenite, which latter is vuglarly called talc in Italy and France, and alſo in England.

GYPSUM *Anhydrous*. See MURIACITE.

Gypſum is often found in very regular ſtrata, between, or accompanied by, red, blue, or grey marle, and by ſtrata of rock ſalt, and ſalt ſprings. In other ſituations the ſtrata of gypſum are feather-edged, or forming large, irregular, and very flat nodules in the marle, and even amorphous maſſes or irregular lumps of great thickneſs and extent. Theſe appearances ſeem to ariſe from the gypſum not forming regular or continuous ſtrata in the marle, which is its matrix, but accidental beds, or nodules, of all ſizes and ſhapes, as is obſerved of the argillaceous iron-ſtone nodules in their uſual matrixes of ſhale, bind, or clay (except that theſe laſt are never very large), and of other nodular imbedded ſubſtances.

The nodular maſſes, or accidental beds, of the vaſt ſtrata of red marle which occur in England beneath the lias ſtrata, and above the yellow or magneſian limeſtone ſtrata, are, as Mr. Farey has obſerved (Phil. Mag. vol. xxxi. p. 40.), among their moſt curious and important phenomena. The vaſt concretions, nodules, or confuſedly cryſtallized maſſes of gypſum, limeſtone, rock-ſalt, ſienite, ſlate, baſalt, ſand, micaceous fine grit-ſtone, very coarſe grit or pudding-ſtone, brick-clay, &c. and perhaps local fields of argillaceous and carboniferous ſtrata or coal-meaſures, which are found alternating with, or ſurrounded by red marle (containing often light blue ſtreaks or patches), cover the greater part of the ſurface of England and Wales, north and weſt of the regular baſſet or edge of the lias clay and limeſtones; and it ſeems probable that it has been owing to the local ſtripping off or denudations of this red marle, that nearly all of the important ſtrata containing coal and argillaceous iron-ſtone have been laid bare or expoſed, for the uſe of man in theſe iſlands.

It ſeems probable that there are ſeveral other ſtrata of gypſeous marle, beſides the Britiſh above-mentioned, in different parts of the world. Thoſe of the environs of Paris are certainly upper ſtrata to the chalk of the ſouth-eaſt of England (ſee Phil. Mag. vol. xxxv. p. 131.), and greatly above the Engliſh red marle ſtrata. It ſeems, however, that gypſum, and ſalt rocks and ſprings, are common in all ſuch diſtricts; and the other anomalous maſſes mentioned above have been noticed by authors in many of them. Gypſum has been mentioned as the produce of the following kingdoms, ſtates, &c. *viz.* Algiers, the Archipelago N. Aſtrachan, Auſtria (Upper), Bavaria, Calabria, England, France, Hartz, Hungary, Italy, Minorca iſle, Parma, Poland, Pruſſia, Savoy, Saxony, Siberia, Spain, Swiſſerland, Tranſilvania, Tunis, Weſtphalia, &c.

The following liſt of places where gypſum is dug in England, France, &c. may prove intereſting to many of our readers, *viz.*

Aix, near Avignon, in France.
Ambaſton (Ballington Hill) S.E. of Derby.
Antoni, 11 miles W. of Paris, in France.
Aſton, three miles S. of Derby.
Bagneaux, 4½ miles S. of Paris, in France.
Chellaſton, three miles S. of Derby.
Chelles, near Paris, in France.
Clamart, 5½ miles S.W. of Paris, in France.
Clifton, S.W. of Nottingham.
Cold Aſton, Glouceſterſhire.
Crowle, near Thorne (York), in Lincolnſhire.
Dammartin, 14 miles N.E. of Paris, in France.
Fairburn, near Pontefract, Yorkſhire.
Frankenberg, in Saxony.
Gotham, S.W. of Nottingham.
Griſſy, near Paris, in France.
Hanbury, N E. (Fauld Hill), N. (Coton and Rowbank), Staffordſhire.
Hanbury (Auſt-paſſage), Glouceſterſhire.
Horninglow, N. of Burton, Staffordſhire.

Marchington (Hound Hill), Staffordſhire.
Meaux, ſix miles S.W. of Paris, in France.
Meandon, near do.
Mingranilla, in Valentia, in Spain.
Mobberley, in Cheſhire.
Monte-martre, 2½ miles N. of Paris, in France.
Montmorency, 10 miles N.E. of do.
Mont Valerian, near Paris, do.
Newark, E. in Nottinghamſhire.
Ratcliff (Red Hill) S.W. of Nottingham.
Stinchcombe, E. of Berkley, Glouceſterſhire.
Syſton, N. of Leiceſter.
Thorne, in Yorkſhire.
Triel, near Paris, in France.
Tutbury, S. (Caſtle Hay) Staffordſhire.
Tuxford (Markham-Moor) Nottinghamſhire.
Ville-d'Avray, eight miles W. of Paris, in France.
Whitehaven, E. Cumberland.
Witton, near Northwich, Cheſhire.

The marly tracts, where gypſum and rock-ſalt are found, ſeem ſubject to circular depreſſions, or Funnel-*ſhaped* hollows (ſee that article), which are noticed by Mr. Jameſon, "Geognoſy," p. 34 and 172.

Gypsum is uſed in the Canaries by way of remedy for their wine; and about Malaga a large quantity is tunned up with the juice of their grapes.

Gypsum *Tymphaicum* is a name given by the ancients to the white chalk, which was eſteemed by them for the cleanſing of clothes, and which makes an excellent plaſter or cement without previous burning. See Calx *nativa*.

GYPSY, a name given to a ſet of vagrants. See Egyptians and Gipsies.

GYRATION, *Centre of*, in *Mechanics*. When any ſyſtem of bodies, as A,B,C, (*Plate* IX. *Analyſis*, *fig*. 1.) is cauſed to revolve round a centre S by the action of a force applied at a given diſtance, which remains unchanged, there will exiſt ſome point R in which, if all the matter A + B + C be collected, the ſame force applied at the ſame diſtance will generate the ſame angular velocity in the ſame time as if the bodies were diſpoſed at their reſpective diſtances S A, S B, S C: this point is called the *centre of gyration*.

N.B. The moving force is here meant to act in the direction of the plane wherein the ſyſtem revolves, and at right angles to a line drawn from the point at which it is applied perpendicular to the axis.

Before we can demonſtrate the method of finding the centre of gyration, it is neceſſary to premiſe a few elementary principles in the doctrine of rotatory motion.

1. If a body be collected into a point B (*fig*. 2.) and revolve round an axis of motion paſſing through S, by the action of a force P applied at the diſtance S D from the axis; it is required to aſſign what quantity of matter muſt be collected in the point D, ſo that D may be accelerated in the ſame manner as when B revolved at the diſtance S B, and conſequently that the angular velocity of B and D round S may be the ſame in both caſes.

When any two bodies are put in motion by two conſtant forces acting for the ſame time, the quantities of matter moved are in a direct ratio of the moving forces, and an inverſe ratio of the velocities generated; that is, if $\frac{M}{m}$ expreſſes the ratio of the moving forces, $\frac{Q}{q}$ that of the quantities of matter, and $\frac{V}{v}$ that of the velocities generated, the relation of theſe quantities is defined by the equation $\frac{Q}{q} = \frac{M}{m} \times \frac{v}{V}$.

To apply this, it muſt be obſerved, that although the abſolute force of the weight P acting upon the point D, remains conſtantly the ſame, yet its effects upon bodies placed at different diſtances from the axis of motion are in the inverſe proportion of thoſe diſtances; therefore the moving forces exerted by P on the points B and D will be in the proportion of S D to S B: alſo, by the problem the angular motions of B and D are equal, and conſequently the velocity of B is to the velocity of D, as S B : S D; and ſince the quantities of matter in B and D are in the direct proportion of the moving forces, or of S D : S B, and an inverſe proportion of the velocities generated, or of S B : S D, we ſhall have the quantity of matter in B to that contained in D, as $SD^2 : SB^2$, and conſequently the weight ſought $= B \times \frac{SB^2}{SD^2}$.

Or thus, let $x =$ the quantity of matter required to be collected in D, M the moving force which acts on B, m that which acts on D, V the velocity of B, v that of D; then will $\frac{B}{x} = \frac{M}{m} \times \frac{v}{V}$, but $\frac{M}{m} = \frac{SD}{SB}$ by the property of the lever: moreover $\frac{v}{V} = \frac{SD}{SB}$ by the nature of angular motion, wherefore $\frac{B}{x} = \frac{SD^2}{SB^2}$, and $x = B \times \frac{SB^2}{SD^2}$.

Cor. 1.—Whenever a body B revolves round an axis, by the action of a conſtant force P, applied at a given diſtance, S D, from the axis; in order to find the force which accelerates D, the maſs B may be ſuppoſed to be removed, and inſtead of it an equivalent weight $B \times \frac{SB^2}{SD^2}$ collected in the point D to which the force is applied.

Cor. 2.—Since the moving force is P, and the maſs moved $\frac{B \times SB^2}{SD^2}$, (the inertia of P not being conſidered,) the force which accelerates D will be that part of the acceleration of gravity which is expreſſed by the fraction

$$\frac{P}{B \times \frac{SB^2}{SD^2}} = \frac{P \times SD^2}{B \times SB^2}.$$

Cor. 3.—Let any number of bodies A, B, C, (*fig*. 3.) be put in motion round a fixed axis paſſing through S, by a conſtant force P applied at D, the point D will be accelerated in the ſame manner, and conſequently the whole ſyſtem will have the ſame angular velocity: if inſtead of A, B, C, &c. placed at the diſtances S A, S B, S C, we ſubſtitute the bodies $\frac{A \times SA^2}{SD^2} + \frac{B \times SB^2}{SD^2} + \frac{C \times SC^2}{SD^2}$, theſe being collected into the points *a*, *b*, and *c* reſpectively: the moving force in this caſe is P; the maſs moved $= \frac{A \times SA^2}{SD^2} + \frac{B \times SB^2}{SD^2} + \frac{S \times SC^2}{SD^2}$; and conſequently the force which accelerates D is that part of the accelerating force of gravity which is expreſſed by the fraction

$$\frac{P}{A \times \frac{SA^2}{SD^2} + B \times \frac{SB^2}{SD^2} + C \times \frac{SC^2}{SD^2}} = \frac{SD^2 \times P}{A \times SA^2 + B \times SB^2 + C \times SC^2}.$$

Cor. 4.—The velocity of the point D is uniformly accelerated, becauſe the force above determined is invariable;

it follows alſo that the angular velocity of the ſyſtem is uniformly accelerated, becauſe the abſolute velocity of any point at a given diſtance from the axis of motion is as the angular velocity of that ſyſtem, and conſequently of the whole ſyſtem.

Cor. 5.—It is manifeſt that it is of no conſequence whether the bodies A, B, C, &c. revolve in the ſame or in different planes, if their diſtances from the axes S A, S B, S C, are the ſame, theſe diſtances being eſtimated by lines drawn through A, B, and C perpendicular to the common axis of motion; if, therefore, they ſhould be ſituated in various planes, they may be referred to one given plane perpendicular to the axis.

Cor. 6.—It is obvious alſo, that changing the poſition of the bodies A, B, and C in the ſame plane will not affect the force which accelerates the ſyſtem, provided their reſpective diſtances from the axis of motion do not alter: thus, with the centre S, and diſtances S B, S C, let the arcs of circles be deſcribed; if B is transferred to *b*, or C to *c*, the moving force, which acts on theſe bodies reſpectively, will not be altered, and conſequently the maſſes moved being likewiſe conſtant, the accelerating force will be the ſame.

Cor. 7.—Alſo the propoſitions concerning rotation will be equally true, whatever be the forces by which the angular motion is generated, provided it be conſtant; or if variable, ſhould its action be conſidered for an evaneſcent particle of time only.

Cor. 8.—In theſe propoſitions the angular motion is ſuppoſed to be communicated by the action of a force applied at a ſingle point only, at an invariable diſtance from the axis. Thus, ſuppoſe a revolving ſyſtem to conſiſt of the bodies A, B, C of evaneſcent magnitudes, and equal to each other in quantity.—Let a weight P equal to A, B, or C be applied by means of a line, going round a wheel D H, ſo as to communicate motion to the ſyſtem during its deſcent. Moreover, let $SD = 1$, $SA = 2$, $SB = 3$, and $SC = 4$, and let it be required to aſſign the force which accelerates the deſcent of the weight P.

Here referring to the rule, we have the force required $= \frac{SD^2 \times P}{A \times AS^2 + B \times BS^2 + C \times CS^2} = \frac{1}{4 + 9 + 16} = \frac{1}{29}$, which is the true accelerating force, when the moving force is void of inertia; but in the preſent caſe the force P acts not only as a moving force, but as part of the maſs moved, and as P moves with the ſame velocity as the point D, the effects of its inertia will be eſtimated by ſuppoſing a maſs of matter = P to be collected into the point D; here then the moving force being P, and the maſs moved $P \times \frac{SD^2}{SD^2} + A \times \frac{AS^2}{SD^2} + B \times \frac{BS^2}{SD^2} + C \times \frac{CS^2}{SD^2}$ the force which accelerates the deſcent of P will be $\frac{SD^2 \times P}{P \times SD^2 + A \times AS^2 + B \times SB^2 + C \times SC^2} = \frac{1}{30}$, the line and parts of the wheel not being taken into account. It follows, therefore, that the weight will deſcend from reſt by the force of this acceleration through $\frac{16\frac{1}{12}}{30}$ parts of a foot in a ſecond; and in other different times of deſcent the ſpaces will be varied in a direct duplicate ratio of the times, becauſe the accelerating force is conſtant.

Moreover, the velocity acquired by the weight P in a given time, or through a given ſpace, will be determined by the uſual laws of falling bodies.

Thus putting $\frac{P \times SD^2}{P \times SD^2 + A \times AS^2 + B \times BS^2 + C \times CS^2} = F$, $l = 193$ inches, $ſ =$ the ſpace deſcribed by P from reſt, the velocity acquired by P will be $\sqrt{4lFſ}$ inches in a ſecond, and in the ſame manner, having given any two of the four quantities, *i. e.* the accelerating force, the ſpace deſcribed from reſt, the time of deſcription, and the velocity acquired, the other two may be determined.

In a ſyſtem of bodies A, B, C, (*fig.* 3.) revolving round an axis which paſſes through S; having given the quantities of matter contained in A, B, C, and the diſtances S A, S B, S C, it is required to determine S R, the diſtance of the centre of gyration from the axis of motion.

Let any force P be applied to turn the ſyſtem at any given diſtance from the axis S D. If the force which accelerates a given point D be the ſame in any two caſes, the abſolute velocity of that point, generated in a given time, muſt be the ſame, and conſequently the angular velocity generated in the ſyſtem equal in both caſes, the force which accelerates the point $D = \frac{P \times SD^2}{A \times AS^2 + B \times BS^2 + C \times CS^2}$; now let $A + B + C$ coincide with R, and the force which accelerates D will be $\frac{P \times SD^2}{\overline{A + B + C} \times SR^2}$: theſe forces muſt be equal by the hypotheſis; making, therefore, $\frac{P \times SD^2}{A \times AS^2 + B \times BS^2 + C \times CS^2} = \frac{P \times SD^2}{\overline{A + B + C} \times SR^2}$ we ſhall have $SR^2 = \frac{A \times AS^2 + B \times BS^2 + C \times CS^2}{A + B + C}$, and the diſtance of the centre of gyration required $= \sqrt{\frac{A \times AS^2 + B \times BS^2 + C \times CS^2}{A + B + C}}$.

Cor. 1.—Let $A + B + C = W$, and ſince $A \times AS^2 + B \times BS^2 + C \times CS^2 = SR^2 \times W$, it follows, that $SR^2 = SO \times SG$: wherefore the diſtance of the centre of gyration is a mean proportional between the diſtances of the centres of gravity and oſcillation from the axis of motion.

Cor. 2.—Every thing remaining, the angular velocity generated in a ſyſtem will be the ſame, whether the maſs W is placed at the diſtance $SR = \sqrt{SO \times SG}$, or whether the maſs $\frac{W \times SR^2}{SD^2}$ is placed at the diſtance S D.

Cor. 3.—Let the ſyſtem revolve in the ſame place as before, and round an axis which paſſes through the centre of gravity, and let $GQ = \sqrt{\frac{A \times GA^2 + B \times GB^2 + C \times GC^2 \&c.}{A + B + C}}$ being the diſtance of the centre of gyration, from the axis of motion; from the propoſition it appears, that $GQ^2 = SG \times GO$.

Cor. 4.—Let A B C D repreſent any pendulous body, moveable a round an axis of motion H I, which paſſes through S, and let any impact be impreſſed on the point D, (while the pendulum is at reſt), in an horizontal direction, and perpendicular to the vertical plane A B C D.

To find the angular velocity which is communicated to the pendulum by the impact, let the weight of the pendulum be W, let G be the centre of gravity, O the centre of oſcillation, and R the centre of gyration; then let a weight be aſſumed, which is to W as SR^2, or $SO \times SG$, to SD^2;

this weight $= \frac{W \times S O \times S G}{S D^2}$ being collected into the point D, the ſame angular velocity will be generated in the ſyſtem, as when the pendulum is of the prior form, every thing elſe being the ſame.

Let S I K (*fig.* 4.) repreſent the plane in which any irregular body or ſyſtem of bodies revolves round an axis of motion, paſſing through the centre of gravity G: having given the weight of the ſyſtem, and the point D, to which a given force is applied, it is required to aſſign the diſtance of the centre of gyration from the axis of motion.

Let G be the common centre of gravity of the ſyſtem; and ſuppoſe the whole to be referred to the plane S I K; let the ſyſtem revolve in this plane round a fixed horizontal axis, which paſſes through G: through G draw any line S G o, and with the centre G, and any diſtance G D, draw the circle S D I K, and ſuppoſe all matter which is coincident with the circumference S I K juſt deſcribed to be collected into A: in like manner imagine all the matter contained in other concentric circles to be collected into the correſponding points in the line G o; let g be the centre of gravity of the matter contained in this line, and let o be the centre of oſcillation; then if a weight $= \frac{W \times S o + S g}{G D^2}$ were collected into the circumference S I K, or any point of it D, the other parts of the ſyſtem being removed, the point D would be accelerated in the ſame manner as when the ſyſtem itſelf is acted upon by the ſame force applied at the ſame diſtance from the axis. In this caſe, the force which accelerates D $= \frac{S D^2 \times P}{S g \times S o \times W}$, or if the inertia of P is conſidered, the force $= \frac{S D^2 P}{P \times S D^2 + S g \times S o \times W}$; but ſince the figure of the ſyſtem is not geometrical, the quantity $W \times \frac{S g \times S o}{S D^2}$, or the equivalent weight, cannot be eſtimated by theory; it may be determined by experiment in the following manner:

Let a weight, P, be applied to communicate motion to the ſyſtem by means of a very ſlender and flexible line going round the wheel S D K, through the centre of which the axis paſſes. Let this weight deſcend from reſt through any convenient ſpace s inches, and let the obſerved time of its deſcent be t ſeconds; then if l be the ſpace through which bodies deſcend freely by gravity in one ſecond, the equivalent weight ſought $= \frac{W \times S g \times S o}{S D^2} = \frac{P \times t^2 l}{s} -$ P. Let this weight = Q, and we ſhall obtain the ſum of each particle multiplied into the ſquare of its diſtance from the axis of motion; and conſequently the diſtance of the centre of gyration from the ſame axis: for ſince Q : W :: $G g \times G o : G D^2$, we have $A \times G A^2 + B \times G B^2 + C \times G C^2$, &c. $= G D^2 \times Q = G o \times G g \times W$, and ſince $G o \times G g = G R^2$, it follows that the diſtance of the centre of gyration from the axis, or $G R = G D \times \sqrt{\frac{Q}{W}}$.

This having been once determined, the force which accelerates any point of the ſyſtem in other caſes, at whatever diſtance the moving force be applied, will be known: for the angular velocity of the ſyſtem will always be the ſame as if the whole were collected into the centre of gyration.

An experimental method is alſo delivered by Bernouilli, and long ago tranſcribed: a demonſtration of it may be here inſerted as a further illuſtration of the principles of rotation. In any irregular figure referred to the plane S I K, (*fig.* 4.) let G be the centre of gravity, D the point to which a moving force is applied to turn the ſyſtem round an axis which is perpendicular to the plane S I K: with the centre G, and diſtance G D, deſcribe a circle S L M, then taking any point in the circumference S, let the ſyſtem vibrate in the plane S I K perpendicular to the axis which paſſes through S, and let O be the centre of oſcillation of the ſyſtem ſo vibrating; then let $G O = b$, $S G = G D = d$, the weight of the ſyſtem $= W$, and the moving force $= p$: the force which accelerates $D = \frac{p \times G S}{p \times G S \times w \times G O} = \frac{p d}{p d \times w b}$: the demonſtration of this rule follows immediately from the preceding principles: for ſince the centre of gravity is G, and of oſcillation O, it follows that $S G \times G O \times w = A \times A G^2 + B \times B G^2 + C \times G C^2$, or the ſum of all the products which are formed by multiplying each particle in the ſyſtem into the ſquare of its diſtances from the axis, when that axis paſſes through the common centre of gravity; wherefore $S G \times G O \times b d = \frac{A \times A G^2 + B \times B G^2 + C \times C G^2}{w}$ = the ſquare of the diſtance of the centre of gyration from the axis, when the ſyſtem revolves round G; let the maſs w be collected into the centre of gyration, at the diſtance $\sqrt{b d}$ from the axis; then will the communication of motion be the ſame as if the equivalent weight $w \times \frac{b d}{d}$ were collected in the point D, the other parts of the ſyſtem being removed: here the force which communicates motion to the point D is p, the maſs moved $p \times \frac{b w}{d}$, and the force which accelerates D $=$

$$\frac{p}{p + \frac{b w}{d}} = \frac{p d}{p d \times b w}.$$

The diſtance S O is obtained practically thus: ſuppoſe that the ſyſtem performed n leaſt vibrations in t ſeconds; if $l = 193$ inches, $p = 3.14159$, &c. $S O = \frac{2 l t^2}{n^2 p^2}$ the length required.

GYRFALCON, in *Ornithology*, the name of a large and fierce ſpecies of falcon, called in Engliſh the *jerfalcon*. Its name is a compound of the German *gyr*, which ſignifies a *vultur*, and *falco*, the *falcon*. See Falco *Candicans*, and Gerfalcon.

Gyrfalcon, *Brown*. See Falco *Gyrfalco*.

GYRINOPS, in *Botany*, from γυρῖνος, a *tadpole*, and οψις, an *aſpect* or *appearance*, apparently becauſe its ſeeds and their ſtalks reſemble thoſe animals. If ſo, the word ought rather to have been *Gyrinopſis*. We can find no reaſon to trace it directly from οψ, the *eye*.

The above name is given by Gærtner, v. 2 276. t. 140, to a fruit from Ceylon, called in that country *Walla*, which he deſcribed from the muſeum at Leyden. It conſiſts of a coriaceous, obovate, compreſſed, ſtalked capſule, not an inch long, and about half an inch broad, marked with a longitudinal furrow on each ſide, and with ſwellings where the ſeeds are ſituated. The edge is ſlightly thickened all round; the apex tipped with a little hooked point. The inſide is divided into two cells, by a longitudinal partition, contrary to the valves, and originating from the centre of one on both of them. In each cell is a ſolitary ſeed, of an ovate pointed figure, convex on one ſide, flat on the other, ſupported by a white, fungous ſtalk, tapering downwards, ſomewhat triangular, half as long again as the ſeed.

Gærtner offers nothing concerning the natural order, or affinities, of this plant. A minute bell-ſhaped calyx, or rather perhaps baſe of a calyx, remains at the bottom of the ſtalk which elevates the capſule, and this is all that is known of the flower. It is enough to prove the plant not of the cruciform or *Tetradynamia* claſs, and more reſembles the calyx of the *Papilionaceæ;* but the partition, as well as the inſertion of the ſeeds, defy all analogies among the latter.

GYRINUS, in *Entomology*, a genus of Coleoptera, the antennæ of which are elevated and rigid; jaws horny, ſingle-toothed, and ſharp-pointed; eyes four, two of which are placed above and two beneath; thorax and wing-caſes margined, the latter ſhorter than the body; legs formed for ſwimming.

The gyrinus at the firſt view appears ſo nearly allied to the dytiſcus, that Scopoli has united them in the ſame genus; the moſt eſſential difference conſiſts in the number of the eyes, the dytiſci having only two; and alſo in the ſtructure of the antennæ, thoſe of the dytiſcus tribe having the elevated part of thoſe organs perfoliated, and not being rigid or ſtiff, as in that of gyrinus.

The inſects of this genus are of the aquatic kind, and are frequently met with in ſtanding waters, where they are eaſily diſtinguiſhed by their ſhining blackneſs, and the ſwift and circular direction of their motions in ſwimming. They are often obſerved on the ſurface of the water on which they run, and form circles with amazing celerity; and when diſturbed, immediately plunge to the bottom, drawing after them a brilliant bubble, reſembling a globule of quick-ſilver. The larvæ are unknown, but are generally believed to reſemble thoſe of the dytiſcus. In England theſe beetles are ſometimes called water fleas.

Species.

NATATOR. Oval, ſub-ſtriated, and black. Geoff. *Dytiſcus natator*, Linn. Fn. Suec. *Pulex aquaticus*, Merret. *Gyrinus pygolampes*, Modeer.

Inhabits Europe, in ſtagnant pools.

BICOLOR. Black, beneath ferruginous; poſterior legs compreſſed. Fabr.

Larger than the laſt, and inhabits Sweden.

AUSTRALIS. Somewhat ſtriated and greeniſh; wing-caſes abbreviated, and ſingle-toothed. Modeer. Fabr. &c.

Found in the waters of New Holland; wing-caſes truncated, and the four poſterior legs ferruginous.

AMERICANUS. Smooth, black, and opaque; four poſterior legs ſhort, and teſtaceous. Fabr.

Native of South America, and reſembles natator, but is twice the ſize.

MICANS. Smooth, olive, poliſhed; wing-caſes with a gloſſy black band behind. Fabr.

The largeſt of its genus, and inhabits Guinea; the body olive, tinged with coppery and ſilvery gloſſes; beneath black; poſterior legs teſtaceous.

SPINOSUS. Black, poliſhed; thorax and wing-caſes edged with yellow, the wing-caſes ſpinous. Fabr.

Native of Coromandel. Wing-caſes with two long ſharp ſpines; body beneath ferruginous; tail black. Fabr.

STRIATUS. Green, poliſhed; edges of the thorax and wing-caſes pale, the laſt ſtriated. Thunberg.

Inhabits Barbary. The antennæ are green; head braſſy-green; front ſometimes violet; wing-caſes ſtriped with green and violet, and rounded at the end; legs pale.

GROSSUS. Beneath black; above paler, and very ſmooth; wing-caſes rounded at the tip. Modeer.

Found in the clear waters of the Cape of Good Hope.

FORMOSUS. Beneath black; breaſt, ſternum, and legs ferruginous; above braſſy-green; tranſverſe line on the lip, two ſpots on the front, tranſverſe interrupted line on the thorax, and ſtreaks on the wing-caſes golden-red. Modeer.

Native of the clear waters of the Cape. Modeer deſcribes a variety half the ſize, in which the golden-hue does not appear.

ORIENTALIS. Beneath pale ferruginous, above braſſy-black; wing-caſes each ſide compreſſed; wing-caſes ſtriated, bronzed, four-toothed behind. Modeer.

Body roundiſh; wing-caſes as long as the abdomen. Native place unknown.

VIOLA AQUATICA. Beneath pale ferruginous; above black, with mouſe-coloured down. Modeer. *Viola aquatica*, Aldrovandus, &c.

Inhabits ſalt-waters.

KIRBII. Above braſſy-black; beneath yellow. Marſh.

Length one line and three quarters; wing-caſes ſtriated; legs as well as body beneath yellow. Native of Britain.

MODEERI. Above ſmooth, black, and ſomewhat downy; beneath pale ferruginous; poſterior legs compreſſed. Marſh.

Inhabits Britain. Length three lines.

ELONGATUS. Black, opaque, and elongated; wing-caſes ſtriated with dots. Marſh.

Length three lines, and inhabits Britain.

GYRINUS, in *Zoology*, a name uſed for a ſpecies of the *Cereari*, and alſo of the *Murex*.

GYRLE, among *Sportſmen*. See GIRLE.

GYROCARPUS, in *Botany*, from γυροω, *to turn round and round*, and καρπος, *fruit;* becauſe the winged fruit, when thrown up into the air, deſcends ſlowly with a twirling motion. Jacquin, the author of the name, tells us the children at Carthagena, where the tree grows, amuſe themſelves with it as a kind of ſport. Jacq. Amer. 282. Roxb. Corom. v. 1. 1. Lamarck. Dict. v. 3. 65. Illuſtr. t. 850. Gærtn. t. 97. Brown. Prod. Nov. Holl. v. 1. 404.—Claſs and order, *Polygamia Monoecia*. Nat. Ord. doubtful. Mr. Brown places it at the end of his *Laurinæ* (*Lauri*, Juſſ.), as more akin to that order, than to a new one in which *Combretum*, *Terminalia*, &c. are included. We ſhould rather think it moſt allied to the latter.

Gen. Ch. United flowers, *Cal.* Perianth ſuperior, in four deep ſegments; the two outermoſt oppoſite ones ſmall, obtuſe, deciduous; two innermoſt larger, erect, dilated, three-toothed, permanent, finally much enlarged. *Cor.* none. *Stam.* Filaments four, thread-ſhaped, ſpreading, equal, rather exceeding the calyx, oppoſite to its ſegments, with four club-ſhaped, rather ſhorter, barren filaments, alternate with them; anthers quadrangular, opening at each ſide by an oval valve from the bottom to the top. *Piſt.* Germen inferior, ovate, angular; "ſtyle very ſhort; ſtigma capitate, oblique." *Brown. Peric.* Drupa dry, ovate, octangular, of one cell, with a coriaceous coat, crowned with the two enlarged, upright, wing-like ſegments of the calyx, above four times its own length. *Seed* ſolitary, obovate; albumen none; embryo inverted; cotyledons ſtalked, convoluted round the embryo; "plumula of two leaves." *Brown.*

Male, *Cal.* Perianth of five deep, ovate, equal ſegments. *Stam.* as in the united flowers, with barren filaments. *Piſt.* none.

Eſſ. Ch. United flowers; Calyx in four ſegments; two oppoſite ones permanent, enlarged. Corolla none. Stamens four or more, with alternate, barren, club-ſhaped filaments. Drupa of one cell, crowned with two wings.

Male ; Calyx of five equal ſegments. Stamens as in the other flowers. Piſtil none.

Obſ. Gærtner was induced to conſider this genus, of which he knew nothing but the fruit, as akin to the Maple tribe ; the wings, however, being formed of the calyx, and not originally a part of the germen, are very different from thoſe of *Acer*, *Banniſteria*, *Triopteris*, &c. Mr. Brown deſcribes the ſegments of the calyx as varying from four to eight, and conſequently the number of ſtamens is variable. This author, moreover, does not mention the difference between the perianths of the two different kinds of flowers, indicated and delineated in Dr. Roxburgh's work, and which is of the more conſequence, as, if it exiſts, the genus truly belongs to the *Polygamia* claſs, for that reaſon ; but if otherwiſe, to *Tetrandria Monogynia*.

The ſpecies are difficult to determine. The late excellent Mr. Dryander, editor of Roxburgh's work, conſidered his plant as the ſame with Jacquin's. Willdenow it ſeems has ſeparated them, but we have not yet obtained this volume of his valuable book. Mr. Brown adopts this meaſure, though he totally rejects Willdenow's ſpecific diſtinctions, nor does he offer any others. We ſhall attempt to define them ſo far as to affix the ſynonyms to each.

1. G. *americanus ;* Jacq. Amer. 282. t. 178. f. 80. Lamarck. Dict. v. 3. 65.—Leaves ſlightly heart-ſhaped, ſmooth ? deeply three-lobed or undivided. Fruit tranſverſely corrugated.—Native of woods in Carthagena, South America, where it grows to a tall, elegant, branching *tree*. The *leaves* are ſcattered on long ſtalks, and are about a foot in length and as much in breadth, ſhining, cut half way down into three ovate acute lobes, with a rib to each ; the margins entire. The ſame tree ſometimes bears undivided ovate leaves. Jacquin ſaw no *flowers*, but the *fruit* grows in looſe terminal bunches, and is dry, ovate, obtuſe, furrowed lengthwiſe, and tranſverſely rugoſe, crowned with two equal, obtuſe, flat, ſtriated, ſhining wings, between two and three inches long. We are poſſeſſed of one fruit only, communicated by Juſſieu as the plant of Jacquin, and having been obtained doubtleſs from America, we preſume it muſt be right.

2. G. *aſiaticus*. (G. Jacquini ; Gærtn. v. 1. 92 ? Roxb. Corom. t. 1. Afrag ; Le Brun Voy. v. 2. 257. fig.)—Leaves deeply heart-ſhaped, undivided, or ſlightly lobed ; downy beneath. Fruit even.—Gathered by Kœnig and Roxburgh in mountainous parts of Coromandel, where it is called by the natives *Tanucoo*, and by the Engliſh Cattamaran-wood tree, the light white wood being excellent for cattamarans or rafts. The *tree* is very large, ſhedding its leaves towards the end of the rainy ſeaſon, and flowering during the ſucceeding cold one, juſt before freſh foliage comes forth. The *bark* is ſmooth, greyiſh. *Branches* thinly ſpreading. *Leaves* crowded about their extremities, ſtalked, broad-heart-ſhaped, acute, undivided, or with one or two ſlight ſhallow lobes, entire, ribbed, veiny ; ſmooth above ; downy beneath ; furniſhed with two depreſſions on the upper ſide at their baſe. *Panicles* cluſtered, terminal, forked, many-flowered, ſhorter than the leaves ; the male flowers terminal, cluſtered ; the united ones ſolitary in the forks below them ; all ſmall and yellowiſh. *Fruit* the ſize of a filberd, furrowed, but apparently not tranſverſely corrugated, at leaſt ſo Roxburgh delineates it, though he deſcribes it *wrinkled*, but this term may apply to the longitudinal furrows. Gærtner's figure, taken moſt probably from one of Kœnig's ſpecimens at ſir Joſeph Banks's, agrees with Roxburgh's in this reſpect, not with Jacquin's, nor with our Americen ſpecimen. Thoſe who have more ample materials muſt decide how far this is a permanent ſpecific diſtinction.

3. G. *ſphenopterus*. Brown. Prod. n. 1.—Leaves heart-ſhaped, downy on both ſides, grey beneath ; the floral ones moſtly undivided. Wings of the fruit obtuſe, entire, or divided.—Gathered by Mr. Brown in the tropical of New Holland. The floral *leaves* are moſtly undivided, rarely two or three-lobed. Their *footſtalks* are ſhorter than the common flower-ſtalk, as in the preceding. Wings of the *fruit* obovato-oblong, obtuſe, occaſionally divided ; that is, as we preſume, when the calyx has a ſuperabundant number of ſegments.

4. G. *rugoſus*. Ibid. n. 2.—" Floral leaves ſomewhat heart-ſhaped, with three angular lobes ; rugged and nearly naked above ; downy and ſoft beneath ; their lobes pointed, ſeparated by very broad ſinuſes."—Diſcovered by Mr. Brown in the ſame country with the laſt, but he did not meet with the fruit. The common *flower-ſtalk* is, in this alſo, longer than the *footſtalks*, if there be no miſtake in this part of Mr. Brown's definition, which we are led to ſuſpect, merely becauſe the ſame character obtains in all the foregoing, and therefore cannot properly make a part of the ſpecific difference of any one. Perhaps in the laſt *longiore* was accidentally written for *breviore*.

GYROGONITES, in *Mineralogy*, an indeterminable foſſil, ſcarcely of the ſize of the head of a pin, and of a white colour ; found diſſeminated in the ſubſtance of a hard ſiliceous ſtone (called mill-ſtone), in the neighbourhood of Paris. Lamarck has eſtabliſhed it as a genus, the character of which is taken from its ſpheric form, and from its ſurface being horizontally all around ſtriated by parallel ſpiral grooves carinated at the borders.

Boſc obſerves that this foſſil need only be ſeen in its place, to convince the obſerver that it is nothing but the inner mould of a deſtroyed ſhell ; that, conſequently, it cannot with propriety be taken for the type of a new genus ; and that the caſt, to which the above characters are likewiſe applicable, furniſhes no particular data to guide us with regard to its determination. We cannot, therefore, ſatisfy our curioſity with reſpect to the nature of this foſſil.

GYROLA, in *Ornithology*. See TANAGRA *Gyrola*.

GYROMANCY, GYROMANTIA, a kind of divination, performed by walking round, or in a circle.

The word is compounded of the Greek γυρος, *circle*, and μαντεια, *divination*.

GYRON. See GIRON.

GYROPHORA, in *Botany*, ſo named by profeſſor Acharius, from γυρος, *a circle*, and φερω, *to bear*, in alluſion to the concentric circles, more or leſs numerous or complicated, obſervable in the diſk of the receptacles or ſhields. Ach. Meth. 100. Sm. Engl. Bot. v. 29. 2066. (Umbilicaria ; Hoffm. Pl. Lich. v. 1. 8. t. 2. Lichen ; Linn. Gen. 566. Schreb. 767. Juſſ. 7. Claſs and order, *Cryptogamia Algæ*. Nat. Ord. *Lichenes*.

Gen. Ch. *Frond* leafy, membranous and flexible when dry, rigid and brittle when wet, peltate, fixed by central roots, more or leſs orbicular, ſimple or luxuriantly compound, the margin wavy, or lobed, jagged or notched, rarely entire. *Tubercles*, or *Tricæ*, either ſeſſile, or ſlightly elevated by a ſhort ſtalk, ſcattered over the upper ſurface, either flat, or more or leſs convex, entirely black, compoſed of concentric plaits, ſometimes tranſverſely folded, on the upper ſide or diſk, at length ſeparating irregularly. *Seeds* lodged on the inſide of the plaits.

Eſſ. Ch. Tubercles ſeſſile on a peltate frond, black, with a plaited a plaited contorted diſk, in whoſe clefts the ſeeds are lodged.

This is one of the moſt diſtinct and moſt natural genera that have been ſeparated from *Lichen*. Examples of it may be ſeen in Engl. Bot. t. 1282, 1283, 2066, 522, and 931. The ſpecies in Acharius's Methodus are 15, beſides his *Lecidea puſtulata*, (*Lichen puſtulatus*, Linn.) which we truſt will ſufficiently appear, by the plate in Engl. Bot. t. 1283, to belong to *Gyrophora*. If it did not, the whole genus would be overſet; for ſo cloſely is that plant allied to the other ſpecies, in their very peculiar habit, that no ſcientific principles can disjoin them. They all grow on expoſed alpine rocks, chiefly on granite, or volcanic ſtones. The vitrified forts in the Highlands of Scotland, as on Tomtarſin hill, produce ſome of them, eſpecially *G. eroſa*.

To diſcriminate the ſpecies and their ſynonyms is, in many caſes, very difficult, and the whole genus wants a thorough inveſtigation, which can be undertaken with effect by thoſe only who have opportunities of tracing their different appearances on their native rocks. By ſuch an inveſtigation ſome ſuppoſed ſpecies, extremely different in ſize and luxuriance, will be found to run into each other, and the fringed margin of others, however curious and remarkable, will prove occaſionally evaneſcent.

GYROVAGI, in *Eccleſiaſtical Writers*, monks, who leaving their monaſteries, under pretence of piety, wandered about from one religious houſe to another.

The ſame appellation was alſo given to prieſts who left their pariſhes.

GYRT, in *Geography*, a ſea-port town of Sweden, in Eaſt Gothland; 30 miles S.S.E. of Nordkioping.

GYSSENS, a town of the iſland of Borneo, on the E. coaſt. N. lat. 1°. E. long. 117°.

GYSSONE, a town of the iſland of Corſica; 29 miles S. of Corte.

GYTHIUM, Colo-Kitia, in *Ancient Geography*, a port of Laconia, in the Laconic gulf, at the mouth of a ſmall river. Livy (l. xxxiv. c. 29.) ſpeaking of the war in Greece occaſioned by T. Quintius Flaminius, B.C. 195, deſcribes it as very ſtrong and well-peopled.

GYTHOW, or Jethow, in *Geography*, a ſmall iſland in the Engliſh channel, between the iſland of Guernſey and the greater Sark.

GYULA, or Julia, a town of Hungary, ſituated on an iſland, in the river Kores, with a caſtle; 50 miles N.N.W. of Temeſvar.

GYZANTES, in *Ancient Geography*, a people of Africa, in the weſtern part of Libya, near the Zauæci, who cultivated bees and made a great quantity of honey. Herodotus ſays, that they painted themſelves with vermilion, and ate apes, which were abundant on their mountains.

GZAT, in *Geography*, a town of Ruſſia, in the government of Smolenſk; 88 miles E.N.E. of Smolenſk. N. lat. 55° 34'. E. long. 35° 14'.

GZINDER, a town of Pruſſian Pomerelia; 10 miles E. of Dantzic.

H.

H Is the eighth letter of our alphabet, and the ſixth conſonant.

Varro, De Re Ruſtica, lib. iii. cap. 1. calls the *h*, *afflatus*; and Martianus Capella ſays it is pronounced only by a gentle contraction of the trachea. Hence it has been diſputed, whether or not the *h* be a real letter.

Some will only have it to be an aſpiration, or ſpirit, becauſe its ſound is ſo weak. And accordingly the Greeks, of later ages at leaſt, do not place it in the line with the other letters, but put it over the head of the letter which follows it; though it ſhould ſeem they anciently wrote it in the ſame line with the reſt.

The Latin grammarians, as they were religious imitators of the Greeks, have, on their authority, generally diſallowed the *h* as a letter; and the moderns have, in this reſpect, followed the Latins, urging, that it is ſounded only by a ſtrong emiſſion of the breath, without any conformation of the organs of ſpeech, and therefore that it is no letter. However, others maintain that the *h*, like all other aſpirates, from the time it is aſpirated, and for this very reaſon that it is aſpirated, is not only a letter, but a real conſonant; it being a motion, or effort of the larynx, to modify the ſound of the vowel that follows; as is evident in the words *heaven*, *health*, *hero*, &c. where the vowel *e* is differently modified from what it is in the words *endive*, *eating*, *elect*, &c. and ſuch modification is all that is eſſential to a conſonant. They add, that the *h* is either a letter, or *ſ* and *z* are none; thoſe being no more than hiſſing aſpirations; and that they who exclude the *h* from among the letters, as conceiving it only a mark of aſpiration, might as well exclude the labial conſonants *b* and *p*, and ſay they are only marks of certain motions of the lips, &c. Hence they conclude that the *h* is a letter, and a conſonant of the guttural kind, *i. e.* a conſonant, to the pronunciation whereof the throat concurs, in a particular manner, more than in any other of the organs of voice.

It is true, in many words beginning with *h*, the aſpiration is very weak, and almoſt inſenſible; the *h* in thoſe caſes not doing its office: but it does not ceaſe to be a conſonant on that ground, more than the various other conſonants, which we write but do not pronounce; as the *k* in *quick*, &c. and ſeveral other letters, particularly in the Hebrew, French, &c. Nor does it ceaſe to be a conſonant, becauſe it does not hinder the eliſion of the foregoing vowel, when another vowel follows in the ſubſequent word: for then *m* would undergo the ſame diſqualification.

M. Menage diſtinguiſhes two kinds of *h*; the one an aſpirate, which he allows to be a conſonant, the other a mute, which he conſiders as a vowel. Now, it is certain, the aſpirated *h* is a conſonant; but the mute *h* is no vowel, as having no peculiar or proper ſound diſtinct from that of the vowel, or diphthong, immediately following it.

When the *h* is preceded by a *c*, the two letters together have frequently the ſound of the Hebrew שׁ, with a point over the right horn: as in *charity*, &c.

In moſt words derived from the Greek, and beginning in that language with the letter χ, the *ch*, which begins them in Engliſh, has generally the ſound of a *k*, as in *echo*, *chorus*, &c. though it is ſometimes ſoftened a little, as in *Cherſoneſus*, &c.

After a *p*, the *h* is always pronounced, together with the *p*, like an *f*; as in *phraſes*, *Philiſtines*, *phlegm*, *phlebotomy*, *philoſophy*, *Phoceans*, &c. Moſt words of this claſs are either proper names, or terms of art, borrowed from the Greek, or the Oriental languages; and written in Greek with a φ, and with a פ in the others.

This letter is pronounced by a ſtrong emiſſion of the breath between the lips cloſing by a gentle motion of the lower jaw to the upper, and the tongue nearly approaching the palate. Our H, which is the ſame with that of the Romans, moſt probably derived its figure from the Hebrew ה.

The *h* in Engliſh is ſcarcely ever mute at the beginning of a word, or where it immediately precedes a vowel, as *houſe*, *behaviour*, &c. It is always ſilent after *r*, as *rhetoric*, *rheum*, *rhubarb*, &c. Where it is followed by a conſonant, it has no ſound, according to the preſent pronunciation. H final, preceded by a vowel, is always ſilent; as *ah! oh! Meſſiah*, *&c.* Mr. Murray, in his much approved Engliſh grammar, obſerves, that from the faintneſs of the ſound of this letter, in many words, and its total ſilence in others, added to the negligence of tutors, and the inattention of pupils, it has happened, that many perſons have become almoſt incapable of acquiring its juſt and full pronunciation. It is, therefore, incumbent on teachers to be particularly careful to inculcate a clear and diſtinct utterance of this ſound.

In ancient authors we frequently meet with *h* put inſtead of *f*, as *haba* for *faba;* but this is principally obſervable in the Spaniſh tongue, where moſt of the words borrowed from the Latin, beginning with an *f*, take the *h* in lieu of it: as *hablar*, for *fabulari; habo*, for *fabus; hado*, for *fatum*. For the relation which *h* has to the Æolic digamma, ſee the letter F.

The aſpirate or ſharp accent of the Greeks, which is the ſame with our *h*, is alſo frequently changed in the Latin for an *s;* ἁλς, *ſal;* ἑπτα, *ſeptem;* ἑξ, *ſex;* ἑρπω, *ſerpo;* ἡμισυ, *ſemis;* ὑς, *ſus*, &c. The *h* is alſo uſed for ſome other letters, enumerated at large by Paſſerat, "De Literarum inter ſe Cognatione & Permutatione."

Anciently the *h* was put for *ch;* thus *Chlodoveus* was formed *Hludovicus*, as it is read on all the coins of the ninth and tenth centuries; and it was on this account that they wrote *Hludovicus* with an *h*. In courſe of time, the ſound of the *h* being much weakened, or entirely ſuppreſſed, the *h* was dropt, and the word was written *Ludovicus*. In like manner we read *Hlotaire*, *Hlovis*, &c. F. Lobineau will have this difference to have ariſen from the differences in the pronunciation. Such, ſays he, as could not pronounce the guttural, with which theſe two words begin, ſubſtituted a *c* for it; and they who pronounced it ſo, wrote it after the ſame manner: but ſuch as were accuſtomed to pronounce the guttural, wrote it likewiſe. He might have added, that ſuch as could not pronounce it, at length abſolutely rejected it, and both wrote and ſpoke *Louis*, *Lotaire*, &c. Some learned men have conjectured, that the *h* ſhould have been detached from the name; and that it ſignified lord, from the Latin *herus*, or the German *herr:* much as the D, which the Spaniards prefix to their proper names, as *D. Phelipe*, for Don Philip. But as it is likewiſe found before the names of ſeveral cities, it is more probable the letter was there uſed to denote the rough harſh pronunciation of the ancient Franks.

In reality, the moſt ancient way of writing the names of theſe French kings was not by *h*, but by *ch;* where the *c* ſeems to have ſtood for *koning*, *king*, and the *h* was inſerted to give the *c* a guttural ſound.

The *h* is ſometimes alſo found prefixed to the *c;* as *Hcarolus*, *hcalendæ*, &c. for *Carolus*, *calendæ*, &c.

H, among the *Ancients*, was alſo a numeral letter, ſignifying 200, according to the verſe:

> "H eoque ducentos per ſe deſignat habendos."

When a daſh is drawn at the top of the H̄, it ſignified two hundred thouſand. See what has been obſerved on this ſubject under the letter A.

H, as an abbreviation, was ſometimes uſed by the ancients to ſignify *homo*, *hæres*, *hora*, &c.

H, as an aſpirate, being no letter in the Italian language, whence moſt of our *Muſical* terms are derived, furniſhes few initials or abbreviations. It ſometimes, however, is uſed for half-note, and haubois. In German muſic it ſtands for B *quadro*, or B ♮, in oppoſition to B *rotondo*, or B ♭. In Guido's ſcale, the B flat is called B *fa*, and the B ♮, or B natural, B *mi*.

HAA, in *Geography*, a ſmall iſland in the North ſea, near the coaſt of Scotland; 3 miles S.E. of Farout Head. N. lat. 58° 32′. W. long. 4° 28′.

HAACK, a town of Holland, on the N.E. coaſt of the iſland of Walcheren, with a light-houſe near it. N. lat. 51° 38′. E. long. 22° 7′.

HAAG, a town of Bavaria, and capital of a county of the ſame name, ſeated on a hill on the W. ſide of the river Inn; 28 miles E. of Munich.

HAAG is alſo the name of ſeveral towns in Auſtria.

HAAL, or HAL, a town of Arabia, in the province of Oman; 15 miles N.W. of Maſcat.

HAANO, one of the iſlands called Hapaee, in the ſouthern Pacific ocean, diſcovered by Capt. Cook in 1777. S. lat. 19° 41′. E. long. 185° 43′.

HAARLEM. See HAERLEM.

HAAS, JOHN MATTHEW, in *Biography*, was born at Augſburg in 1684, where he received the early part of his education, and was ſent to Helmſtadt to ſtudy theology, with an intention of making that the principal purſuit of his life, but having a decided turn for mathematics, he removed to Leipſic, where he purſued the ſciences, properly ſo called, with diligence and great ſucceſs. The firſt attempt as an author was the conſtruction of maps, which obtained for him much applauſe. His principal object in the maps was to exhibit with more accuracy the ſituation of countries at that time but little known. He took his regular degrees, and ſupported himſelf by teaching. His chief work was entitled "Deſcriptio Geographica et Hiſtorica Regni Davidici et Salomonæi, cum Delineatione Syriæ et

"Egypti," fol. cum fig. He laboured alſo many years at another work, part of which only was publiſhed, entitled "Prodromus Hiſtoriarum; ſive, Prodromus Theatri ſummorum Imperiorum; hoc eſt, Hiſtoriæ Politicæ univerſalis, potioris, et principalis, &c." An abridgment of this was publiſhed in 1743, with the title of "Hiſtoriæ Univerſalis Politicæ Idæa plane nova et legitima, &c." This was illuſtrated with twenty-eight maps and ſixteen chronological tables. After the author's death, which happened in Sept. 1742, theſe works were publiſhed under the general title of "An hiſtorical Atlas, containing the great Kingdoms and Monarchies, according to ancient Geography." Gen. Biog.

HAATYBUNDER, in *Geography*, a town of Bengal; 38 miles S.E. of Dinagepour.

HABAEL, *Iſlands of*, a cluſter of ſmall iſlands in the Red ſea, near the coaſt of Abyſſinia, anciently called "Alalæi." N. lat. 14° 15′.

HABAKKUK, one of the twelve leſſer prophets, whoſe prophecies are taken into the canon of the Old Teſtament.

The name is written in Hebrew with ח *hheth*; and ſignifies a *wreſtler* or *grappler*. The Greek tranſlators call him *Abbakoum*.

Nothing certain is known concerning the country, or preciſe time in which this prophet lived. It is ſaid, however, that he was of the tribe of Simeon, and a native of Bethzacar; and that, foreſeeing the capture of Jeruſalem by Nebuchadnezzar, he eſcaped to Arabia, where he remained at Oſtracin, near the lake Sirbonis, for ſome time; but that after the city was taken by the Chaldæans, he returned to Judea, and employed himſelf in agriculture. In this country he died and was buried, two years before the end of the captivity, A. M. 3466, B. C. 538. St. Jerom, who makes him to be the ſame with the prophet Habakkuk, to whom the hiſtory of Bel and the Dragon is aſcribed, believes that he was contemporary with Daniel.

The preciſe time is not known when Habakkuk propheſied; but from his predicting the ruin of the Jews by the Chaldæans, it may be concluded that he was contemporary with Jeremiah, and propheſied in the reign of Joſiah. He alſo foretells the conqueſts of Nebuchadnezzar, his metamorphoſis, and death, and the judgments that ſhould befal the Chaldæans, who completed the captivity of the two tribes. He ſpeaks againſt a prince who built with blood and iniquity; probably the king of Tyre; and he accuſes another king with having intoxicated his friend, in order to diſcover his nakedneſs; probably the king of Egypt. His prophecy only conſiſts of three chapters; and cloſes with an admirable ſong, or prayer to God, whoſe majeſty he deſcribes with the utmoſt grandeur and ſublimity of expreſſion. The ſtyle of Habakkuk is poetical, eſpecially in his ode, which, indeed, may be accounted among the moſt perfect ſpecimens of that claſs. Habakkuk, on cloſe examination, will be found to be a great imitator of former poets, but not without new additions of his own; not in the manner of Ezekiel, who is very copious, and who flags behind thoſe whom he imitates, but with much greater brevity, and with no common degree of ſublimity, riſing in this reſpect ſuperior to thoſe whom he imitates, or at leaſt keeping on an equality with them.

HABASCIA, in *Geography*, a town of Arabia, in the country of Yemen; 25 miles E. of Serrain.

HABASEH, a town of Egypt, in the lake Sheib; 48 miles E.N.E of Cairo. N. lat. 30 18′. E. long. 31° 10′.

HABAT. See Beni-*Haſſen*.

HABDALA, or Habhdalah, a Jewiſh ceremony, practiſed among that people every ſabbath-day evening.

The word is Hebrew, and literally ſignifies *ſeparation*: it is formed of בדל, *badal, to ſeparate*; the ceremony being looked upon as the diviſion, or parting of the ſabbath from the reſt of the week. It was eſtabliſhed to prevent their being too haſty in ending the ſabbath.

Towards the cloſe of the ſabbath, when the ſtars begin to appear, every maſter of a family lights a torch or flambeau, or at leaſt a lamp with two wicks. A little box of ſpices is then prepared, and a glaſs of wine taken; then ſinging, or rehearſing a prayer, and bleſſing the wine and the ſpices, they all ſmell at them; and, after a few ceremonies performed about the torch, or lamp, they caſt a little of the conſecrated wine into the flame; every body taſtes; and thus they break up, wiſhing each other, not a good night, but a good week.

HABEAS *Corpora Juratorum*, in *Law*, is a writ that lies for bringing in a jury, or ſo many of them as refuſe to come upon the *venire facias*, for the trial of a cauſe brought to iſſue. This is of the ſame nature in the common pleas, as the *diſtringas juratores* in the court of king's bench. This writ commands the ſheriff to have their bodies, or to diſtrain them by their lands and goods, that they may appear upon the day appointed.

Habeas *Corpus*, a writ, which a man indicted and impriſoned for any crime, or treſpaſs, before the juſtices of peace, or in a court of franchiſe, having offered ſufficient bail, which is refuſed, though the caſe be bailable, may have out of the king's bench, thereby to remove himſelf thither, at his own coſts, to anſwer the cauſe at the bar thereof.

The order, in this caſe, is firſt to procure a *certiorari* out of the chancery, directed to the ſaid juſtices, for removing the indictment into the king's bench; and upon that to procure this writ to the ſheriff, for cauſing his body to be brought at a certain day.

This writ is alſo uſed to bring the body of a perſon into court, who is committed to any gaol, either in criminal or civil cauſes; and a *habeas corpus* will remove a perſon and cauſe from one court and priſon to another. Of this there are various kinds: ſuch as the *habeas corpus ad reſpondendum*, when a man hath a cauſe of action againſt one who is confined by the proceſs of ſome inferior court; in order to remove the priſoner, and charge him with this new action in the courts above (2 Mod. 198.); ſuch is that *ad ſatisfaciendum*, when a priſoner hath had judgment againſt him in an action, and the plaintiff is deſirous to bring him up to ſome ſuperior court to charge him with proceſs of execution. (2 Lilly prac. reg. 4.) Such alſo are thoſe *ad proſequendum, teſtificandum, deliberandum*, &c. which iſſue when it is neceſſary to remove a priſoner, in order to proſecute or bear teſtimony in any court, or to be tried in the proper juriſdiction wherein the fact was committed. Such is likewiſe the common writ *ad faciendum et recipiendum*, which iſſues out of any of the courts of Weſtminſter-hall, when a perſon is ſued in ſome inferior juriſdiction, and is deſirous to remove the action into the ſuperior court; commanding the inferior judges to produce the body of the defendant, together with the day and cauſe of his caption and detainer, (whence the writ is frequently denominated an *habeas corpus cum cauſa*,) *to do* and *receive* whatſoever the king's court ſhall conſider in that behalf. This is a writ grantable of common right, without any motion in court (2 Mod. 306.); and it inſtantly ſuperſedes all proceedings in the court below. But in order to prevent the ſurreptitious diſcharge of priſoners, it is ordered by ſtatute 1 and 2 P. & M. c. 13. that no *habeas corpus* ſhall iſſue to remove any priſoner out of any gaol, unleſs ſigned by ſome judge of the court out of which it is awarded. And, to avoid vexatious delays by removal of frivolous cauſes, it is enacted by ſtatute 21 Jac. I. c. 23. that, when the judge of an inferior court of record is a barriſter of three years ſtanding, no cauſe ſhall be removed from thence by *habeas corpus* or other writ, after iſſue or demurrer deliberately joined: that no cauſe, if once remanded to the inferior court by writ of *procedendo* or otherwiſe, ſhall ever afterwards be again removed; and that no cauſe ſhall be removed at all, if the debt or damages laid in the declaration do not amount to the ſum of five pounds. But an "expedient" having been found out to elude the latter branch of the ſtatute, by procuring a nominal plaintiff to bring another action for five pounds or upwards, (and then by the courſe of the court the *habeas corpus* removed both actions together,) it is therefore enacted by ſtatute 12 Geo. I. c. 29, that the inferior court may proceed in ſuch actions as are under the value of five pounds, notwithſtanding other actions may be brought againſt the ſame defendant to a greater amount. And by ſtatute 19 Geo. III. c. 70 no cauſe, under the value of ten pounds, ſhall be removed by *habeas corpus*, or otherwiſe, into any ſuperior court, unleſs the defendant ſo removing the ſame, ſhall give ſpecial bail for payment of the debt and coſts. But the great and efficacious writ, in all manner of illegal confinement, is that of *habeas corpus ad ſubjiciendum*, directed to the perſon detaining another, and commanding him to produce the body of the priſoner, with the day and cauſe of his caption and detention, to do, ſubmit to, and receive the award of the judge or court. (St. Trials, viii. 142.) This is a high prerogative writ, iſſuing by the common law out of the court of king's bench, not only in term time, but alſo during the vacation, by a *fiat* from the chief juſtice, or any other of the judges, and running into all parts of the king's dominions; for the king is at all times entitled to have an account, why the liberty of any of his ſubjects is reſtrained (Cro. Jac. 543.), wherever that reſtraint may be inflicted. If it iſſues in vacation, it is uſually returnable before the judge himſelf who awarded it; and he proceeds by himſelf thereon (4 Burr. 856.); unleſs the term ſhould intervene, and then it may be returned in court. (Ibid. 460. 542. 606.) Indeed, if the party were privileged in the courts of common pleas and exchequer, as being (or ſuppoſed to be) an officer or ſuitor of the court, an *habeas corpus ad ſubjiciendum* might alſo by common law have been awarded from thence (2 Inſt. 55. 4 Inſt. 290, 2 Hal. P. C. 144. 2 Ventr. 24.); and if the cauſe of impriſonment were palpably illegal, they might have diſcharged him (Vaugh. 155.); but if he were committed for any criminal matter, they could only have remanded him, or taken bail for his appearance in the court of king's bench (Carter, 221. 2 Jon. 13.); which occaſioned the common pleas for ſome time to diſcountenance ſuch applications. But ſince the mention of the king's bench and common pleas, as co-ordinate in this juriſdiction, by ſtatute 16 Car. I. c. 10, it hath been holden, that every ſubject of the kingdom is equally entitled to the benefit of the common law writ, in either of theſe courts, at his option. (2 Mod. 198. Wood's Caſe. C. B. Hil. 11 Geo. III.) It hath alſo been ſaid, and by very reſpectable authorities (4 Inſt. 182. 2 Hal. P. C. 147.), thas the like *habeas corpus* may iſſue out of the court of chancery in vacation; but as no precedent could be found upon the famous application to lord Nottingham by Jenks, his lordſhip refuſed it.

In the king's bench and common pleas it is neceſſary to apply for it by motion to the court (2 Mod. 306. 1 Lev. 1.), as in the caſe of all other prerogative writs (*certiorari*, prohibition, *mandamus*, &c.) which do not iſſue as of mere courſe, without ſhewing ſome probable cauſe, why the extraordinary power of the crown is called in to the party's aſſiſtance; and when a probable ground is ſhewn, that the party is impriſoned without juſt cauſe (2 Inſt. 615.), the writ of *habeas corpus* is then a writ of right, which "may not be denied, but ought to be granted to every man that is committed to priſon, or detained there, or otherwiſe reſtrained, though it be by the command of the king, the privy-council, or any other." Com. Journ. 1 April, 1628.

The writ of *habeas corpus* was originally ordained by the common law of the land, as a remedy for ſuch as were unjuſtly impriſoned, to procure their liberty; but many abuſes having been introduced into the mode of granting it, it became neceſſary to prevent them by modern ſtatutes. Accordingly, by the petition of right, 3 Car. I. it is enacted, that no freeman ſhall be impriſoned or detained, without cauſe ſhewn, to which he may make anſwer according to law. And by 16 Car. I. cap. 10. if any perſon be reſtrained of his liberty by order or decree of any illegal court, or by command of the king's majeſty in perſon, or by warrant of the council-board, or of any of the privy-council, he ſhall, upon demand of his counſel, have a writ of *habeas corpus*, to bring his body before the court of king's bench or common pleas; who ſhall determine whether the cauſe of his commitment be juſt, and thereupon do as to juſtice ſhall appertain. The methods of obtaining this are farther pointed out and enforced by 31 Car. II. cap, 2. See the next article.

HABEAS *Corpus Act* is the famous ſtatute 31 Car. II. cap. 2. which ſome have called the ſecond *Magna Charta*, and bulwark of Engliſh liberty. The ſubſtance of this important ſtatute is compriſed in the following particulars; *viz.* 1. That the writ of *habeas corpus* ſhall be returned, and the priſoners brought up within a limited time, according to the diſtance, not exceeding in any caſe twenty days. 2. That ſuch writs ſhall be endorſed as granted in purſuance of this act, and ſigned by the perſon awarding them. 3. That on complaint and requeſt in writing by or on behalf of any perſon committed and charged with any crime (unleſs committed for treaſon or felony, expreſſed in the warrant, or for ſuſpicion of the ſame, or as acceſſary thereto before the fact, or convicted or charged in execution by legal proceſs) the lord chancellor, or any of the twelve judges, in vacation, upon viewing a copy of the warrant, or affidavit that a copy is denied, ſhall (unleſs the party has neglected for two terms to apply to any court for his enlargement) award a *habeas corpus* for ſuch priſoner, returnable immediately before himſelf or any other of the judges; and upon the return made ſhall diſcharge the party, if bailable, upon giving ſecurity to appear and anſwer to the accuſation in the proper court of judicature. 4. That officers and keepers neglecting to make due returns, or not delivering to the priſoner or his agent, within ſix hours after demand, a copy of the warrant of commitment, or ſhifting the cuſtody of a priſoner from one to another, without ſufficient reaſon or authority (ſpecified in the act), ſhall for the firſt offence forfeit 100*l.* and for the ſecond offence 200*l.* to the party grieved, and be diſabled to hold his office. 5. That no perſon, once delivered by *habeas corpus*, ſhall be recommitted for the ſame offence, on penalty of 500*l.* 6. That every perſon committed for treaſon or felony ſhall, if he requires it, the firſt week of the next term, or the firſt day of the next ſeſſion of oyer and terminer, be indicted in that term or ſeſſion, or elſe admitted to bail; unleſs the king's witneſſes cannot be produced at that time; and if acquitted, or if not indicted and tried in the ſecond term or ſeſſion, he ſhall be diſcharged from his impriſonment for ſuch imputed offence; but that no perſon, after the aſſiſes ſhall be opened for the county in which he is detained, ſhall be removed by *habeas corpus*, till after the aſſiſes are ended; but ſhall be left to the juſtice of the judges of aſſiſe. 7. That any ſuch priſoner may move for and obtain his *habeas corpus*, as well out of the chancery or exchequer, as out of the king's bench or common pleas; and the lord chancellor or judges denying the ſame, on ſight of the warrant or oath that the ſame is refuſed, forfeit ſeverally to the party grieved the ſum of 500*l*. 8. That this writ of *habeas corpus* ſhall run into the counties-palatine, cinque-ports, and other privileged places, and the iſlands of Jerſey and Guernſey. 9. That no inhabitant of England (except perſons contracting, or convicts praying, to be tranſported, or having committed ſome capital offence in the place to which they are ſent) ſhall be ſent priſoner to Scotland, Ireland, Jerſey, Guernſey, or any places beyond the ſeas, within or without the king's dominions; on pain that the party committing, his adviſers, aiders, and aſſiſtants, ſhall forfeit to the party grieved a ſum not leſs than 500*l*. to be recovered with treble coſts; ſhall be diſabled to bear any office of truſt or profit; ſhall incur the penalties of *præmunire*, and ſhall be incapable of the king's pardon. And, leſt this act ſhould be evaded, by demanding unreaſonable bail, or ſureties, for the priſoner's appearance, it is declared by 1 W. & M. ſtat. 2 cap. 2. that exceſſive bail ought not to be required.

In conſequence of this act, it is now expected by the court, that, upon writs of *habeas corpus* at the common law, the writ ſhould be immediately obeyed, without waiting for any *alias* or *pluries;* otherwiſe an attachment will iſſue. Blackſt. Com. vol. i. p. 135, &c. vol. iii. p. 136, &c.

The preſervation of perſonal liberty by ſuch means, and in conformity to the explicit language of Magna Charta, " that no freeman ſhall be taken or impriſoned but by the lawful judgment of his equals, or by the law of the land," is of great importance to the public: for if once it were left in the power of any, the higheſt magiſtrate, to impriſon arbitrarily whenever he or his officers thought proper, there would ſoon be an end of all other rights and immunities. Some have thought, that unjuſt attacks, even upon life or property, at the arbitrary will of the magiſtrate, are leſs dangerous to the commonwealth than ſuch as are made upon the perſonal liberty of the ſubject. To bereave a man of life, or by violence to confiſcate his eſtate without accuſation or trial, would be ſo groſs and notorious an act of deſpotiſm, as muſt at once convey the alarm of tyranny throughout the whole kingdom: but confinement of the perſon, by ſecretly hurrying him to goal, where his ſufferings are unknown or forgotten, is a leſs public, a leſs ſtriking, and therefore a more dangerous engine of arbitrary government: and yet ſometimes, when the ſtate is in real danger, even this may be a neceſſary meaſure. But the happineſs of our conſtitution is, that it is not left to the executive power to determine when the danger of the ſtate is ſo great, as to render this meaſure expedient: for it is the parliament only, or legiſlative power, that, whenever it ſees proper, can authorize the crown, by ſuſpending the *habeas corpus* act for a ſhort and limited time, to impriſon ſuſpected perſons without giving any reaſon for ſo doing: as the ſenate of Rome was wont to have recourſe to a dictator, a magiſtrate of abſolute authority, when they judged the republic in any imminent danger. The decree of the ſenate, which uſually preceded the nomination of this magiſtrate, " dent operam conſules ne quid reſpublica detrimenti capiat," was called the " ſenatus-conſultum ultimæ neceſſitatis." In like manner this experiment ought only to be tried in caſes of extreme emergency; and in theſe the nation parts with its liberty for a while, in order to preſerve it for ever.

HABEEBA, in *Geography*, two iſlands in the Mediterranean, near the coaſt of Algiers; one of which, about three miles in circumference, lies ſeven miles N.E. from cape Figalo, with a harbour and freſh water. N. lat. 35° 46′. E. long. 0° 10′. The other, being ſmaller, is ſituated about 12 miles more to the E. four miles S.W. of cape Falcon.

HABELSCHWERDT, a town of Sileſia, in the county of Glatz, ſeated on the Nieſſe; dependent on the town of Glatz; but made a free town in 1319. The church belongs to the Roman Catholics; but the Lutherans are allowed to hold their religious aſſemblies in the town-houſe; eight miles S. of Glatz. N. lat. 50° 8′. E. long. 16° 24′.

HABENA, in *Surgery*, is the name of a bandage for keeping the ſides of wounds in contact.

HABENARIA, in *Botany*, from *habena*, a thong; on account of the long narrow ſtrips or ſegments of the lip, at leaſt in the original genus as founded by profeſſor Willdenow, though Mr. Brown has greatly augmented this genus on other principles. Willd. Sp. Pl. v. 4. 44. Brown. Prod. v. 1. 312. (Orchis; Linn. Gen. 461. Swartz. Orchid. 6.)—Claſs and order, *Gynandria Monandria*. Nat. Ord. *Orchideæ*.

Gen. Ch. *Cal.* three-leaved; leaflets elliptical, concave, obtuſe; the uppermoſt vaulted. *Cor.* Petals two, very narrow, longer than the calyx, ſpreading, ſometimes divided. Nectary a lip proceeding from the lower part of the ſtyle, in three deep, long, narrow ſegments, with a ſpur behind. *Stam.* Anther terminal, of two parallel vertical cells, with an elongated ſpur at the baſe of each; maſſes of pollen oblong, their ſtalks each inſerted into a naked gland. *Piſt.* Germen inferior, club-ſhaped, angular, erect, ſlightly twiſted; ſtyle very ſhort; ſtigma concave, in front, under the anther. *Peric.* Capſule inferior, oblong, taper, of one cell and three valves. *Seeds* numerous, minute, tunicate.

Eſſ. Ch. Calyx-leaves ſlightly ſpreading; the upper one vaulted. Petals long and linear. Nectary with a ſpur. Anther terminal, of two parallel vertical cells, with two horns at its baſe.

The only ſpecies in Willdenow are,

1. H. *macroceratitis*. (Orchis habenaria; Linn. Sp. Pl. 1331. Swartz. Obſ. 319. t. 9.)—" Spur awl-ſhaped, thrice as long as the germen. Leaves ovate."—Native of graſſy, flat places among the mountains of Jamaica. *Swartz*. *Bulb* ſolitary, downy. *Stem* a foot or two high, ſimple, leafy, ſmooth. *Leaves* ſeveral, elliptic-lanceolate, acute. *Spike* of ſix or eight large white flowers, whoſe long narrow ſharp ſegments of the lip and petals, and ſtill longer ſpur, have a very peculiar appearance.

2. H. *brachyceratitis*. (Orchis monorrhiza; Swartz. Prod. 118.)—" Spur compreſſed, the length of the germen. Leaves lanceolate."—Native of Jamaica and Hiſpaniola. *Stem* about 20 inches high, according to Browne's Jamaica, whoſe firſt ſpecies of *Satyrium* this is ſaid to be. We have ſeen no ſpecimen of it.—Swartz firſt hinted that this plant and the former might probably together conſtitute a diſtinct genus.

HABENDUM, in *Law*, a word of courſe in a conveyance. In every conveyance are two principal parts, the *premiſes*, and the *habendum:* the office of the firſt is to expreſs the name of the grantor, the grantee, and the thing granted. See Deed.

The *habendum* is to limit the eſtate, ſo that the general implication, which, by conſtruction of law, paſſed in the premiſes, is by the *habendum* controuled and qualified.

Thus, if a grant be to " A and the heirs of his body" in the premiſes, *habendum* " to him and his heirs for ever," or *vice verſâ;* here A has an eſtate-tail, and a fee-ſimple expectant thereon. (Co. Litt. 21. 2 Roll. Rep. 19. 23. Cro.

Jac. 476.) But if it had been in the premiſes "to him and his heirs," *habendum* "to him for life," the *habendum* would be utterly void (2 Rep. 23. 8 Rep. 56.); for an eſtate of inheritance is veſted in him before the *habendum* comes, and ſhall not afterwards be taken away, or diveſted by it.

HABENGTON, Henry, in *Biography*, was one of the firſt Engliſh muſicians who received academical honours in our univerſities. Wood, in his Faſti, has been able to produce no names of muſicians that have been enrolled among the graduates of the univerſity of Oxford before the 16th century, though we are told of ſeveral at Cambridge of an earlier period. But academical honours in the faculty of muſic may be traced up to the year 1463, when Henry Habengton was admitted to the degree of bachelor of muſic at Cambridge, and Thomas Saintwix, doctor in muſic, was made maſter of King's College in the ſame univerſity.

HABENTIA, in *Law*, ſignifies riches. In ſome ancient charters, *habentes homines* is taken for rich men; and we read, *nec rex ſuum paſtum requirat, vel* habentes homines, *quos nos dicimus* feaſting men.

HABERDASHER, in *Commerce*, a ſeller of hats and other ſmall wares.

The maſter and wardens of the company of haberdaſhers in London, calling to their aſſiſtance one of the company of cappers, and another of the hat-makers and mayors, &c. of towns, may ſearch the wares of all hatters who work hats with foreign wool, and who have not been apprentices to the trade, or who dye them with any thing but copperas and galls, or woad and madder; in which caſes they are liable to penalties by ſtat. 8 Eliz. cap. 7. and 5 Geo. II. cap. 22.

For the etymology of this denomination, ſee Berdash.

Haberdashers' *Hoſpital.* See Hospital.

HABERE *facias poſſeſſionem*, in *Law*, is a writ that lies where one has recovered a term for years in an action of ejectment, in order to put him into poſſeſſion again. See Execution.

Habere *facias ſeiſinam*, a judicial writ, which lies where a man has recovered lands in the king's court; directed to the ſheriff, commanding him to give him the ſeiſin thereof. See Execution.

This writ ſometimes alſo iſſues out of the records of a fine, directed to the ſheriff of the county where the lands lie; commanding him to give to the cognizee, or to his heirs, ſeiſin of the land whereof the fine is levied.

There is alſo a writ called *habere facias ſeiſinam, ubi rex habuit annum, diem, & vaſtum;* which lies for the delivery of lands to the lord of the fee, after the king had taken his due of a perſon's lands who was convict of felony.

Habere *facias viſum*, is a writ that lies in divers caſes, as in dower, formedon, &c. where a view is to be taken of the land or tenement in queſtion.

HABERGION, or Haubergeon, *Habergetum*, a coat of mail; an ancient piece of defenſive armour, in form of a coat, deſcending from the neck to the middle; and formed of little iron rings, or maſhes, linked into each other.

The word is alſo written *haberge, hauberge, haubere, haubert, hauther, haulbert*, and *hauberk*. Spelman takes it to have been formed from the ancient French *hault, high*, and *berg, armour, covering;* as ſerving to defend the upper part of the body. Du Cange and Skinner chooſe to derive it from the Belgic *hals*, or Teutonic *haltz, neck*, and *bergen, to cover;* as if it were a peculiar defence for the neck. Others would have it formed of *al, alla*, q. d. *all*, and *bergen, to cover;* as importing it a cover for the whole body.

HABESAN, in *Geography*, a town of Perſia, in the province of Mecran; 40 miles N.W. of Kelueh.

HABESH. See Abyssinia.

HABHAZZIS, in *Botany*, a name given by Leo Africanus, and ſome other of the writers of geography, to a plant growing in many parts of Africa, which they ſay produces its fruit under the earth in form of ſmall round globules, which are much eſteemed as food, and have the taſte of an almond. The fruit, as it is called, is no other than the disjunct tubera of the root, which are connected by fibres or ſtrings, and are in the propagation of the plant very uſeful to its ſpreading over a large ſpot of ground in a little time; all the fibres which ſhoot out horizontally from the root being terminated by theſe tubera, and each of theſe ſending out on the oppoſite ſide ſeveral other fibres, which at due diſtances produce other tubera. The Africans dig up the ground at random near to the place where they ſee any of theſe plants, and never fail of picking up a great number of them. The plant which produces them is the *tarſi*, and they are eaten in many other places beſides Africa. The Spaniards are very fond of them, and call them *avellanas*, from their likeneſs to hazel-nuts in ſhape.

HABICHSPEI, in *Geography*. See Brenner.

HABICHTSWALD, a hilly territory of Germany, in the Heſſian territories.

HABILIMENTS *of War*, in our *Ancient Statutes*, ſignify armour, harneſs, utenſils, or other proviſions for war; without which there is ſuppoſed no ability to maintain war.

HABIRHAOUTCHIN, in *Geography*, a town of Chineſe Tartary, in the country of the Monguls. N. lat. 44° 10'. E. long. 114° 24'.

HABIT, in *Philoſophy*, an aptitude, or diſpoſition, either of mind or body, acquired by the frequent repetition of the ſame act; or, a facility of doing a thing, acquired by having done it frequently. This definition is ſufficient for habits of art; but the habits, which may, with propriety, be called principles of action, muſt give more than a facility; they muſt give an inclination or impulſe to do the action: and it is certain that, in many inſtances, habits have this force. Habit differs from inſtinct, not in its nature, but in its origin; the latter being natural, the former acquired. Both operate without will or intention, without thought, and therefore, ſays Dr. Reid (Eſſays, p. 117.), may be called "mechanical principles." Theſe principles, united, have no ſmall ſhare in forming the characters and manners of moſt men. See Instinct.

Others define habit an affection of mind or body, perſiſting by long uſe and continuance. In which ſenſe εξις, a conſtant habit, is diſtinguiſhed from διαθεσις, a preſent diſpoſition, liable ſoon to alter.

Habits may be diſtinguiſhed into thoſe of the mind, and of the body. Thus, virtue is called a habit of the mind; ſtrength, a habit of the body.

All natural habits, whether of body or mind, are modes of the body or mind, in which either perſeveres, till effaced by ſome contrary mode. Ariſtotle enumerates five habits of the mind; *viz.* underſtanding, knowledge, wiſdom, prudence, and art: whereas later writers only admit of three intellectual habits; *viz.* ſcience, prudence, and art: agreeable to the three kinds of objects, about which the mind has occaſion to be facilitated; which are either theoretical, practical, or effective.

Habits, conſidered, in a more reſtricted ſenſe, as principles of action, are, according to Dr. Reid, a part of our conſtitution, ſo that what we have been accuſtomed to do, we acquire not only a facility, but a proneneſs to do on like occaſions, ſo that it requires a particular will and effort to forbear it; but to do it, requires very often no will at all.

Habits, as well as inſtinct, are, as he conceives, parts of our original conſtitution; having an evident uſe and deſign, though we can aſſign no cauſe of them, but the will of him who made us; for no man can ſhew a reaſon why our doing a thing frequently, ſhould produce either facility or inclination to do it.

Virtues and vices are conſidered by philoſophers under the notion of good and bad habits.

The archbiſhop of Cambray defines habits, in general, to be certain impreſſions left in the mind, by means whereof we find a greater eaſe, readineſs, and inclination to do anything formerly done, by having the idea ready at hand to direct us how it was done before. Thus, *e. gr.* we form a habit of ſobriety by having always before us the inconveniencies of exceſs; the reflections whereof, being often repeated, render the exerciſe of that virtue continually more and more eaſy.

F. Malebranche gives a more mechanical theory of the habits. His principle is, that they conſiſt in a facility which the ſpirits have acquired, of paſſing eaſily from one part of the body to another. He argues thus: if the mind act on and move the body, it is, in all probability, by means of a ſtock of animal ſpirits lodged in the brain, ready to be ſent at the motion of the will, by means of the nerves which open or terminate in the brain, into the muſcles of the body.

Now, an influx of ſpirits into a muſcle occaſions a ſwelling, and, of courſe, a ſhortening of the muſcle; and, conſequently, a motion of the part to which that muſcle is faſtened.

Farther, the ſpirits do not always find all the roads open and free, which they are to paſs through; whence that difficulty we perceive of moving the fingers with that quickneſs neceſſary to play on a muſical inſtrument; or of moving the muſcles neceſſary to pronounce the words of a foreign language. But, by degrees, the ſpirits, by their continual flux, ſmoothen the way; ſo that at length they meet with no reſiſtance at all. In this facility the ſpirits find of paſſing, when directed into the members of the body, habits conſiſt.

On this hypotheſis, it is eaſy to account for an infinity of phenomena relating to the habits. Why, for inſtance, children acquire new habits with more eaſe than grown perſons? Why it is difficult to get rid of inveterate habits? Whence that incredible quickneſs in the pronunciation of words, even without thinking of them; as is particularly obſervable in thoſe long accuſtomed to formulas, &c.

On this ground the faculty of memory appears to have very much the nature of a habit; inſomuch that in one ſenſe it may paſs for a habit.

Cuſtom, ſays Mr. Locke, ſettles habits of thinking in the underſtanding, as well as of determining in the will, and of motions in the body; all which ſeem to be but trains of motion in the animal ſpirits, which, once ſet a-going, continue in the ſame ſteps they have been uſed to, which, by often treading, are worn into a ſmooth path, and the motion in it becomes eaſy, and as it were natural. Eſſay on the Human Underſtanding, book ii. ch. 33. See Association *of Ideas.*

Habit, in *Medicine,* is what we otherwiſe call the temperament, or conſtitution of the body; whether obtained by birth, or occaſioned by the manner of living.

An ill, diſtempered habit, without any particular apparent diſeaſe, the phyſicians uſually call a *cachexia,* or *cacochymia.*

A thing is ſaid to *enter the habit,* when it becomes intimately diffuſed throughout the body, and is conveyed to the remoteſt ſtages of circulation.

Habit is alſo uſed for a dreſs, or garb; or the compoſition of garments wherewith a perſon is covered.

In this ſenſe we ſay, the habit of an eccleſiaſtic; of a religious, &c. the military habit, &c.

The principal part of the dreſs worn by the Jews and the Greeks was the ιματιον and the χιτων: the former was an upper garment, conſiſting of a looſe piece of cloth wrapped round the body: the latter was an under garment, or tunic, which was faſtened cloſely round the body, and which fell down to the middle of the thigh. It has been, not unappropriately, obſerved that a perſon diveſted of the upper garment was, in the eaſtern language, ſaid to be *naked,* and thus David danced naked before the ark.

The ſeveral ſort of garments in uſe with both ſexes, among the Romans, were the toga, tunica, peluna, lacerna, chlamys, paludamentum, læna, ſtola, pallium or pella; which ſee reſpectively.

In the Eaſt it was the cuſtom, in times of deep mourning, to put off their upper garment; and this circumſtance accounts for the ſeptuagint tranſlation of Exodus, xxxiii. 4—6, in which Moſes gives an account of the mourning of the Iſraelites. It was likewiſe reckoned in the Eaſt a mark of reſpect often to change their garments; and to this frequent change of veſtments the Pſalmiſt alludes when he deſcribes the change which the heavens ſhall undergo as more ſpeedy, in compariſon with the eternity and immutability of God, than the laying aſide of a veſtment which kings and princes change often in a day. The changing of clothes was a token of Eaſtern magnificence; how wonderfully ſublime then, in this view, is the ſcriptural repreſentation of the majeſty of God "*thou* ſhalt change theſe heavens as a prince changes his veſture."

The different habits and clothes which the generality of the world wear, are, through inadvertency and inattention, very frequently the cauſe of very unhappy maladies. Mr. Winſlow, in the Memoirs of the Royal Academy of Sciences at Paris, has obſerved, that the greateſt attention and care are neceſſary on ſeveral occaſions in regard to this, as it is ſuppoſed, trifling article; and has given many inſtances of the ill effects of it. The ancients have obſerved the inconveniencies of many parts of dreſs, and daily obſervation confirms to us the many miſchiefs the ladies ſuffer from the ſtiff whale-bone ſtays they wear, and the diſorders of the viſcera of the lower belly, to which thoſe are ſubject who lace themſelves too tightly; and this is not only of dangerous conſequence to themſelves, but frequently is the death of children in breeding women.

The tight binding of the neck by the men's neckcloths, ſtocks, or the too tight collars of their ſhirts, &c. has been very frequently the only occaſion of ſeveral very terrible diſorders of the head, the eyes, and the breaſt; deafneſs, vertigoes, fainting, and bleedings at the noſe, are the frequent conſequences of this practice; and the phyſicians, conſulted for relief in theſe caſes, have found all means ineffectual, merely from their not attending to the cauſe of the malady; when a cure might have been, and often has been, made without the help of medicines, only by leaving off thoſe unnatural bandages which had been the occaſion of them, from the not ſuffering the free return of the blood by the jugular veins, which had paſſed up into the head, without moleſtation, by the carotid arteries.

Mr. Winſlow has obſerved, that the different motions of the bones of the foot, which are very free in their natural ſtate, as it is very plainly ſeen in young children, are uſually wholly loſt to us as we grow up, by means of the improper preſſure of our ſhoes. See the particular illuſtration of theſe circumſtances in Mem. Acad. Scienc. Paris, 1740.

Habit is particularly uſed for the uniform garments of the religious, conformable to the rule and order whereof they make profeſſion; as the habit of St. Benedict, of St. Auguſtine, &c.

In this ſenſe we ſay abſolutely, ſuch a perſon has taken the habit; meaning, he has entered upon a noviciate in a certain order. So he is ſaid to quit the habit, when he renounces the order. See Vow.

The habits of the ſeveral religions are not ſuppoſed to have been calculated for ſingularity or novelty; the founders of the orders, who were at firſt chiefly inhabitants of deſerts and ſolitudes, gave their monks the habit uſual among the country people. Accordingly, the primitive habits of St. Anthony, St. Hilarion, St. Benedict, &c. are deſcribed by the ancient writers as conſiſting chiefly of ſheepſkins, the common dreſs of the peaſants, ſhepherds, and mountaineers of that time; and the ſame they gave to their diſciples.

The orders eſtabliſhed in and about cities and inhabited places, took the habit worn by other eccleſiaſtics at the time of their inſtitution. Thus, St. Dominic gave his diſciples the habit of regular canons, which he himſelf had always worn to that time. And the like may be ſaid of the Jeſuits, Barnabites, Theatins, Oratorians, &c. who took the common habit of the eccleſiaſtics at the time of their foundation. And what makes them differ ſo much from each other, as well as from the eccleſiaſtical habit of the preſent times, is, that they have always kept invariably to the ſame form: whereas the eccleſiaſtics and laics have been changing their mode on every occaſion.

The eccleſiaſtical habit only commenced about the time of Gregory the Great, *i. e.* it only began at that time to be diſtinguiſhed from the lay habit; *viz.* in the ſixth century. The eſtabliſhment of the barbarous nations was the occaſion thereof; for the laymen took the habit of the nations they had ſubmitted to, but the prieſts kept to the Roman dreſs.

The abbot Boileau has an expreſs treatiſe on the eccleſiaſtical habit; wherein he maintains, contrary to the common opinion and cuſtom, that the eccleſiaſtical habit ſhould be a ſhort one, and that a ſhort habit is more decent than a long one. For the peculiar habit of the prieſts among the Jews, Greeks, and Romans, ſee Priests.

HABIT-ANI, in *Ornithology*. See Sylvia *Campeſtris*.

HABITATION, a dwelling-place, or *houſe*; which ſee.

Habitation is ſometimes alſo uſed for *cohabitation*.

HABITE *and* Repute, in *Scots Law*, the common opinion of the people, among whom a perſon lives, with reſpect to any circumſtance relating to him.

HABITUAL, ſomething that is become a habit or habitude. Thus we ſay an habitual, or inveterate diſeaſe; habitual ſin, &c.

Habitual *Grace*. See Grace.

The Romiſh divines hold *habitual* grace only neceſſary in order to be ſaved; and *actual* grace to the doing any thing meritorious.

HABITUDE, Habitudo, in the *Schools*, ſignifies the reſpect or relation which one thing bears to another.

In this ſenſe, habitude is one of Ariſtotle's categories. See Relation.

Habitude is alſo uſed, in *Philoſophy*, for what we popularly call habit; *viz.* a certain diſpoſition, or aptitude, for the performing or ſuffering of certain things; contracted by reiterated acts of the ſame kind. See Habit.

HABOST, in *Geography*, a town of Perſia, in the province of Segeſtan; 160 miles S.E. of Zareng.

HABRAH, a conſiderable river of Africa, in the weſtern province of Algiers, which falls into the Sigg; ſo called from a numerous tribe of Arabs who live upon its banks. The mouth of theſe confluent ſtreams is called El Muckdah, or the Ford, which, except in the rainy ſeaſon, leaves the ſand dry. This was probably the *Cartennus* of Ptolemy.

HABSBURG, or Hapsburg, a bailiwick of Switzerland, in the canton of Lucerne.—Alſo, a caſtle, ſituated in the canton of Berne, on the right bank of the Aar, about three miles above the town of Bruck; 5 miles N. of Lenzburg.

HABSHEIM, a town of France, in the department of the Upper Rhine, and chief place of a canton, in the diſtrict of Altkirch; 9 miles N.N.E. of Altkirch. The place contains 1416, and the canton 12,681 inhabitants, on a territory of 222½ kiliometres, in 17 communes.

HABU, a village of Egypt, in which are the ruins of a magnificent temple, and near which is the celebrated ſtatue of Memnon, and another coloſſal ſtatue; ſeated on the left bank of the Nile, and 25 miles N. of Syene.

HABUR, a ſmall iſland in the Red ſea, 6 miles from the coaſt of Arabia. N. lat. 16 45′.—Alſo, a town of Arabia, in the province of Yemen; 12 miles S.W. of Chamir.

HACARI, a town of Peru, in the dioceſe of Lima; 45 miles S.E. of Naſca.

HACBOTE, in our *Old Writers* a recompence or amends for violence offered to perſons in holy orders.

HACHA, Rio de la, in *Geography*, a government or diſtrict, comprehended within the royal audience of Santa Fé, the capital of New Granada, bounding the government of Maracaibo on the weſt. This diſtrict is ſurrounded on two ſides, *viz.* N. and N.W. by the ocean, and on the third, E. by the gulf of Venezuela. The town of the ſame name is ſituated at the mouth of the river bearing alſo the ſame appellation, which is navigable for light veſſels, and the harbour of which is expoſed to the N. wind. The environs are very fertile; they have mines of gold and precious ſtones; and on the coaſt is a pearl-fiſhery. The interior of the country is infeſted with tigers, and the river with alligators. The town lies 210 miles E.N.E. from Carthagena. N. lat. 11° 28′. W. long. 72° 46′.

HA-CHAM-POU, a town of Aſia, in the kingdom of Corea. N. lat. 42° 40′. E. long. 132° 35.′

HACHENBURG, a town of Germany, in the county of Sayn; 17 miles N.E. of Coblentz. N. lat. 50° 35′. E. long. 7° 54′.

HACHES, and Haching. See Hatching.

HACHOWKA, in *Geography*, a town of Poland, in Volhynia; 34 miles N. of Zytomiers.

HACK, in *Rural Economy*, a ſort of pick-axe or mattock, which has only one end, and that a broad one. It is a kind of half mattock, which is found to be a very uſeful tool for many different purpoſes.

Hack, a term pretty generally applied to a road-horſe, whether let out to hire or the contrary. It is ſometimes applied as a mark of inferiority to ſuch ſorts of horſes.

HACKANBO, in *Geography*, a town of Sweden, in the province of Upland; 28 miles N. of Upſal.

HACKAS, a town of Sweden, in the province of Jamtland; 18 miles S. of Oſterſund.

HACKERT, John, in *Biography*, a landſcape-painter, who was born at Amſterdam about the year 1635. His peculiar taſte induced him to paint romantic ſcenery, and therefore, that he might draw with juſt character, he travelled through the mountainous countries of Germany and Switzerland; making ſketches of thoſe things which moſt excited his admiration, and would beſt ſerve him in his future application of the talents nature had endowed him with for the profeſſion of art. He obtained very conſiderable rank as a painter: his manner of handling was delicate and pleaſing. Not being very ſkilful in deſigning figures, he judiciouſly ſought aid in that particular from Adrian Vandevelde, and by this means highly increaſed the value of his pictures.

HACKET, John, an Engliſh prelate, was born at London in the year 1592, and educated at Weſtminſter ſchool, till he was elected to Trinity college, Cambridge, in the year 1608. Having at this laſt place taken his degrees, he undertook the office of tutor with great reputation, and pupils from ſome of the beſt families in England were committed to his care. In one of the long vacations he compoſed a Latin comedy, entitled "Loyala," which was twice acted before king James I. and printed. In 1618 he was admitted to holy orders, and patronized by Dr. Williams, biſhop of Lincoln, by whom he was elected his chaplain, and introduced to other conſiderable preferment. In 1625 Mr. Hacket was nominated by the king to attend his ambaſſador to Germany, but fearing the reſentment of the Jeſuits, whom he had attacked very ſeverely in his "Loyala," he declined the office. In 1628 he took his degree of D.D. and in 1631 was made arch-deacon of Bedford. Soon after the breaking out of the civil wars he was appointed one of a ſub-committee, ſelected to prepare matters for diſcuſſion of the "committee of accommodation," appointed by the houſe of lords to examine into the innovations in doctrine and diſcipline introduced into the church ſince the Reformation, and to conſider of ſuch amendment in the liturgy as might obviate the principal objections of the Puritan party, and prevent the ruin of the eccleſiaſtical conſtitution. This committee, however, was broken up, partly in conſequence of the jealouſy and oppoſition of the biſhops, and partly owing to the ferment occaſioned by the diſcovery of the king's deſign of bringing the army to London, to diſſolve parliament. After this Dr. Hacket was preſented to a prebend and reſidentiaryſhip in the cathedral church of St. Paul's, but the confuſion into which the country fell prevented him from enjoying much of the emoluments connected with theſe offices. He was zealouſly attached to the eccleſiaſtical form of church government, and at his houſe there were private meetings held by the biſhops and clergy, whence letters were circulated among the divines in different parts of England, to exhort them to ſtedfaſtneſs in the cauſe of epiſcopacy and monarchy. His zeal led him into difficulties, and he was impriſoned by the parliamentary power. He was, however, in a very ſhort time, liberated, and upon the reſtoration of Charles II. recovered all his preferments, and was offered the biſhopric of Glouceſter, which he refuſed, though he afterwards accepted that of Litchfield and Coventry, and was conſecrated in the year 1661. When he took poſſeſſion of the ſee, he found the cathedral church at Litchfield in ruins, and his epiſcopal palaces in a ſtate of dilapidation, owing to the rage of the republicans, which had been levelled againſt them; at an expence of 20,000*l.* he reſtored thoſe buildings, and rendered them more complete and beautiful than they were before their deſtruction. He died at Litchfield, in 1670, having attained to his ſeventy-ninth year. He was a prelate of great and extenſive learning, diſtinguiſhed for piety, integrity, benevolence, and charity, and for ſtrictly virtuous and exemplary manners. During his life he publiſhed a ſingle ſermon, and his "Loyala," but after his death "A Century of his Sermons, upon ſeveral remarkable ſubjects," was printed by Dr. Plume, and in 1693 appeared his learned and valuable "Life of his Patron Archbiſhop Williams." Biog. Brit.

HACKETSTOWN, in *Geography*, a poſt-town of the county of Carlow, and province of Leinſter, Ireland, 41½ miles S.W. of Dublin.—Alſo, a ſmall poſt-town of America, in Suſſex county, New Jerſey, on the N.W. ſide of Muſconecunk river; 120 miles N.N.E. of Philadelphia.

HACKINSAC, the chief and poſt-town of Bergen county, New Jerſey, ſituated near the W. bank of a river of the ſame name, which unites with Paſſau river at the head of Newark bay, and is navigable about 15 miles. The town, which is 20 miles N.W. from New York, is chiefly inhabited by Dutch, and the houſes, moſtly of ſtone, are conſtructed in the Dutch taſte. It has a Dutch and epiſcopal church, a court-houſe, and a flouriſhing academy. The people, who are generally farmers, carry their productions to New York. N. lat. 40° 53′. W. long. 74° 4′.

HACKLE, in *Rural Economy*, a term ſometimes applied to a ſmall ſort of hack. It is alſo applied to the practice of raiſing turnips, by means of a ſmall two-pronged hack.

Hackle, the name of a tool employed in the buſineſs of dreſſing flax. See Flax.

Hackles, in *Agriculture*, a term provincially uſed in many places to ſignify the handfuls, cones, or ſinglets of bean-crops that are tied and ſet up after being pulled, in order to prevent their being injured by the wet.

HACKLUYT's Head-Land, in *Geography*, the weſtern point of the iſland of Amſterdam, in the North ſea, near the N.W. coaſt of Spitzbergen. N. lat. 79° 47′. E. long. 9 11′.

HACKNESS, a cape on the S.E. coaſt of the iſland of Shapinſha. N. lat. 58° 53′. W. long. 2° 42′

HACKNEY, a large and populous pariſh in the hundred of Oſſulſton and county of Middleſex, conſiſted, in the year 1801, of 2134 houſes, which contained 12,730 inhabitants. The ſouthern boundary of this pariſh joins to that of Shoreditch, London, and is connected with the metropolis by ſeveral new rows and ſtreets that have been erected within a few years. Hackney pariſh comprehends the following hamlets: Upper and Lower Clapton, Dalſton, Shacklewell, Kingſland, and Homerton. All theſe places are chiefly occupied by, and belong to, various merchants and tradeſmen of London, who reſide here with their families, and tranſact buſineſs at their reſpective counting-houſes, warehouſes, and ſhops in the metropolis. This extenſive pariſh contains one pariſh church and ſeveral chapels; ſome of which belong to it, and others are appropriated to different claſſes of diſſenters. A new church, on a large ſcale, was begun here in 1791; the old church being inſufficient to hold the congregation. It ſtands on high ground at ſome diſtance from the old fabric; of which the tower and part of the chancel remain. The preſent church is built of brick from deſigns by Mr. Blackburn and Mr. Spiller, and, for commodious and appropriate arrangement, is much to be admired. A chapel-of-eaſe, in Wells-ſtreet, has been recently erected from deſigns by Mr. James Savage; the ground for which was given by the Rev. Mr. Norris. Another chapel for the Unitarians, called the "Gravel-Pit Meeting-Houſe," is alſo a modern ſtructure, and is built from deſigns by Mr. Edmund Aikin, to whoſe ſcience and taſte it is an honourable memorial. In the old church and its cemetery, ſeveral diſtinguiſhed perſonages have been interred; among whom the following names occur: Chriſtopher Urſwick, an eminent ſtateſman under Henry VII. and rector of this pariſh; Henry, earl of Northumberland, who died at his manor-houſe in the time of Henry VIII.

Hackney, it is ſaid, was the firſt place in the vicinity of London where ſtage-coaches applied for hire; and hence the origin of the name hackney-coaches. The lords Brooke formerly had a country manſion here, which is now a receptacle for lunatics, and ſtill called Brooke-houſe. Another ancient building in Wells-ſtreet, called St. John's-palace, is ſuppoſed to have been the reſidence of the knights of St. John of Jeruſalem. On Hackney-marſh have been found the remains of a ſtone-cauſeway, which is conjectured to have been the courſe of a Roman road from London into Eſſex. See Lyſons's "Environs of London," vol. ii., and Brayley's "London and Middleſex," vol. ii. 8vo. 1811.

HACKNEY, in *Rural Economy*, the name of a ſaddle-horſe, or one that is chiefly uſed for the purpoſe of riding. See HORSE

HACKNEY. See HAQUENY.

HACKNEY *Coach*. See COACH.

HACKSPAN, THEODORE, in *Biography*, was born at Weimar, in Thuringia, in the year 1607. He ſpent ſeven years at Jena in the ſtudy of theology and the Oriental languages. He acquired at this and other places ſuch a reputation in this kind of learning, that he was the firſt perſon fixed on to teach the Eaſtern tongues at Altdorf. Here, alſo, he undertook the profeſſorſhip of theology in connection with his other office. By intenſe application to his ſtudies, and to the performance of thoſe duties attached to his ſituation, he brought on a decline, to which he fell a ſacrifice in the year 1649, when he was in the 52d year of his age. He was author of many learned works, which did honour not only to the talents of the writer, but to the age and country in which he flouriſhed. He was regarded as being more perfectly acquainted with the Hebrew, both ſcriptural and rabbinical, the Syriac, the Chaldee, and the Arabic languages, than any of his contemporaries. Moreri.

HACMAN, in *Geography*, a town of the iſland of Ceylon; 24 miles N. of Matura.

HACUB, in *Botany*, Rauwolf. It. t. 74. See GUNDELIA.

HACZEG, in *Geography*, a town of Tranſilvania; 30 miles S. of Hnnyad.

HAD, EL, a town of Africa, in the weſtern province of Algiers, at the conflux of the Mina and Shelliff; 50 miles E. N. E. of Oran.

HADAJA, a town of Africa, in Fez, long deſolate, but lately peopled by a colony of Arabs; 120 miles N. E. of Fez. N. lat. 34° 10′. W. long. 3°.

HADAMAR, a town of Germany, in the principality of Naſſau, and capital of a ſmall principality, called "Naſſau-Hadamar," having a ſuperb chateau, and a convent of Franciſcans; 15 miles S. W. of Dillenburg. N. lat. 50° 24′. E. long. 8° 1′.

HADARISA, a town of Arabia; 40 miles S. of Cathem.

HADAWI, a town of Abyſſinia; 30 miles S. of Arkeeko.

HADDAM, a poſt-town of America, in Middleſex county, Connecticut, on the W. ſide of Connecticut river, ten miles S. E. of Middletown, containing 2307 inhabitants. Oppoſite to this, on the E. ſide of the river, is Eaſt Haddam, a poſt-town, ſettled in 1704, and containing 2805 inhabitants.

HAD-DESSA, a mountain of Africa, in the country of Tunis, at the eaſtern extremity of the lake of Marks, the "lacus Tritonis" of the ancients, compoſed entirely of ſalt, hard and ſolid like a ſtone, and of a blue or violet colour, which being diſſolved by the dew, becomes white as ſnow.

HADDINGTON. See HADINGTON.

HADDO, a town of Scotland, in the county of Aberdeen; nine miles N. N. E. of Inverary.

HADDOCK, in *Ichthyology*. See GADUS *Æglefinus*.

HADDON, WALTER, in *Biography*, was deſcended from a reſpectable family in Buckinghamſhire, and born in the year 1516. He was educated partly at Eton, and partly at King's college, Cambridge, of which he became a fellow. He was a very elegant ſcholar, wrote Latin with great purity and claſſical taſte, and made himſelf a proficient in poetry and oratory. He devoted himſelf to the purſuit of the civil law, in which he took a doctor's degree, and read public lectures. He was likewiſe appointed profeſſor of rhetoric, and orator of the univerſity, and in the reign of Edward VI. he was elected maſter of Trinity-hall, in the room of Gardiner. In 1550 he ſerved the office of vice-chancellor, and then was elected preſident of Magdalen college, Oxford. Upon the acceſſion of Mary he was glad to ſeek retirement, in which he quietly remained, till death put an end to her bloody reign. By queen Elizabeth he was appointed one of her maſters of requeſts, and by the archbiſhop of Canterbury he was made judge of the prerogative court. He was employed in various official ſituations, and would have attained to high preferment, but his death prevented the good intentions of his patrons. He died in 1571-2, leaving behind him many works which teſtify to his learning and talents. He had a principal concern in drawing up and putting into Latin the code of eccleſiaſtical law, entitled "Reformatio Legum Eccleſiaſticarum," edited in 1571 by John Foxe. He publiſhed, in 1563, a reply to Ozorio's letters, entitled "Admonitio ad Elizabetham, Reginam Angliæ." Some original letters of Dr. Haddon are preſerved among the Harleian MSS. Biog. Brit.

HADDONFIELD, in *Geography*, a ſmall poſt-town of America, in Glouceſter county, New Jerſey; nine miles S. E. by E. from Philadelphia.

HADE, in *Mining*, ſignifies the inclination, or deviation from the vertical of a mineral vein; in different mining diſtricts this is called the pick, want, tilt, fall, &c. and ſuch veins are ſaid to under-beat, batter-off, decline, &c. In a great majority of caſes of hading veins, the ſame is occaſioned by the dip or inclination of the rock or ſtratum in which the vein is found, and owing to the poſition of the veins being moſtly perpendicular to the planes of the ſtrata, but this is not always the caſe, ſince ſome veins hade in different directions even in the ſame rock, as firſt N. then S. and then N. again, &c. The following are the mines in Derbyſhire which hade in a remarkable degree or manner, *viz.* Bondog-hole, Bacchus, Barrow, Bright-ſide, Corderlow, Earl of Mar, Gang, Hading-vein, Little-paſture, Longſdon-edge venture, Odin, Mandale, Rantor, Thaws-wood, Thiſtley, Water-hole, Yield, Yokecliff, &c. as enumerated in Mr. Farey's Report on Derbyſhire, where much information on this and other phenomena of the veins of this diſtrict will be found; ſee alſo Mr. Werner's "New Theory of Veins," tranſlated by Dr. C. Anderſon, Williams's "Mineral Kingdom," 2d edit.; and W. Forſter's "Treatiſe on a Section of Strata," Newcaſtle, 1809.

HADELAND, in *Geography*, a town of Norway, in the dioceſe of Aggerhuus; 32 miles N. N. E. of Chriſtiania.

HADELN, a ſmall county of Germany, near the Elbe, bordering on the duchy of Bremen, about 8 miles long, and of the ſame breadth, ſecured by a large dyke from inundations. The ſoil is fertile, and the country abounds in grain, fruit, cattle, and fiſh. It formerly belonged to the elector of Hanover.

HADEQUIS, a town of Morocco; 20 miles E. of Mogador.

HADERSLEBEN, a ſea-port of Denmark, in the duchy of Sleſwick, on the N. ſide of a gulf, about 8 miles from its mouth, which opens into the Little Belt. Its harbour can accommodate only ſmall veſſels; and it principally depends for its ſupport on being the paſſage from Sleſwick to the iſland of Fyen; 24 miles N. of Ripen. N. lat. 55° 15'. E. long. 9° 30'.

HADES. See Ades.

HADESOGN, a town of Norway, in the dioceſe of Bergen; 36 miles S. E. of Bergen.

HADGI-Bestash, a town of Aſiatic Turkey, in Caramania; 28 miles S. E. of Kir-ſhehr.

Hadgi-*Hamzeh*, a town of Aſiatic Turkey, in the government of Sivas; 31 miles E. of Kiangari.

Hadgi-*Keui*, a town of Aſiatic Turkey, in the government of Sivas; 30 miles N. W. of Amaſieh.

Hadgi-*Morat*, a town of Aſiatic Turkey, in the government of Sivas; 36 miles N. N. E. of Sivas.

HADJAR el Hamar, a town of Africa, in Algiers; 29 miles S. W. Conſtantina.

HADIE', a town of Arabia, in Yemen; 16 miles E. of Beit-el-Fakieh.

HADINGTON, a royal borough, and county town of Eaſt-Lothian, or Hadingtonſhire, Scotland, is ſeated on the banks of the river Tyne, at the diſtance of about 17 miles eaſt of Edinburgh. It conſiſts of four ſtreets, which croſs each other nearly at right angles; and contained, in the year 1791, a population of about 3915 inhabitants. The return to parliament in 1801 was, 711 houſes, and 4049 inhabitants. Connected with the town by a bridge of three arches acroſs the Tyne, is a ſuburb called Nungate, which, with another called Giffordgate, contained 502 inhabitants. Nungate derives its name from a nunnery, which was founded here in 1178 by Ada, the mother of king Malcolm IV. who alſo granted a charter to the town, wherein ſhe ſtyles it "meum burgum de Haddington." The town is governed by a provoſt, three bailiffs, a dean of guild, treaſurer, and 12 counſellors; and, in conjunction with the other towns of the county, returns one member to parliament. Formerly this place was fortified, and ſome fragments of its embattled walls remain. Hadington has ſuſtained material injury both by fire and water: in the year 1775 the water of the Tyne roſe full 17 feet above its uſual level, and inundated nearly one-half of the town. Of the public buildings, the church is the principal. It is a large ancient edifice, apparently built about the thirteenth century; and was originally attached to a monaſtery of Franciſcans. Only part of it is uſed for parochial purpoſes: the other part is in ruins. It contains the family vault of the Maitlands, who poſſeſſed, for many ages, the eſtates of Leithington, now belonging to lord Blantyre. Among the monuments in the church is one to the memory of John Maitland, baron of Thirlſtane, lord high chancellor of Scotland. His epitaph was written by king James VI. Here are ſome marble effigies of the dukes of Lauderdale. A town-houſe was built here in 1748 by the late Mr. Adams, architect. Hadington has two yearly fairs, and a weekly market, which is abundantly ſupplied with corn.

In the vicinity of the town are ſeveral handſome and reſpectable manſions; the moſt noted of which is Amisfield, the ſeat of the earl of Wemyſs; who poſſeſſes ſome fine pictures. Other ſeats are named Leithington, Stevenſtone, Adderſtone, Clerhington, and Letham. At Hadington was born John Knox, the diſtinguiſhed reformer of Scotland, who died in 1572. After his death was publiſhed his "Hiſtory of the Reformation of Religion within the Realm of Scotland."

Sinclair's Statiſtical Account of Scotland, vol. vi. p. 535, written by the Rev. George Barclay, who furniſhed, according to ſir John Sinclair, "a very complete, intelligent, and ſatisfactory hiſtory of Hadington pariſh," for the firſt volume of the Tranſactions of the Society of Antiquaries of Scotland. An account of the town will alſo be found in the ſecond volume of Chalmers's Caledonia, p. 412, &c.

HADINGTONSHIRE, or East-Lothian, a county of Scotland, is ſituated at the ſouth-eaſtern extremity of that part of the kingdom; and is bounded by the German ocean on the eaſt, the Frith-of-Forth on the north, the county of Edinburgh on the W. and S. W.; and Berwickſhire on the S. and S. E. The area thus circumſcribed meaſures, on an average, about 24 miles from W. to E. and nearly 16 in a tranſverſe line. According to Armſtrong's map, it is calculated "to contain 297 ſquare miles, or 190,363 Engliſh acres, of which about 64 parts are arable, 16 meadows, or low-lying land, and 20 parts, or one-fifth of the whole, conſiſts of hills and waſtes, a great part of which is uncultivated." This is the account of Mr. Somerville, who, in another part of his "Agricultural Survey of Eaſt-Lothian," ſays, that in point of ſoil, cultivation, and produce, this county "holds the firſt rank in Scotland; and in ſome of theſe reſpects, particularly the mode of huſbandry, it will bear a compariſon with the beſt improved diſtricts in England; notwithſtanding the great difference of latitude, being ſituated between 55° 46' 10", and 56° 3' 10" of north latitude, three degrees farther north than the county of Norfolk, whoſe rival it is in many reſpects." The area of this county ſeems to have been called Bernicia, from the abdication of the Romans till the epoch of 1020. The Saxon ſettlers afterwards denominated the whole country lying along the ſea and the forth, from the Tweed to the Avon, Lothian. This diſtrict was known diſtinct from Scotland during the reign of David I. Afterwards it was divided into three parts, and called, from their relative ſituation to each other, Eaſt-Lothian, Mid-Lothian, or Edinburghſhire, and Weſt-Lothian, or Linlithgowſhire.

In an agricultural point of view this county may be divided into four diſtricts, in particulariſing which, the general character of the whole will be pointed out. 1. Coaſt-land; 2. Midlands; 3. Uplands; and, 4. Mountainous, or Lammer-muir diſtrict. The firſt is a ſhelving or ſloping tract of land, affording a fine fertile ſoil; the ſecond is a ridge of ground north of the Tyne, ſloping partly to that river and partly to the coaſt-land. It comprehends a great proportion of the arable land of the county, including every variety of ſoil, a great part of which is extremely valuable. The third conſiſts of a tract of varied breadth, elevated above the mid-lands, and continuing along the baſe of the mountains, nearly the whole extent of the county. The fourth conſiſts of an extenſive range of mountains, which commences at the ſouth-weſt extremity of the county, and terminates at a high promontory called St. Abb's-head, on the eaſt ſhore. The greater part of this is moor, or moſs; but ſome parts in the glens, or low-lands, between the hills, are kept under a regular rotation of crops. Farming is the chief purſuit of the inhabitants, but on the ſea-coaſt many are employed in fiſhing, ſalt-making, and in commercial purſuits. At ſome places the linen and woollen manufactures have been eſtabliſhed, and at Preſton-pans is a large manufactory for oil of vitriol, and another for ſal-ammoniac. The weſtern part of the county abounds with coal; beſides which lime-ſtone, and red granite or iron-ſtone conſtitute the chief mineral ſubſtances beneath the ſurface. Several ſtreams and rivulets are found in the county; but it has only one river of any conſequence, which extends through the whole in a north-eaſterly direction, entering it near Ormiſton, and leaving it at Tyningham, where it forms a bay.

Hadingtonſhire abounds with gentlemens' ſeats, ſome of which are built on a large and commodious ſcale: and ſome of their proprietors reſide, almoſt wholly, at them. Amiſfield and Goſford belong to the earl of Wemyſs; Broxmouth to the duke of Roxburgh; Yeſter-caſtle, the ſeat of the marquis of Tweedale; Tyningham belongs to the earl of Hadington; Leithington, the ſeat of lord Blantyre; Balincrief, the ſeat of lord Elibank; Ormiſtown-hall, a ſeat of the earl of Hopetown; Dunglaſs, the ſeat of ſir James Hall, bart.; Lockend, ſir Peter Warrender; Gilmerton, ſir George Kinloch. Beſides theſe the county contains ſome ſeats called caſtles, which belong to ancient families: the principal are the caſtles of Dunbar and Hailes, once the property of the earl of Bothwell. Tantallan, the reſidence of the Douglaſſes: the caſtle of Redhouſe, the property of the Hamiltons: Dirlton caſtle, belonging to the Neſbit family: and Luffneſs, to the Hopes.

Near the northern coaſt of this county are the ſmall iſlands of Baſs, Fiddrie; alſo ſome rocks called Craig-Leith, Ibres, and Lamb. The firſt is a ſingular inſulated rock of about one mile in circumference, and is chiefly inhabited by rabbits and ſea-birds.

Hadingtonſhire contains the three royal boroughs of Hadington, North-Berwick, and Dunbar. According to the parliamentary report of 1801, it then contained 6257 houſes, and 29,986 inhabitants. Groſe, in "The Antiquities of Scotland," gives accounts, with prints, of the following ancient buildings in this county. A ruin on the ſhore at North-Berwick; a Ciſtertian nunnery at the ſame place; Dirleton-caſtle; Dunbar-caſtle; Gulene church; Hadington church; Hales-caſtle; Innerwick-caſtle; and Tantallan, or Tamtallon-caſtle. Antiquarian objects of a more remote character are, an encampment, called Cheſters in Bolton pariſh; another of a circular form at Gawald; a third at Carfrac; a fourth on Prieſtlaw, which is encompaſſed by four ditches, and meaſures 2000 feet in circumference. The county is divided into three preſbyteries, and theſe again divided into twenty-four pariſhes. A good map of Hadingtonſhire, on a ſcale of two inches to a mile, was publiſhed in 1799 by Mr. Foreſt. In Chalmers's Caledonia, vol. ii. is a full and intereſting account of this county.

HADITA, a town of Curdiſtan, at the conflux of the Altun-ſu with the Tigris; 45 miles S. of Moſul.

HADITH, or HADITSCHEF, a town of Syria, on the Euphrates; 100 miles W.N.W. of Bagdad.

HADLEY, or HADLEIGH, a market-town and pariſh in the hundred of Coſford, and county of Suffolk, is ſeated on the river Breton, at the diſtance of 7 miles W. of Ipſwich, and 64 N.E. of London. The town contained 482 houſes, and 2486 inhabitants, in the year 1801. Camden deſcribes the town as being "famous for the clothing trade" in his time; but at preſent the only manufacture, or trade of the place, is ſpinning of yarn for the Norwich weavers. It is noted by ancient hiſtorians as the burial-place of Guthrum, or Gormo, the Dane, who, on adopting the Chriſtian religion, was preſented by king Alfred with the country of Eaſt-Anglia. Gough ſays the inhabitants "pretend to ſhew the tomb of Guthrum, but there is only a long arch with a bouquet on its point in the ſouth wall of the church, of much later date." The ſame author obſerves, that before the rectory-houſe ſtands a venerable brick gate, with two hexagonal towers, built, with the houſe, by William Pikyngham, dean of Stoke college, and rector here about 1490. He alſo founded, in the year 1497, 12 alms-houſes for 24 aged poor perſons, with a chapel. On the adjoining common is a ſtone, with an inſcription, to perpetuate the martyrdom of Dr. Rowland Taylor, rector of this place, who, in 1555, for

"Defending what was good,
Upon this plas he left his blood."

This town was anciently incorporated, but its charter was ſurrendered by writ of quo-warranto to king James II. It had formerly two weekly markets, but has now only one, on Mondays, and two annual fairs.

HADLEY, a pleaſant poſt-town of America, in Hampſhire county, Maſſachuſetts, on the E. ſide of Connecticut river, nearly oppoſite to Northampton; 97 miles W. of Boſton. It conſiſts of two long ſtreets, parallel to one another, and to the river, and the townſhip contains 1073 inhabitants.

HADOWTY. See NAGORE.

HADRAMAUT, a province of Arabia Felix, bounded on the W. by Yemen, on the S.E. by the ocean, on the N.E. by Oman, and on the N. by a great deſert. It comprehends a wide extent of country, more eſpecially if, with the Arabians, we include in it the diſtrict of *Mahhra*, which ſee. Hadramaut, like Yemen, exhibits great diverſities of ſoil and ſurface. Some parts of it are dry and deſart; but the hills are extremely fertile, and are interſected by well-watered vales. The inhabitants of this province, like thoſe of Yemen, are divided into Arabs, ſettled in towns, wandering Bedouins, and Kobarts, or highlanders. The religion is a tiſſue of fantaſtic fragments of ſuperſtition; for the prevailing ſect among them is that of the Sunnites. This province, and that of Yemen, conſtituting Arabia Felix, enjoyed, in the remoteſt time, a very extenſive commerce. Its exports conſiſted not only of its own productions, but likewiſe of thoſe of India, which were brought into its harbours, upon the ſhores of the ocean, by veſſels from India; and theſe articles of merchandize were conveyed by land, from the apprehended danger of navigating the Arabic gulf, into Egypt and Syria. The caravans were a ſource of wealth to the whole nation; the inhabitants of the towns gained by purchaſes and ſales, and the Bedouins by hiring out their camels. But ſince the Europeans have diſcovered a different route to India, the trade of South Arabia has neceſſarily declined. However, this province, though deſtitute of the coffee which has been the reſource of Yemen, ſtill carries on ſome trade in its native productions; for theſe ſhips from Maſkat viſit its harbours upon the ocean; the little coffee which it affords, incenſe, gum Arabic, dragon's blood, myrrh, and aloes, are the articles of this trade. The aloes of Soccatra, an iſle belonging to the princes of Hadramaut, has been always in the higheſt eſtimation. The inhabitants have likewiſe ſome trivial manufactures. Yemen is furniſhed from this province with coarſe cloths, carpets, and the knives called "Jumbeu," which are hung from their girdles. But the inhabitants of Hadramaut being averſe to a maritime life, the trade from their ſea-ports is carried on altogether in foreign bottoms. There are ſeveral conſiderable towns in this province, which were better known to the ancients than they are at preſent; ſuch are Schibam, Doan, Dafur, Keſchim, Marbat, Haſek, and Ainad, and alſo ſeveral ſea-ports. The Bedouins, and inhabitants of the hills, have here, as well as through other parts of Arabia, a number of independent Scheiks; and the coaſts, together with the adjacent country, are ſhared among foreigners of higher dignity, whom travellers have called kings, though they take only the title of ſcheik, or ſultan. The ſcheik of Schibam is the moſt powerful. The capital of this province is Hadramaut; 360 miles E.N.E. of Mocha.

HADRAN, a town of Perſia, in the province of Adirbeitzan; 132 miles S.W. of Tauris.

HADRIA. See Adria.

HADRIAN. See Adrian.

HADRIANEA, or Hadrianalia, in *Antiquity*, games inſtituted by Antonine, at Puzzuoli, in honour of the emperor Hadrian, or Adrian.

There were two ſorts of Hadrianalia, the one held every year, and the other every five years.

HADRIANISTS, Hadrianistæ, in *Church Hiſtory*. See Adrianists.

HADRO, in *Geography*, a town of Curdiſtan; 58 miles S.S.W. of Kerkuk.

HADSJAR. See Lachsa.

HAEGT, a town of France, in the department of the Dyle, and chief place of a canton, in the diſtrict of Louvain. The place contains 1345, and the canton 10,550 inhabitants, on a territory of 122½ kiliometres, in 11 communes.

HÆMACATE, in *Zoology*, the name of a ſerpent found in Aſia, the colour of which is bright red: it is a dangerous creature, and is conceived to be the *vipera corallina* of modern naturaliſts.

HÆMACHATES, the *blood-coloured agate*, in the *Natural Hiſtory of the Ancients*, the name of an agate found at this time in the Eaſt Indies, and in ſome parts of Germany, and called by Dr. Hill *achates ſanguineus variegatus*; or the blood-coloured variegated agate.

It is one of the moſt beautiful of the agate kind, and was extremely well characterized by the name the ancients gave it, being always of a ſtrong and deep red, like that of blood. Often it is only of this plain and ſingle colour throughout the maſs, but more frequently it is found beautifully variegated with a pale blue, and with brown; the blue in this caſe always ſurrounding the red, and appearing like the ſerum which ſeparates from and floats about the blood, when it has been ſome time out of the body; the brown, or hair-colour, is often the baſis, or ground-colour, of the ſtone, and the red in ſpots only, and variegations, ſurrounded with this thin blueiſh colour; it is very hard, and takes a fine poliſh, and is cut into the tops of ſnuff-boxes, and other toys, and much valued by our lapidaries.

HÆMAGOGOS, of αιμα, *blood*, and αγω, *I draw away*, the name of a medicinal compoſition deſcribed in Myrepſus, and intended to bring away the lochia, or forward the menſtrual diſcharges. It conſiſts of black hellebore and the fœtid gums, with honey.

HÆMALOPIA, a term derived from αιμα, *blood*, and οπτομαι, *to ſee*, and ſignifying a morbid affection of the eye, in which every thing appears to have a red colour.

HÆMANTHUS, in *Botany*, from αἷμα, *blood*, and ανθος, *a flower*, alluding to the fine red colour of the corolla and involucrum, as well as perhaps to the purple ſtains upon the ſtalk. Linn. Gen. 160. Schreb. 214. Willd. Sp. Pl. v. 2. 24. Mart Mill. Dict. v. 2. Ait. Hort. Kew. v. 1. 403. Juſſ. 55. Tourn. t. 433. Lamarck. Illuſtr. t. 228. Gærtn. t. 11.—Claſs and order, *Hexandria Monogynia*. Nat. Ord. *Spathaceæ*, Linn. *Narciſſi*, Juſſ.

Gen. Ch. *Cal.* Involucrum of ſeveral, more or leſs coloured, oblong, permanent leaves, ſurrounding the umbel, with ſlender linear leaflets between the flowers. *Cor.* of one petal, ſuperior, erect; tube ſhort, angular; limb in ſix deep linear equal ſegments, incurved at the points. *Stam.* Filaments ſix, awl-ſhaped, inſerted into the tube, longer than the limb, all equal; anthers oblong, incumbent. *Piſt.* Germen inferior; ſtyle ſimple, as long as the ſtamens; ſtigma ſimple. *Peric.* Berry roundiſh, of three cells. *Seeds* ſolitary, triangular.

Eſſ. Ch. Involucrum of ſeveral leaves, many-flowered. Corolla ſuperior, in ſix deep equal ſegments. Berry of three cells. Seeds ſolitary.

Of this very handſome genus of bulbous plants, the lateſt work of Linnæus enumerates but four ſpecies. Jacquin has figured and deſcribed ſix new ones, in his ſplendid *Hortus Schoenbrunnenſis*, ſo that Willdenow defines 14 from theſe and other ſources. All except *H multiflorus*, which comes from Sierra Leone, are natives of the Cape of Good Hope.

1. H. *coccineus*. Linn. Sp. Pl. 412. Curt. Mag. t. 1075. Redout. Liliac. t. 39. (H. africanus; Comm. Hort. v. 2. 127. t. 64. Narciſſus indicus puniceus; Ferrari Cult. t. 137. 139. N. indicus ſerpentarius; Columna in Hernand Mex. 885. 899. N. indicus, gemino latiore folio; Rudb. Elyſ. v. 2. 49. f. 8.)—Leaves two, tongue-ſhaped, divaricated, depreſſed, flat, ſmooth. Umbel denſe, level-topped, ſhorter than the involucrum.—An old inhabitant of the gardens of Europe, flowering in the latter part of ſummer, after which its leaves appear. It is cultivated in the ſtove. The *bulb* is large. The broad dark-green *leaves* lie flat on the ground, ſpreading about a foot each way. *Flower-ſtalks* ſolitary, erect, a foot high, ſpeckled with dark purple. *Involucrum* of about ſix very broad and ſtriking ſcarlet leaves, riſing above the numerous *flowers*, which are comparatively pale and inconſpicuous. *Berry* pale-red, rarely ripened with us, and then ſeldom perfecting more than one or two black ſeeds, though there are always the rudiments of three. The flowers are without ſcent.

2. H. *coarctatus*. Jacq. Hort. Schoen. v. 1. 30. t. 57.—Leaves oblong-lanceolate, keeled, ſmooth, erect; callous at the tip. Umbel denſe, level-topped, ſhorter than the cloſe lanceolate-leaved involucrum.—The *leaves* are green, ſpotleſs and ſmooth, reſembling thoſe of a *Crinum*, being nearly erect, concave and keeled; their tips red and callous. *Stalk* dotted with red. *Involucrum* deep ſcarlet, erect, of ſeveral lanceolate leaves, pale at the baſe. It flowers in November, the leaves coming out afterwards.

3 H. *puniceus*. Linn. Sp. Pl. 413. Curt. Mag. t. 1315. (H. colchici foliis, perianthio herbaceo; Dill. Elth. 167. t. 140. Trew. Ehret. 14. t. 44.)—Leaves elliptic-oblong, acute, waved, ſpreading. Umbel denſe, level-topped, taller than the lanceolate-leaved upright involucrum.—A greenhouſe plant, imported from the Cape, through the hands of the Dutch, and cultivated by Sherard at Eltham about the year 1722. The *root* is thick, and rather tuberous than bulbous. *Leaves* ſeveral, with ſpotted ſheathing ſtalks, elevating them, like a ſtem, ſeveral inches above the root. *Flower-ſtalk* rather taller than the leaf-ſtalks, and from a different bud, naked, ſolitary, ſpotted. *Involucrum* green, more or leſs ſtained with purple. *Flowers* pale ſcarlet, or ſalmon-coloured, their ſegments and ſtamens but ſlightly ſpreading. *Berries* crimſon.

4. H. *multiflorus*. Mart. Mill. Dict. n. 8. Nodder Ic. 1. Andr. Repoſ. t. 318. Curt. Mag. t. 961. (Satyrium e Guinea; Swert. Floril. t. 62. f. 3. Rudb. Elyſ. v. 2. 210. f. 3. Orchis e Guinea delata, ſive ſatyrium; Moris. Sect. 12. t. 12. f. 11.)

f. 11.)—Leaves elliptical, ſpreading. Umbel ſpreading, longer than the deflexed lanceolate involucrum. Corolla ſalver-ſhaped. Native of the coaſt of Sierra Leone, from whence it was reſtored to our gardens by the companion of Dr. Afzelius, Francis Borone, who in 1793 ſupplied Meſſrs. Lee and Kennedy with a conſiderable ſtock of the roots, which flowered abundantly, even with a very moderate heat. To bloom ſucceſſively, the plant requires to be kept in a ſtove. Its habit reſembles the laſt, to which its ſynonyms were erroneouſly referred by Linnæus; but the *leaves* are leſs undulated, and the *flowers* far more beautiful, being of a rich deep ſcarlet, forming a large widely expanding umbel, whoſe involucrum is ſmall, pale, and reflexed, like the ſpatha of an *Amaryllis*. The ſegments of the *corolla* ſpread at a right angle with its tube, and the ſtamens are long and divaricated. The *flowers* grow on a rather ſlender ſpotted ſtalk, ſituated, as in the laſt, on the outſide of the leaves, not growing from among them, as drawn by Vallet. This author took his figure from a plant at Paris early in the 17th century, and is copied by thoſe old writers we have cited. In theſe the partial flower-ſtalks look jointed, though originally meant to repreſent ſome flowers as having fallen. This has led profeſſor Willdenow to conſtruct an erroneous ſpecific character.

5. H. *tigrinus*. Jacq. Hort. Schoenbr. v. 1. 29. t. 56.—Leaves two, tongue-ſhaped, divaricated, ſmooth, fringed. Umbel level-topped, denſe, ſhorter than the cloſe, obovate-leaved involucrum.—Native of the Cape of Good Hope, like all the following. It flowered with Jacquin in September. The *bulb* is large and ſcaly. *Leaves* two, ſpreading oppoſitely, as in the firſt ſpecies, but not ſo much depreſſed. They are broad, dark-green, ſmooth, except at the edge, which is denſely fringed, and their baſe externally ſpotted, as in the two laſt. *Flower-ſtalk* compreſſed, beautifully ſpeckled with red. *Involucrum* of about nine upright, obovate, deep-ſcarlet leaves, concealing the flowers, except the tops of their ſtamens and ſtyles. *Corolla* pale red, erect.

6. H. *quadrivalvis*. Jacq. Hort. Schoenbr. v. 1. 30. t. 58.—Leaves two, divaricated, elliptic-oblong, fringed, hairy on the upper ſide. Involucrum of four ſlightly expanding leaves, taller than the cloſe level-topped umbel.—Rather ſmaller than the laſt, and diſtinguiſhed by the rough *foliage*, as well as the few *leaves* of the involucrum, which are pale ſcarlet, with their points expanding, riſing much above the *flowers*, whoſe corolla is of the ſame colour, quite erect, tipped with white.

7. H. *pubeſcens*. Linn. Suppl. 193. Ait. Hort. Kew. v. 1. 404.—Leaves oblong-lanceolate, hairy all over. Umbel roundiſh-level-topped. Limb of the corolla erect.—Introduced into the Kew garden in 1774, by Mr. F. Maſſon. It flowers in Auguſt, and grows naturally in ſandy ground. "The *leaves* are moſtly two, erect, about a ſpan long, ſcarcely an inch broad, flat, ribbed, hairy on both ſides, bluntiſh, contracted at the baſe. *Flower-ſtalk* thread-ſhaped, very ſmooth, reddiſh, three or four inches high, and as thick as a gooſe-quill. *Involucrum* erect, red, of ſix oblong, flat, bluntiſh leaves, an inch and half long and an inch broad. *Flowers* numerous, crowded into a roundiſh-topped umbel, on a level with the involucrum, their *corolla* reddiſh, erect." *Linn. fil. MSS.*

8. H. *ciliaris*. Linn. Sp. Pl. 413. Ait. Hort. Kew. v. 1. 404? (Amaryllis ciliaris; Linn. Suppl. 195.)—Leaves tongue-ſhaped, ſmooth on both ſides, fringed with many rows of hairs pointing forwards.—A ſpecies involved in much confuſion. We have ſeen nothing of the *flowers*, but the *leaves* of the authentic ſpecimen, defined as above, are very different from any thing we find elſewhere deſcribed or figured. Breynius's t. 39. by no means accords with them.

9. H. *albiflos*. Jacq. Hort. Schoenbr. v. 1. 31. t. 59. Curt. Mag. t. 1239.—Leaves elliptical, flat, ſmooth, finely fringed. Stalk hairy, reclining. Involucrum membranous, veiny, of four unequal leaves.—The broad downy-edged *leaves*, white *flowers*, green-veined white *involucrum*, and hairy *flower-ſtalk* diſtinguiſh this from all the preceding. Jacquin makes the *involucrum* ſmooth, Edwards and Gawler in Curt. Mag. fringed. The *corolla* is nearly erect, *umbel* cloſe, *anthers* yellow, *berries* bright ſcarlet.

10. H. *toxicarius*. Ait. Hort. Kew. v. 1. 405. Thunb. Prod. 59. Curt. Mag. t. 1217. (Amaryllis diſticha; Linn. Suppl. 195. Patterſon's Travels, 51, with a very bad plate.—Leaves numerous, two-ranked, lanceolate, glaucous, ſpreading. Involucrum of two leaves, erect. Corolla ſalver-ſhaped.—The only flowers of this plant, known to have been produced in England, were given us in April 1794, from the ſtove of the Hon. Mrs. Barrington at Mongewell, Oxfordſhire. Mr. Sowerby's drawing of them was communicated to the Bot. Mag. by Mr. Lambert, and the original ſpecimen is now before us. The *root* is an ovate bulb, and its juice ſerves the Hottentots to poiſon the arrows, with which they kill antelopes. The *leaves*, common in our ſtoves, are long, glaucous, ſpreading remarkably in two ranks. *Flower-ſtalk* much compreſſed, a foot or more in height, and an inch broad. *Involucrum* more like the ſpatha of an *Amaryllis*, but we preſume the fruit is known to be a *berry*, which places it in the preſent genus. The *flowers* are innumerable, making a denſe umbel; their ſtalks two or three inches long, with many narrow white membranous leaflets among them. *Corolla* very pale roſe-colour, its ſegments horizontal or reflexed, broader than in *H. multiflorus*. *Stamens* of the ſame colour and length.

11. H. *lancifolius*. Jacq. Hort. Schoenbr. v. 1. 31. t. 60.—Leaves few, divaricated, elliptic-lanceolate, ſmooth, fringed with reflexed hairs. Flowers ſalver-ſhaped, taller than the involucrum.—*Bulb* ovate. *Leaves* generally two, widely ſpreading and nearly flat, a ſpan long, an inch and half broad in the middle, tapering at the baſe, dark-green, ſmooth, fringed with reflexed hairs. *Stalk* ſmooth. *Flowers* about ſeven, white with a tinge of red, riſing much above the leaves of the *involucrum*, which are few, erect, oblong, reddiſh, ſpatha-like. The ſegments of the *corolla* ſpread horizontally as in the laſt, and the tube is very ſhort.

12. H. *carinatus*. Mill. Dict. ed. 8. n. 2.—Leaves linear, elongated, keeled.—We know nothing of this but from Miller, who mentions that he received the bulbs from Van Royen of Leyden. He ſays the *root* is like that of *H. coccineus*. *Leaves* three or four, a foot long, or more, not flat, but hollowed like the keel of a boat, more erect than thoſe of *coccineus*, but not quite ſo broad. *Flowers* like that ſpecies, but paler. This deſcription does not much differ from Jacquin's *coarctatus*, ſee n. 2, which may poſſibly be the ſame plant.

13. H. *pumilio*. Jacq. Hort. Schoenbr. v. 1. 32. t. 61.—Leaves linear-lanceolate, upright, ſmooth, naked. Flowers ſalver-ſhaped, taller than the involucrum.—A ſmaller plant than *H. lancifolius*, from which its upright, narrow, ſmooth-edged *leaves* abundantly diſtinguiſh it, though their *flowers* are exactly alike.

14. H. *ſpiralis*. Linn. fil. in Ait. Hort. Kew. v. 1. 405. Thunb. Prod. 58. (Crinum tenellum; Linn. Suppl. 194. Jacq. Ic. Rar. t. 363.)—Leaves briſtle-ſhaped. Stalk thread-ſhaped, ſpiral at the baſe. Involucrum awl-ſhaped, ſhorter than the umbel.—Mr. F. Maſſon ſent this to Kew

garden in 1774, where it flowers in September, and is treated as a green-houſe plant. Nothing can be leſs like the other *Hæmanthi*, and there ſeems no reaſon to place it with them except the pulpy *fruit*, which however differs from the reſt in being tricoccous, or three-lobed. The whole habit is very ſlender and thread-ſhaped. *Flowers* ſcarcely above three or four, in a lax umbel, white, funnel-ſhaped, not unlike thoſe of *Anthericum ſerotinum* and others of that genus. *Involucrum* of two ſhort, ſlender, purpliſh leaves. *Stigmas* very diſtinctly three. *Berry* browniſh. The *bulb* is no bigger than a filberd.

Mr. Donn in his *Hortus Cantabrigienſis* mentions, beſides moſt of the above, four ſpecies unknown to us, all from the Cape of Good Hope. Theſe are named by him *H. orbicularis; obliquus; maculatus;* and *undulatus*.

Hæmanthus, in *Gardening*, comprehends plants of the bulbous-rooted, herbaceous, perennial flowering kind; of which the ſpecies cultivated are, the ſcarlet hæmanthus, blood flower, or lilly (H. coccineus); the wave-leaved hæmanthus, blood flower, or baſtard dragon (H. puniceus); and the carinated Cape hæmanthus, (H. carinatus.)

Method of Culture.—In the firſt and third ſpecies the off-ſets being ſparingly afforded, they are of courſe raiſed with ſome difficulty. When the off-ſets are capable of being procured they ſhould be planted in pots of light loamy mould, immediately when the ſtems decay depoſiting them in a dry glaſs frame. The old roots, after they have been taken up, may remain out of the ground until Auguſt, when they ſhould be new potted and placed out in the open air, till they require protection for the winter ſeaſon.

In the ſecond ſort the plants may be readily increaſed by dividing the roots, and planting them out during the early ſpring months, before they ſend forth new ſtems, in pots of light loamy earth. The old roots ſhould alſo be repotted at this ſeaſon.

All the ſorts are likewiſe capable of being raiſed from ſeeds, but eſpecially the ſecond kind, by ſowing them in pots of light ſandy earth, and immediately plunging them into the bark ſtove. As ſoon as the plants appear they ſhould have a pretty free admiſſion of freſh air; and as ſoon as they have attained a good growth, they ſhould be removed into ſeparate pots, and be replunged in the hot-bed. After being properly hardened they may be depoſited in the dry ſtove.

They all require the management of bulbous-rooted plants, little water being given them during the winter ſeaſon, but pretty frequently when the weather is warm, as well as when they are in the flowering ſtate, air being likewiſe pretty freely allowed.

Plants of this nature afford ornament and variety in ſtove collections.

HÆMATEMESIS, in *Medicine*, from αἷμα, *blood*, and ἐμέω, *I vomit*, ſignifies a vomiting of blood.

A diſcharge of blood from the ſtomach is a diſeaſe generally alarming to the patient, and ſometimes attended with conſiderable uneaſineſs and diſtreſs, and occaſionally with danger. From the importance of the organ in the animal economy, and its great connection with life, we ſhould, indeed, be led to ſuppoſe that an hæmorrhage from its veſſels could not occur, without occaſioning very ſerious injury to the conſtitution, or being itſelf the reſult of ſome formidable diſorder of the ſtomach itſelf. But experience altogether invalidates the correctneſs of ſuch a ſuppoſition; and teaches us that, in the great majority of inſtances, a vomiting of blood does not originate in any actual diſeaſe of the ſtomach, but is ſymptomatic of diſorder in ſome other organ, whoſe operations are connected by ſympathy with thoſe of the ſtomach, eſpecially the inteſtines, the liver, the uterus, and other abdominal viſcera; and farther, that the primary diſorder is moſt frequently a ſlight derangement of the bowels or of the liver, which is eaſily removed by medicine. This form of hæmatemeſis we ſhall firſt deſcribe, and afterwards notice the leſs frequent varieties.

The ordinary form of this diſeaſe chiefly attacks females, between the eighteenth and thirtieth year of their age. It is preceded by great languor and oppreſſion, both about the cheſt and the region of the ſtomach; by a ſenſe of fulneſs of the præcordia; by cough, difficulty of breathing, and ſometimes by pain in the breaſt; by loſs of appetite, head-ache, giddineſs, and diſturbed ſleep. The eye is dull, the countenance is expreſſive of much diſtreſs, the pulſe is feeble, and the bowels are conſtipated. In this ſtate of impaired health, a particular fit of ſickneſs and nauſea is the immediate fore-runner of the attack of the vomiting of blood. The blood brought up is ſometimes florid, and at other times black and grumous; ſometimes it is mixed with a large quantity of mucus, and at others with the remains of the alimentary matters taken into the ſtomach. The quantity of blood brought up at one time varies from a few ounces to a pound or more. The diſtreſſing ſymptoms are relieved by this diſcharge of blood; but they are again aggravated, previouſly to the return of a ſimilar attack of the vomiting.

It is requiſite, when blood is brought up, to aſcertain with accuracy whether it has been diſcharged from the ſtomach or from the lungs: in popular language, the origin of every diſcharge from the cheſt is generally referred to the ſtomach. For this purpoſe the following circumſtances ſhould be inveſtigated. If the blood is brought up manifeſtly by the action of vomiting, without any coughing; if the vomiting has been preceded by ſome ſenſe of weight, anxiety, and pain in the region of the ſtomach; if the blood diſcharged is of a black and grumous appearance; and if it is manifeſtly mixed with other contents of the ſtomach; we can ſeldom have any doubt of the ſource from whence the blood proceeds, and therefore of the exiſtence of the diſeaſe in queſtion. We ſhall have occaſion to notice this ſubject again under the head of Hæmoptysis.

The *cauſes* of this hæmatemeſis have been the ſubject of much ſpeculation. The time of life in which it principally occurs, and the circumſtance of being peculiar to the female ſex, have induced phyſicians to imagine that it is intimately connected with the menſtrual flux, the ſuppreſſion of which has generally been conſidered as the ſole cauſe of the diſeaſe: it has been ſaid to be a hæmorrhage vicarious of the menſes. Dr. Cullen, after ſtating that a plethora in the veſſels of the ſtomach, where there is a general plethoric ſtate of the habit, although it might be ſuppoſed to give riſe to hæmatemeſis, is in fact not found by experience to do ſo; and that ſuch a plethoric ſtate of the ſyſtem is probably induced by the ſuppreſſion of the menſes; is at length compelled to admit that ſome particular (we might as well ſay, unknown) circumſtances of the ſtomach itſelf muſt be ſuppoſed to exiſt which "determine an afflux of blood to that organ, and may therefore occur without any conſiderable or dangerous plethora prevailing in the ſyſtem." The peculiar circumſtances, in this inſtance, he ſuppoſes to be "the connection and conſent which we know to ſubſiſt between the uterus and the whole of the alimentary canal, and eſpecially that principal part of it the ſtomach." (Firſt Lines, par. 1023.)

The obſervations of Dr. Hamilton on this ſubject are more conſiſtent with ſound reaſoning. Admitting the great importance of the uterine ſyſtem in the animal economy, he is inclined to think that too much has been imputed to the influence of the catamenia in circumſtances of diſeaſe; and that, in explaining theſe circumſtances, we have reaſoned too much on a ſubject that is little underſtood. He farther obſerves, "in the caſe now before us, the cauſe aſſumed, to account for vomiting of blood, proceeds upon limited or miſtaken information. Suſpended menſtruation is not a neceſſary concomitant of hæmatemeſis, which appears when the menſes are regular. I do not know," he adds, "in what proportion of inſtances this is the caſe; but if it is ſo in one inſtance, this one inſtance overturns the theory, does away the vicarious nature of hæmatemeſis, and gives it a place, where I conceive it ought to have one, among idiopathic diſeaſes." (Obſervations on Purgative Medicines, Edinburgh 1805, page 113.)

This cannot but be deemed a ſatisfactory refutation of the vicarious nature of hæmatemeſis; and the fact of the occaſional ceſſation of the diſeaſe, on the re-appearance of ſuſpended catamenia, which was even ſtated by Hippocrates, ("Mulieri ſanguinem evomenti menſtruis erumpentibus ſolutio fit." Aphoriſm, ſect. v. 32.) is eaſily explained on other grounds. The ceſſation of the periodical diſcharge, notwithſtanding the general opinion of females, who attribute almoſt every malady to this ſource, is probably much more frequently a conſequence and a ſign of the ill condition of the general health, than a cauſe of it. (See CHLOROSIS.) The re-appearance of the menſes, therefore, and the ceſſation of the hæmatemeſis, are nearly co-incident, not becauſe the one is the cauſe of the other, but becauſe both are the conſequence of the reſtoration of the general health. It is obvious then, that theoretical diſquiſitions, founded upon ſuch views of the diſorder, muſt have led to practical errors; namely, to the difficult and precarious attempts to reſtore the ſuppreſſed menſes; when obſervation and experience, unſhackled by hypotheſis, would have conducted the practitioner to more efficient means of cure.

Accordingly we find, that under the ordinary method of treatment formerly recommended by practical phyſicians, hæmatemeſis was a diſeaſe of uncertain duration and of very unequal ſeverity; whilſt, under the plan lately introduced by Dr. Hamilton, it is in general ſpeedily removed. Hoffmann affirms, that "a vomiting of blood is, of almoſt all hæmorrhages, the moſt dangerous:" (Medicin. Ration. Syſtem. tom. ii. par. ii.) but he admits at the ſame time that when it ariſes from plethora, or ſuppreſſed evacuations, "we need not deſpair." Dr. Cullen, however, juſtly conſidered this form of hæmatemeſis as "hardly ever a dangerous diſeaſe;" and for ourſelves, we have never witneſſed any ill conſequences reſulting from it, but have always found it yield readily to the method of treatment recommended by Dr. Hamilton, to which indeed our own obſervation had led us previouſly to the appearance of his publication.

The uſual practice adopted for the cure of hæmatemeſis conſiſts in the uſe of refrigerant, or cooling medicines, as they have been called, ſuch as the neutral ſalts, eſpecially nitre, the diluted ſulphuric acid, ſmall doſes of opium, with acidulated drinks and light diet; to which ſome have added the uſe of ſpermaceti and oleaginous matters. If the diſeaſe, notwithſtanding the exhibition of theſe medicines, continued for ſome time, then powerful aſtringents and ſedatives, ſuch as alum, kino, the tincture of muriated iron, digitalis, &c. were reſorted to with the occaſional interpoſition of a gentle laxative, ſuch as the caſtor oil. (See Thomas's Modern Practice of Phyſic.) Dr. Cullen recommended the uſe of the ordinary remedies employed in the caſe of ſuppreſſed catamenia; and Hoffmann likewiſe preſcribed the employment of mild emmenagogues, frequent emmenagogue glyſters and bleeding in the foot, when the bloody vomiting aroſe from ſuppreſſions or obſtructions of the menſes. The ſame able phyſician alſo adviſed that, if the patient be plethoric, bleeding from the arm, cautiouſly proportioned to the age, ſtrength, and degree of repletion of the individual, ſhould be reſorted to in the paroxyſm; and where there was much heat with ſtrong pulſe, he uſed free dilution with watery liquids, containing nitre and ſyrup of poppies, as well as emollient glyſters with nitre, with a view to relax the ſpaſms of the inteſtines, and to procure a derivation of the humours from the ſtomach. In order to prevent a recurrence of the vomiting, he preſcribed "half a drachm of rhubarb twice a-week at bed-time, either by itſelf or with crabs'-eyes, or half a grain of camphor for common drink, pure water in which iron has been quenched, or acidulated whey; and for tea an infuſion of veronica, knot-graſs, milfoil tops, liquorice, and fennel ſeeds." He cautions us to be wary in the uſe of opium in all vomitings of blood, from whatever cauſe, and likewiſe of aſtringent and vitriolic medicines; which, he ſays, though they reſtrain the hæmorrhage, endanger the occurrence of inflammation, and even of dropſy. (Hoffmann, loc. cit.)

The experience of Dr. James Hamilton, in the Royal Infirmary at Edinburgh, led him to the knowledge of the connection of hæmatemeſis with a conſtipated ſtate of the alimentary canal, and of the conſequent facility of removing the diſeaſe by the exhibition of cathartics. After having adopted this mode of treatment during a period of ten years, Dr. Hamilton thus ſtates his opinion of its efficacy. "I have followed the practice, which this caſe ſuggeſted in the inſtances of the ailment which I have ſince met with; and my ſucceſs has been ſo uniform, that I now lay it down as a certain poſition, that the proper exhibition of purgative medicines affords ſure and effectual means of removing hæmatemeſis, the ſubject of this chapter." He goes on to remark, "the purgatives which I have uſed in theſe caſes have never excited vomiting; and what may be thought ſingular, I have never been able to aſcertain the preſence of blood in the fæces. As the ſtrength of patients labouring under this vomiting of blood is generally pretty entire, we need not dread full purging; but this effect is not wanted; if we unload the bowels we accompliſh the cure. The fæces which are brought off are copious, unnatural in colour, conſiſtence, and ſmell, as they generally are after long remora, the conſequence of obſtinate and protracted coſtiveneſs. The different circumſtances which not only expoſe women to coſtiveneſs more readily than men; but when it does occur, to a more obſtinate kind of it, as already noticed, may explain why they are excluſively the ſubjects of the diſeaſe." (Loc. cit. p. 116.) The medicines which Dr. Hamilton employed with a view to empty the bowels were various; combinations of calomel and jalap, aloetic pills, neutral ſalts, &c. occaſionally aided by the uſe of injections: and as far as our own experience goes, the nature of the purgative, provided it will agree with the ſtate of the ſtomach, and is proportioned to the ſtrength of the patient, and to the neceſſity of evacuation, is a matter of ſecondary importance.

This practical fact being aſcertained, the rational inquirer will not aſk for any theoretical explanation of it. Whether we may ſuppoſe the loaded bowels to impede the hepatic and abdominal circulation, and thus to occaſion a venous plethora in the ſtomach and inteſtines; or whether the languid circulation in theſe parts, and the ſlow action of the bowels, may be alike the conſequence of the general languor of the ſyſtem; or whether any other hypotheſis may be reſorted to, the value of the practical fact is neither diminiſhed nor augmented.

Having diſcuſſed the ordinary form of hæmatemeſis at ſome length, we have only a few words to add relative to ſome other modifications of the diſeaſe, which depend upon more ſerious diſorder of the ſtomach itſelf, of other organs, or of the ſyſtem at large. Succeſs in the cure of theſe varieties of bloody vomiting is doubtful in the extreme, and very difficult to be attained; for the conſtitution itſelf is undermined in theſe caſes, by acute diſeaſe, or by previous irregularities and intemperance, in addition to the local miſchief.

The organic derangements of the ſtomach, which are accompanied by vomiting of blood, are thoſe ariſing from wounds or other mechanical injury to its ſtructure, which are generally ſpeedily fatal. Theſe are included in the ſecond ſpecies of Sauvages, Hæmatemeſis *traumatica;* to which may be added the ninth, or H. *cholerica*, as far as regards its origin from corroſive poiſon ſwallowed; and the fourth, or H. *ab hyrudine*, in which the internal coat of the ſtomach has been wounded by a leech, ſwallowed in drinking ditch water. (Riverius, Cent. iv. Obſ. 26.) In cancer and ſcirrhus of the ſtomach a blackiſh matter, reſembling the grounds of coffee, is commonly ejected by vomiting; but as this is not in a fluid ſtate it can ſcarcely be denominated hæmatemeſis.

Morbid enlargements of the neighbouring viſcera, the ſpleen, pancreas, and liver, (ſee Sauvages, ſpec. 6, 7, and 13) aneuriſm of the aorta, (ſpecies 2.) and compreſſion of that artery, (ſpec. 11.) have all been aſſigned as occaſional cauſes of hæmatemeſis. In the records of phyſic, Dr. Cullen obſerves, there are many inſtances of vomitings of blood, which were accompanied with a tumified ſpleen, which had compreſſed the vas breve, and thereby prevented the return of venous blood from the ſtomach. It is alſo poſſible, that an obſtruction of the liver, reſiſting the free motion of the blood in the vena portarum, may ſometimes interrupt the free return of the venous blood from the veſſels of the ſtomach, and thereby occaſion a vomiting of blood; but the inſtances of this are neither ſo frequent nor ſo clearly explained as thoſe of the former caſe. (Firſt Lines, par. 1027—28.) In the *morbus niger* of authors, and the *melæna* of Sauvages, the black and grumous blood is ſometimes thrown out by vomiting, as well as diſcharged downwards, and is conſidered as originating in a venous plethora in the inteſtinal canal, connected with obſtructed viſcera. (See Melæna.) This forms the twelfth ſpecies of Sauvage, or H. *atra*.

There are two or three conditions of the conſtitution in which hæmatemeſis is liable to occur, and in which it is to be deemed a hopeleſs ſymptom. The firſt of theſe is the laſt ſtage of acute fevers, in which ſpontaneous hæmorrhage takes place from different parts of the body, and is uſually conſidered as the moſt decided ſymptom of the malignancy and putreſcency of the diſeaſe. In typhus, ſcarlet-fever, ſmall-pox, &c. this ſort of hæmorrhage occaſionally cloſes the ſcene. Hence the aphoriſm of Hippocrates, "qui ſanguinem vomunt, ſi quidem ſine febre, ſalutare; ſi verò cum febre, malum." (Sect vii. Aph. 37.) The other conſtitutional condition is that which is found in ſcurvy, and in the *purpura hæmorrhagica*, *hæmorrhœa petechialis*, or *purples*, as the diſeaſe has been variouſly denominated. In the higheſt degree of theſe maladies, blood flows from every part of the body, internal and external, where the cuticle or inveſting membrane is delicate and thin, and hæmorrhage from the ſtomach is one form of the diſcharge.

Laſtly, we may obſerve, that Sauvages has included in his account a pretended hæmatemeſis, (H. *ſimulata*. ſpec. 10.) in which a deception was practiſed, even upon the medical attendant, by a girl who was confined in a convent and was deſirous of being ſent out. She vomited ſeveral pounds of blood, for ſeveral days even in the preſence of the phyſician: but it was at length diſcovered that ſhe ſwallowed bullock's blood, which was clandeſtinely conveyed to her daily. (Sauvages Noſol. Method. Claſs ix. genus 4.)

HÆMATION, a word uſed among the *Ancients*, for a ſort of reddiſh garon, made of the inteſtines and blood of fiſhes macerated in ſalt.

HÆMATITES, from αιμα, *blood*, in *Natural Hiſtory*, the *blood-ſtone;* a kind of ruddy mineral ſubſtance; thus called, either on account of its reſembling dry curdled blood, or of its reputed faculty of ſtaunching blood.

Pliny reckons five kinds of blood-ſtone; *viz.* the *Ethiopic*, *androdamas*, the *Arabic*, the *elatites* or *miltites*, and the *ſchiſtos;* beſides that commonly called in his time the *magnes hæmatites*, from the property it hath of attracting iron.

Theſe five ſorts differ chiefly in point of hardneſs: the beſt, according to Dioſcorides, is that which is friable, hard, black, and ſmooth, without either gritty parts, or veins. That commonly uſed by the painters is factitious, being made of Armenian bole, and other drugs.

The common native, or the foſſil kind, comes from Egypt, Bohemia, &c. This is of various figures; ſpherical, ſemi-ſpherical, pyramidal, or cellular; compoſed of ſmall pyramids, the apices of which appear, in a tranſverſe ſection, in the centre. It contains a large portion of iron; but the iron is obtained with ſuch difficulty, and is of ſo bad a quality, that this ore is not commonly ſmelted. This ſtone, when expoſed to a moderately ſtrong fire, falls by degrees into ſcales; and in this ſtate is attracted by the magnet, and gives out its iron to acids. It has divers uſes in medicine; being held cooling and aſtringent, and, in that quality, preſcribed in hæmorrhages and uterine obſtructions. It is given in ſubſtance, in form of a fine powder, from one ſcruple to three or four, for a doſe. It is alſo uſed in diſtemperatures of the eyes; but pure iron, or the preparations of iron, muſt be preferable to this ſtone in the ſame intention.

The gilders uſe it for burniſhers to poliſh their metals. Bauſchius has an expreſs treatiſe on the lapis hæmatites.

HÆMATOCELE, in *Surgery*, denotes a ſwelling of the ſcrotum, or of the ſpermatic cord, cauſed by blood. The term is derived from the Greek αιμα, *blood*, and κηλη, *a tumour*.

In this article we have little more to do than inſert Mr. Pott's account of the diſeaſe, of which no earlier, nor any later author has treated with equal ability. He begins with pointing out the importance of making diſtinctions in the complaint, as without them it cannot be properly underſtood, and an ill-founded and haſty prognoſis is apt to be given.

Mr. Pott remarks, that "the diſeaſe, properly called hæmatocele, is of four kinds; two of which have their ſeat within the tunica vaginalis teſtis; one within the albuginea; and the fourth in the tunica communis, or common cellular membrane, inveſting the ſpermatic veſſels.

"In paſſing an inſtrument, in order to let out the water from an hydrocele of the vaginal coat, a veſſel is ſometimes wounded, which is of ſuch ſize, as to tinge the fluid pretty deeply at the time of its running out. The orifice becoming cloſe, when the water is all diſcharged, and a plaſter being applied, the blood ceaſes to flow from thence, but inſinuates itſelf partly into the cavity of the vaginal coat, and partly into the cells of the dartos; making, ſometimes, in the ſpace of a few hours, a tumour nearly equal in ſize to the original hydrocele. This is one ſpecies.

"It ſometimes happens, in tapping an hydrocele, that although the fluid diſcharged by that operation be perfectly clear

clear and limpid, yet, in a very ſhort ſpace of time (ſometimes in a few hours), the ſcrotum becomes as large as it was before, and palpably as full of a fluid. If a new puncture be now made, the diſcharge, inſtead of being limpid (as before), is now either pure blood, or very bloody. This is another ſpecies; but, like the preceding, confined to the tunica vaginalis.

“The whole vaſcular compages of the teſticle is ſometimes very much enlarged, and at the ſame time rendered ſo lax and looſe, that the tumour produced thereby has, to the fingers of an examiner, very much the appearance of a ſwelling compoſed of a mere fluid, ſuppoſed to be ſomewhat thick or viſcid. This is in ſome meaſure a deception; but not totally ſo. The greater part of the tumefaction is cauſed by the looſened texture of the teſtis; but there is very frequently a quantity of extravaſated blood alſo.

“If this be ſuppoſed to be an hydrocele, and pierced, the diſcharge will be mere blood. This is a third kind of hæmatocele; and very different, in all its circumſtances, from the two preceding. The fluid is ſhed from the veſſels of the glandular part of the teſticle, and contained within the tunica albuginea.

“The fourth conſiſts in a rupture of, and an effuſion of blood from, a branch of the ſpermatic vein, in its paſſage from the groin to the teſticle; in which caſe, the extravaſation is made into the tunica communis, or cellular membrane inveſting the ſpermatic veſſels.”

Theſe four, Mr. Pott has ſeen ſo diſtinctly and perfectly, that he has not the ſmalleſt doubt concerning their exiſtence, and of their difference from each other.

He next ſtates, that “the tunica vaginalis teſtis, in a natural and healthy ſtate, is a membrane, which, although firm, is of no great thickneſs. It is white, or rather of a reddiſh white colour, and its blood-veſſels are (in a healthy ſtate) no more apparent to the eye than are thoſe of the tunica albuginea; but when it has been long or much diſtended, it thereby becomes thick and tough, and the veſſels (eſpecially thoſe of its inner ſurface) are ſometimes ſo large as to be very viſible, and even varicoſe. If one of theſe lies in the way of the inſtrument wherewith the palliative cure is performed, it is ſometimes wounded; in which caſe, as I have already obſerved, the firſt part of the ſerum which is diſcharged is pretty deeply tinged with blood.

“Upon the collapſion of the membranes, and of the empty bag, this kind of hæmorrhage generally ceaſes, and nothing more comes of it. But it ſometimes happens, either from the toughneſs of the tunic, or from the varicoſe ſtate of the veſſel, that the wound (eſpecially if made by a lancet) does not immediately unite, but continues to diſcharge blood into the cavity of the ſaid tunic, thereby producing a new tumour, and a freſh neceſſity of operation.”

Mr. Pott calls this the firſt ſpecies of hæmatocele, which evidently conſiſts in a wound of a veſſel of the vaginal tunic.

“Upon the ſudden diſcharge of the fluid, from the bag of an over-ſtretched hydrocele, and thereby removing all counter-preſſure againſt the ſides of the veſſels, ſome of which are become varicoſe, one of them will ſometimes, without having been wounded, burſt. If the quantity of blood ſhed from the veſſel ſo burſt be ſmall, it is ſoon abſorbed again; and, creating no trouble, the thing is not known. But if the quantity be conſiderable, it, like the preceding, occaſions a new tumour, and calls for a repetition of the operation.” This is the ſecond ſpecies, “which, like the firſt, belongs entirely to the vaginal coat, and has no concern either with the teſticle, or with the ſpermatic veſſels. In both the bag, which was full of water, becomes in a ſhort ſpace of time diſtended with blood, which blood, if not carried off by abſorption, muſt be diſcharged by opening the containing cyſt; but in neither of theſe can caſtration (though ſaid to be the only remedy) be ever neceſſary. The mere diviſion of the ſacculus, and the application of dry lint to its inſide, will in general, if not always, reſtrain the hæmorrhage, and anſwer every purpoſe for which ſo ſevere a remedy has been preſcribed. The other two are indeed of more conſequence; they intereſt either the teſticle itſelf, or the veſſels by which it is ſupplied with blood, and rendered capable of executing its office, and are ſometimes not curable but by removal of the part.

“One of theſe is ſeated within the tunica albuginea of the teſticle; the other in the tunica communis of its veſſels. They are neither of them very frequent; but when they do happen they call for all our attention.

“If blood be extravaſated within the tunica albuginea, or proper coat of the teſticle, in conſequence of a great relaxation, and, as it were, diſſolution of part of the vaſcular compages of that gland, and the quantity be conſiderable, it will afford or produce a fluctuation, to the hand of an examiner, very like to that of an hydrocele of the tunica vaginalis; allowing ſomething for the different denſity of the different fluids, and the greater depth of the former from the ſurface.

“If this be miſtaken for a ſimple hydrocele, and an opening be made, the diſcharge will be blood; not fluid, or very thin; not like to blood circulating through its proper veſſels, but dark and duſky in colour, and nearly of the conſiſtence of thin chocolate (like that which is moſt frequently found in the imperforate vagina). The quantity diſcharged will be much ſmaller than was expected from the ſize of the tumour, which ſize will not be conſiderably diminiſhed. When this ſmall quantity of blood has been ſo drawn off, the teſticle will, upon examination, be found to be much larger than it ought to be, as well as much more looſe and flabby. Inſtead of that roundneſs and reſiſtance ariſing from an healthy ſtate of the gland within its firm ſtrong coat, it is ſoft, and capable of being compreſſed almoſt flat, and that generally without any of that pain and uneaſineſs which always attend the compreſſion of a ſound teſticle. If the bleeding ceaſes upon the withdrawing the cannula (ſuppoſing a trochar to have been uſed) and the puncture cloſes, a freſh accumulation of the ſame kind of fluid is ſoon made, and the ſame degree of tumefaction is produced as before the operation. If the orifice does not cloſe, the hæmorrhage continues, and very ſoon becomes alarming.

“In the two preceding ſpecies, the blood comes from the tunica vaginalis, the teſtis itſelf being ſafe and unconcerned, and the remedy is found by opening the cavity of the ſaid tunic; but in this the hæmorrhage comes from the ſubſtance of the teſticle—from the convolutions of the ſpermatic artery within the tunica albuginea. The diviſion of the vaginal coat can here do no good; and an inciſion made into the albuginea can only increaſe the miſchief. The teſticle is ſpoiled or rendered uſeleſs by that kind of alteration made in it previous to the extravaſation; and caſtration is the only cure which a patient in ſuch circumſtances can depend upon.

“The laſt ſpecies of this diſeaſe ariſes from a burſting of a branch of the ſpermatic vein between the groin and ſcrotum, in what is generally known by the name of the ſpermatic proceſs. This, which is generally produced by great or ſudden exertions of ſtrength, feats of agility, &c. may happen to perſons in the beſt health, whoſe blood and juices are in the beſt order, and whoſe genital parts are free from blemiſh or diſeaſe.

“The effuſion or extravaſation is made into the cellular membrane, which inveſts and envelopes the ſpermatic veſſels, and has ſomething the appearance of a true hernia. When the caſe is clear, and the extravaſated blood does not give way to diſcutient applications, the only remedy is to lay the tumour fairly open through its whole length. If the veſſel or breach be ſmall, the hæmorrhage may be reſtrained by mere compreſſion with dry lint, or by the uſe of ſtyptics; but if it be large, and theſe means do not ſucceed, the ligature muſt be made uſe of." Pott's Chirurgical Works, voll. ii.

HÆMATOCHYSIS, a word derived from αιμα, *blood*, and χειν, *to pour out*; an effuſion of blood.

HÆMATOMPHALOCELE, a tumour at the navel, containing blood. The term is deduced from αιμα, *blood*, ομφαλος, *the navel*, and κηλη, *a tumour*.

HÆMATOPUS, in *Ornithology*, a genus of the Grallæ order, diſtinguiſhed by having the bill compreſſed with the tip equal and cuneated; noſtrils linear; tongue about one-third the length of the bill; and the feet three-toed, cleft, and formed for running. The only ſpecies of this genus at preſent known is that called Oſtralegus by Linnæus.

Ostralegus. Bill orange; head, neck, and ſhoulders black; wings and tail black and white, body beneath white; legs red. Linn. &c. *Marſpitt*, *ſtrandſkjura*, Linn. Fn. Suec. *Tirma*, Martin. *Scolopax pica*, Scop. *L'huitrier*, Briſſ. *Sea pie*, Ray. *Pied oyſter-catcher*, Donov. Br. Birds, &c.

This bird is an inhabitant of almoſt every ſhore throughout Europe, and alſo extends to America, differing, however, in ſome countries, in being more or leſs variegated with white, and in ſometimes being deſtitute of any intermixture of that colour. The pied variety is more peculiar to England, and other European countries; thoſe entirely black are met with in the north of Europe, in ſome parts of America, in New Zealand, Terra del Fuego, and Van Diemen's land.

Both varieties of the ſpecies are excluſively confined to the ſhores of the ſea, its food conſiſting of marine worms, cruſtaceous animals, inſects, and the various kinds of littoral ſhell-fiſh, as the limpet, muſcle, and oyſter.

In England this bird is known by the name of ſea-pie, and perhaps not leſs generally by that of oyſter-catcher, the latter alluding to the facility with which it contrives to open the ſhell of the oyſter, and extract the fiſh. This ſingular feat is not unfrequently accompliſhed by force, the bird violently thruſting its laterally compreſſed bill between the valves, and burſting the ſhell aſunder, as if effected by means of a knife: in like manner it opens the muſcle, or removes the limpet from the rock, and devours the inhabitant. It is a wily, artful bird, and is often obſerved to have recourſe to ſtratagem as well as force to obtain its prey; the oyſter eſpecially, as the ſhells of thoſe are oftentimes ſtrong enough to withſtand the violence of its attacks; in this caſe it deſiſts, waiting patiently for the convenient moment when the oyſter gapes, and cautiouſly approaching, drops or inſerts a pebble between the valves, which preventing them from again cloſing, the animal within becomes an eaſy prey.

During winter theſe birds are ſeen in large flocks; in the ſummer ſeaſon they uſually appear in pairs. The female lays four or five eggs on the bare ground, above high water mark: the colour of the eggs is greeniſh-grey, varied with ſpots or blotches of black. The total length of the adult bird is ſixteen inches and a half.

HÆMATOSIS, formed of αιμα, *blood*, in *Medicine*, the action whereby the chyle is converted into blood; called alſo *ſanguification*.

The chief of the vital actions are the chyloſis and hæmatoſis.

HÆMATOXYLUM, in *Botany*, from αιμα, *blood*, and ξυλον, *wood*; becauſe of the dark-red colour of the wood, for which it is uſeful in dyeing. Log-wood.—Linn. Gen. 210. Schreb. 280. Willd. Sp. Pl. v. 2. 547. Mart. Mill. Dict. v. 2. Juſſ. 348. Lamarck. Illuſtr. t. 340. Claſs and order, *Decandria Monogynia.* Nat. Ord. *Lomentaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, coloured; tube very ſhort, cup-ſhaped, fleſhy, permanent; limb in five deep, ſpreading, oblong, obtuſe, deciduous ſegments, of which the four uppermoſt are equal, the lower one rather the longeſt. *Cor.* Petals five, lanceolate, broader upwards, obtuſe, veiny, ſpreading, nearly equal, inſerted into the calyx, and larger than its ſegments. *Stam.* Filaments ten, awl-ſhaped, erect, unequal, ſcarcely longer than the corolla, inſerted into the calyx, their lower part hairy on the inſide; anthers oval, ſmall. *Piſt.* Germen ſuperior, oblong, ſcimitar-ſhaped, compreſſed; ſtyle capillary, curved at the point, longer than the ſtamens; ſtigma funnel-ſhaped. *Peric.* Legume lanceolate, flat, obtuſe, of one cell, bordered at each edge with a thickiſh ſuture, which does not ſeparate, but opening by a longitudinal laceration along the middle of each valve, ſo as to divide itſelf into two unequal boat-like parts. *Seeds* few, oblong, compreſſed, furrowed, affixed to one of the ſutures.

Eſſ. Ch. Calyx in five deep deciduous ſegments. Petals five. Legume lanceolate, of one cell, opening along the middle of its valves. Seeds ſeveral.

1. H. *campechianum.* Linn. Sp. Pl. 549. Jacq. Obſ. faſc. 1. 20. Woodv. Med. Bot. t. 17.—The only ſpecies hitherto diſcovered. Native of South America, eſpecially at Campeachy, in the bay of Honduras, from whence it was brought to Jamaica in 1715, in order to be propagated there for exportation. This ſcheme does not appear to have anſwered, though the plant thrives there in ſwampy ground. It is known by the name of Logwood, Campeachy-wood, or Blood-wood, and is principally uſed in Europe for dyeing, though, from its aſtringent quality, not totally uſeleſs as a corroborant of the inteſtines after diarrhœas, and even dyſenteries. It gives a red colour to the ſtools, and ſometimes the urine. The taſte of the wood is ſweetiſh, the ſmell peculiar, not without a faint fragrance. Its colour is a deep purpliſh red, which it communicates to water or ſpirit. This wood is brought to Europe in logs about a yard long, of a ſinuous and twiſted appearance, and very heavy. Before it can be uſed, it is ground, or rather cut and bruiſed, by a mill on purpoſe, and gains conſiderably in bulk. The plant is ſaid to have been cultivated in England 70 years ago by Miller, who mentions it as thriving well, but Dr. Woodville aſſures us he ſought in vain for a ſpecimen in moſt of the hot-houſes about London, nor have we ever ſeen any growing.—The *tree* is ſmall and crooked, with a dark rough bark, the branches armed with ſolitary, axillary, prominent thorns. *Leaves* abruptly pinnate, compoſed of four or five pair of rigid, very ſmooth and ſhining, wedge-ſhaped, emarginate, entire leaflets. *Flowers* reddiſh-yellow, numerous, in axillary ſpikes, longer than the leaves, either ſolitary or in pairs, appearing in March.

HÆMATURIA, in *Medicine*, from αιμα, *blood*, and ουρον, *urine*, ſignifies the paſſing of bloody urine, *mictus cruentus*.

A diſcharge of blood from the urinary paſſages is ſeldom, if ever, an idiopathic diſeaſe; but is occaſioned, perhaps always, by ſome injury to the parts, or by ſome other diſeaſe affecting them, of which the hæmaturia is a conſequence and a ſypmtom. It has been alleged, indeed, by ſome writers, that a ſpontaneous or idiopathic hæmaturia occaſionally occurs in plethoric conſtitutions; in which it has been conſidered as a ſalutary evacuation, originating in the local congeſtion or plethora of the kidnies. (See Sauvages Noſol. Meth. Claſs. ix. Gen. v. Spec. 1. Hæmaturia *ſpontanea*: alſo Juncker, Tabul. 10. in Aph. 25.) Such inſtances, however, are at leaſt extremely rare, and have not occurred to the obſervation of Dr. Cullen and other experienced phyſicians. Dr. Cullen thinks it probable that the obſervations, which have been recorded, may have been fallacious; "for I have frequently obſerved," he ſays, "an hæmaturia without ſymptoms of other affection of the kidney or urinary paſſages being, for the time, preſent; whilſt, however, fits of a *nephralgia calculoſa* having before, or ſoon after, happened, rendered it to me ſufficiently probable, that the hæmaturia was owing to a wound made by a ſtone preſent in ſome part of the urinary paſſages." (Firſt Lines, par. 1034.)

The moſt frequent cauſe of hæmaturia, is the preſence of a ſtone or concretion in ſome part of theſe paſſages; and the diſcharge of blood, in ſuch caſes, is manifeſtly owing to the wounding of the internal ſurface of the pelvis of the kidney, of the ureter, or of the bladder, occaſioned by this hard and often irregularly ſhaped ſubſtance. This is the Hæmaturia *calculoſa*, ſpecies 5, of Sauvages. The attending ſymptoms will enable us to aſcertain, without much difficulty in general, whether the ſource of the blood is in the kidney or ureter, or in the bladder itſelf. If a calculus is preſent in the pelvis of the kidney, or in the ureter leading to the bladder, there is generally a moſt ſevere pain fixed in one ſide of the loins, and ſhooting in the direction of the ureter to the bladder; in men it is accompanied with a painful retraction of the teſticle of the ſame ſide, and in women with a numbneſs extending down the thigh; and during the ſeverity of the pain, there is generally a nauſea in the ſtomach, and even vomiting. See Nephralgia.

In ſuch caſes, the blood diſcharged with the urine is ſometimes of a florid colour, but for the moſt part it is of a dark hue. The whole of it is ſometimes diffuſed or diſſolved, and therefore entirely ſuſpended, in the urine; but if it is in any large quantity, a portion of it is depoſited to the bottom of the veſſel in which it is contained. On different occaſions it puts on other appearances. Thus when blood, poured out in the kidney, has happened to ſtagnate for ſome time in the ureters or bladder, it is ſometimes coagulated, and the coagulated part is afterwards broken down into a grumous maſs of a dark or black colour, and therefore gives the ſame colour to the urine voided; or if the quantity of broken down blood is ſmall, it gives only a browniſh urine reſembling coffee. It ſometimes alſo happens, that the blood, ſtagnating and coagulating in the ureters, takes the form of theſe veſſels, and is thereſore voided under the appearance of a worm; and if the coagulated blood happens to have the gluten ſeparated from the red globules, theſe worm-like appearances have their external ſurface whitiſh, and the whole ſeemingly forming a tube containing a red liquor. (Cullen.) "Hæc vermiformia corpora vidi;" ſays Sauvages, "ſunt tubuli pellucidi ſero rubro pleni." Theſe coagula have ſometimes been miſtaken for worms, as by Platerus probably, in the caſe of *lumbricorum mictus*, lib. iii. Dr. Cullen ſays that he had ſometimes obſerved the blood, which had ſeemingly been coagulated in the ureter, come away in an almoſt dry ſtate, reſembling the half-burnt wick of a candle.

Theſe are the ſeveral appearances of the blood, voided in the hæmaturia calculoſa, when it proceeds eſpecially from the kidney or ureter, and many of the ſame appearances are obſerved, when the blood proceeds only from the bladder when a ſtone is lodged there. The ſymptoms in this caſe, however, are conſiderably different. The ſigns of a ſtone in the bladder will have commonly preceded the hæmaturia; and the abſence of acute pain in the lumbar region, extending obliquely acroſs to the bladder, the ſenſe of weight and pain in the ſeat of this organ, the ſudden ſtoppage of the urine, while paſſing in a full ſtream, &c. (ſee Stone), will contribute to point out the ſource of the hæmorrhage. It may happen, indeed, as Dr. Cullen has remarked, that, when a quantity of blood from the kidney or ureter is coagulated in the bladder, and is therefore with difficulty got rid of, the pain and uneaſineſs may appear to be chiefly in the bladder, though it contains no ſtone; but in ſuch caſe, he obſerves, the antecedent ſymptoms will commonly diſcover the nature of the diſeaſe.

The *cure* of hæmaturia *calculoſa* can only be effected by the removal of the calculus, which excites the hæmorrhage, and its return prevented by the remedies which ſeem to obviate the formation of the uric acid, of which the calculi or concretions commonly conſiſt. Theſe are chiefly alkaline and abſorbent medicines. But as the treatment of the diſeaſes, of which the hæmaturia is a ſymptom, is amply detailed under their reſpective heads, a repetition of it is unneceſſary here. (See Gravel, Nephralgia, and Stone) It may be ſufficient to add, that every ſpecies of irritation that can affect the kidnies or ureters muſt be carefully avoided; and that of ſuch irritation none is more frequent or more conſiderable than the preſence of hardened fæces in the colon, which of courſe muſt be removed by the frequent uſe of gentle laxatives.

Hæmaturia occaſionally happens from the application of external violence (conſtituting the H. *violenta*, and H. *traumatica*, of Sauvages, ſpec. 2, and 13.); as from a kick or blow in the loins, or (as we once obſerved) in the ſide of the belly; or from the violent or long continued exerciſe of the muſcles incumbent on the kidnies, as in riding on horſeback. The former of theſe circumſtances are often immediately followed by a diſcharge of pure blood from the urinary paſſages. In ſuch caſes, the rigid adoption of the antiphlogiſtic regimen becomes immediately neceſſary; and if any tendency to inflammation in the wounded organ appears, even a farther depletion of the blood-veſſels may be requiſite. See Nephritis.

Under the head of hæmaturia from violence, Sauvages includes the variety of the diſeaſe, which occurs in conſequence of taking certain acrid ſubſtances, which particularly paſs off by the urinary canals, and which, by inflaming and ſwelling the neck of the bladder, bring on a rupture of the over-diſtended veſſels, and give occaſion to a bloody urine. Cantharides, turpentines, and acrid diuretic medicines, are liable to produce this effect. In theſe inſtances, the diſorder will be removed by omitting the uſe of theſe medicines, by the free exhibition of thin, diluent, and mucilaginous liquors, by camphor and other anodynes, as in caſes of ſtrangury in general.

Inſtances of hæmaturia have alſo been mentioned by authors originating from a ſuppreſſion of the menſtrual and hæmorrhoidal diſcharges; but theſe are at leaſt extremely rare. The examples of bloody urine connected with the ſcorbutic or petechial diatheſis, whether independent of fever, or occurring in the latter ſtage of typhus, ſmall-pox, &c. are commonly accompanied by hæmorrhages from other parts, and denote, not any particular diſeaſe of the urinary organs, but that looſe and uncoagulating condition of the blood, which is commonly aſſumed as a mark of its putreſcent ſtate. See Hæmorrhæa.

The ſtate of the urine, which is coloured by the red juices of ſome particular fruit, as the ficus opuntiæ, has given riſe to a ſpecies in the catalogue of Sauvages, by a ſort of ſolecism called Hæmaturia *deceptiva*. The ſame obſervation is applicable to his H. *ſpuria*, and H. *lateritia*, in both of which there is no blood in the urine; but this fluid is of a deep red colour, ſo as to give a ſuſpicion of its being tinged with blood. This occurs in ſome diſeaſes, and it is important in many caſes to determine, whether the red colour of the urine be from blood preſent in it, or from a ſuperabundance or altered condition of the ſalts and oils, which are conſtituent parts of the urine. According to Dr. Cullen, the queſtion may commonly be decided by the following conſiderations:

When any conſiderable quantity of blood is voided with the urine, there is always a portion of it depoſited at the bottom of the veſſel; and in ſuch a caſe, there will be no doubt in attributing the colour of the urine floating above, to ſome part of the blood diffuſed in it. The queſtion, therefore, can only occur, when no ſuch depoſition appears; and when the blood, that may be ſuppoſed to be preſent, is diſſolved or diffuſed, and therefore entirely ſuſpended in the urine. In this caſe the preſence of blood may be commonly known; 1ſt, by the colour which blood imparts to urine, and which a little experience will enable moſt perſons to diſtinguiſh. 2dly. By the circumſtance, that the preſence of blood always diminiſhes the tranſparency of the urine with which it is mixed; while the moſt high-coloured urine ſeldom loſes its tranſparency, at leaſt when it is recently voided. 3dly. When urine has blood mixed with it, it tinges a piece of linen dipt into it with a red colour, which the higheſt coloured urine without blood never does. 4thly. High-coloured urine, without blood, upon cooling and remaining at reſt in a veſſel, almoſt always depoſits a lateritious ſediment, and if bloody urine makes a depoſit of part of its blood in this way, the difference may be diſcerned by heating the urine, in which caſe the lateritious ſediment will be re-diſſolved, which will not happen to any ſediment of blood. Laſtly, we know no ſtate of urine without blood, which ſhews any portion of it coagulable by a heat equal to that of boiling water; but blood diffuſed in urine is ſtill coagulable in ſuch a heat; and by this teſt, therefore, the preſence of blood in urine may be commonly aſcertained. Cullen, Firſt Lines, par. 1044.

HÆMIONIUM, in *Botany*, a name by which Dioſcorides calls the *aſplenium*.

HÆMITYBION, in the *Writings of the Ancients*, a linen piece of apparel fringed on both ſides. Others call it a ſoft kind of handkerchief to wipe off ſweat; but Galen makes it ſignify a thick piece of linen cloth. In this he has an eye to ſome paſſages of Hippocrates, where the word ſeems plainly to be uſed in that ſenſe; others of the ancients have alſo uſed it exactly in the ſame meaning.

HÆMOCERCHNUS, of αιμα, *blood*, and κερχνος, *roughneſs of the throat*, in *Medicine*, a term uſed by ſome of the old writers for a ſpitting of blood, attended with a rattling noiſe in the noſe and fauces.

HÆMODIA, a ſtupor of the teeth, cauſed by auſtere and acid ſubſtances.

HÆMODORACEÆ, in *Botany*, ſo called from *Hæmodorum*, one of the genera which compoſe it; a natural order of plants eſtabliſhed by Mr. R. Brown. Prod. Nov. Holl. v. 1 299, who gives it the following characters. *Perianth* (rather *corolla*) ſuperior, rarely inferior, in ſix deep ſegments. *Stamens* inſerted into the ſame, ſix or three, in the latter caſe oppoſite to its inner ſegments; anthers in front. *Germen* with one, two, or many ſeeds in each cell; ſtyle ſimple; ſtigma undivided. *Pericarp* capſular, moſtly valvular, rarely without valves, and ſomewhat catkin-like. *Seeds* either definite and peltate, or indefinite. *Leaves* equitant.

Theſe plants differ from the *Enſatæ* of Linnæus and Gawler in having ſix ſtamens; or when there are only three, they are oppoſite to the inner ſegments of the (corolla or) calyx; the anthers moreover are placed on the fore or inſide, nor are the habits of the two orders ſimilar.—To this belongs *Dilatris*, *Lanaria*, *Wachendorfia*, and Michaux's *Heritiera*. *Xiphidium* remains doubtful, Mr. Brown having never ſeen its fruit. The New Holland genera which range under the order in queſtion are *Hæmodorum*, (ſee the next article); *Conoſtylis* and *Phlebocarya* of Brown; with *Anigozanthos* of Labillardiere.

HÆMODORUM, ſo named by the author of the preſent article, from αἱμα, *blood*, and δωρον, a *gift* or *offering*, becauſe of the fine red colour of the whole herb as well as flowers. The name is given by Theophraſtus to a ſort of *Orobanche;* what preciſe ſpecies cannot be determined. Some commentators would have the word αἱμοδερον, from δερα, the *ſkin*.—Smith Tr. of Linn. Soc. v. 4. 213. Vahl. Enum. v. 2. 179. Brown. Prod. Nov. Holl. v. 1. 299.—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Iridibus affine*, Juſſ. *Hæmodoraceæ*, Brown.

Gen. Ch. *Cal.* none, unleſs the corolla be taken for ſuch. *Cor.* ſuperior, regular, of ſix linear, ſomewhat ſpreading, permanent, ſmooth *petals*. *Stam.* Filaments three, inſerted into the three inner petals, awl-ſhaped, much ſhorter than the corolla; anthers incumbent, ovate-oblong, obtuſe, of two cells, burſting lengthwiſe in front. *Piſt.* Germen inferior, turbinate; ſtyle thread-ſhaped, longer than the ſtamens; ſtigma capitate. *Peric.* Capſule half-ſuperior, three-lobed, three-celled, with three heart-ſhaped valves, the partitions formed by their centres. *Seeds* two in each cell, peltate, depreſſed, thin, opaque, with a broad membranous border.

Eſſ. Ch. Petals ſix, ſuperior; the three inner ones bearing the ſtamens. Stigma capitate. Capſule half-ſuperior, of three cells. Seeds two in each cell, peltate, bordered.

A genus of New Holland, herbaceous, perennial, ſmooth plants, remarkable for their ſcarlet colour, which turns as black as ink in drying. Mr. Brown informs us the *roots* conſiſt of cluſtered ſpindle-ſhaped knobs, and even theſe are ſcarlet. The *ſtems* are ſolitary, two or three feet high, leafy; corymboſe, rarely ſpiked, in their upper part. *Leaves* ſimple, ſheathing, alternate, erect, either flat or ſomewhat cylindrical.

1. H. *coccineum*. Brown. n. 1.—Corymbs compound. Leaves flat. Three outer petals obtuſe, about half as long as the inner.—Gathered by Mr. Brown in the tropical part of New Holland. Of this we have ſeen no ſpecimen.

2. H. *planifolium*. Br. n. 2.—Corymbs compound; with ſpreading branches. Leaves flat. Inner petals rather the longeſt, bearing the ſtamens from their baſe.—Native of New South Wales, near Port Jackſon; communicated to us by ſir Joſeph Banks. The *branches* are long, and widely extended, the lateral or inferior ones riſing about the central part. *Filaments* ſlender. *Anthers* long. *Capſules* large.

3. H. *teretifolium*. Br. n. 3. (H. *corymboſum;* Vahl. Enum. v. 1. 179.)—Corymbs compound; their branches erect. Bracteas lanceolate, pointed. Leaves nearly cylindrical. Inner petals longeſt, bearing the ſtamens from their

middle.—Sent by Dr. White from Port Jackſon, New South Wales, in 1792. It was alſo gathered there, as well as the laſt, by Mr. Brown. The *infloreſcence* is cloſe and level-topped, exactly as in the genus *Corymbium*. *Filaments* and *anthers* ſhorter than in *H. planifolium*. This is the ſpecies from whence the generic character was originally taken, as will appear by comparing that character with the above ſpecific difference.

4. H. *laxum*. Br. n. 4.—“ Corymbs compound; their branches ſpreading. Bracteas oblong, obtuſe, membranous. Leaves nearly cylindrical.”—Diſcovered by Mr. Brown on the ſouthern coaſt of New Holland.

5. H. *ſpicatum*. Br. n. 5.—“ Spikes elongated. Flower-ſtalks in pairs.”—Found by Mr. Brown in the ſame country.

HÆMOPTYSIS, or HÆMOPTOË, in *Medicine*, from αἷμα, *blood*, and πτύω, *I ſpit*, ſignifies literally a *ſpitting of blood*.

It is not every diſcharge of blood by the mouth, however, to which the term is applied; for, in that caſe, the ſame appellation would denote ſeveral forms of diſeaſe, altogether diſtinct in their nature and origin, and equally different in the danger attendant on them, and in the method of treament requiſite for their cure. Blood eſcaping from the veſſels of the poſterior part of the noſe, of the gums, throat, gullet, and ſtomach, muſt of courſe be diſcharged by the mouth, as well as that which eſcapes from the veſſels of the lungs; but it is to this laſt ſpecies of hæmorrhage only that the term *hæmoptyſis* is appropriated; which is therefore ſynonymous with hæmorrhage from the lungs, or pulmonary hæmorrhage.

The careful diſtinction of this hæmorrhage, from thoſe juſt mentioned, is of conſiderable practical importance: becauſe, while the latter are generally neither the cauſe nor the effect of any dangerous condition of the body, hæmoptyſis is always an alarming affection; being moſt commonly either the precurſor of that moſt fatal malady, pulmonary conſumption, or one of the ſigns indicative of the commencement or actual preſence of the diſeaſe. Dr. Cullen, indeed, conſidered hæmoptyſis as the ordinary exciting cauſe of conſumption of the lungs; and, therefore, has violated the order of his noſological ſyſtem, by placing conſumption among the “Hæmorrhagiæ.” (Claſs I. Ord. 4.) But, as we have already ſtated, there are many reaſons for believing, that hæmoptyſis is often not the cauſe, but one of the ſymptoms of the diſeaſe. See CONSUMPTION.

When we reflect upon the ſtructure of the lungs, and the nature of the circulation through them, the frequency of the diſeaſe will be far from occaſioning any ſurpriſe. The blood-veſſels of the lungs are more numerous than thoſe of any other part of the body of the ſame bulk; indeed thoſe organs conſiſt almoſt entirely of blood-veſſels, the largeſt of which, as they ariſe from the heart, are more immediately, than in any other part, ſubdivided into veſſels of the ſmalleſt ſize; and theſe ſmall veſſels, ſpread out near the internal ſurfaces of the bronchial cavities, are ſituated in a looſe cellular texture, and covered by a tender membrane only. And when we conſider farther, the conſtant alternate compreſſion and dilatation of the whole collection of minute veſſels in reſpiration, and the frequency and readineſs with which they are gorged with blood, as by active exerciſe, ſevere coughing, ſneezing, &c. we may underſtand why a hæmorrhage from the lungs is one of the moſt frequent that occurs, and why any violent ſhock, given to the whole body, ſo readily produces it.

The ancients obſerved, that there are three ways in which blood might eſcape from the veſſels of the lungs, and give riſe to hæmoptyſis: namely, 1. By a mechanical rupture of the veſſels from external violence, which, according to Aretæus and Galen, was called ῥῆξις, or *rupture*: 2. By a corroſion of the veſſels from an acrimony of the fluids, which was termed διάβρωσις, *eroſion*; and, 3. By a mere dilatation of the extreme apertures of the veſſels, which they called ἀναστόμωσις, *anaſtomoſis*, or *opening of mouths*. (See Aretæus, de cauſ. et ſignis morbor. acut. lib. ii. cap. 2. Galen de uſu partium, lib. vii. cap. 3.) This diviſion of the modifications of hæmoptyſis was partly the reſult of obſervation, and partly of hypotheſis; as may be collected from the diagnoſtics and prognoſtics which they deduced from it. Thus an hæmoptyſis ariſing from the firſt of theſe cauſes may be recognized, they affirm, if a perſon ſpits blood immediately after a fall, or blow, lifting a great weight, &c.; in which caſe a ſudden *rupture* of the veſſels muſt be inferred. If one of the larger veſſels be thus ruptured, death may ſpeedily enſue, from the quantity of blood diſcharged; but if the hæmorrhage be moderate, this ſpecies of it may be conſidered as not without a conſiderable chance of a cure. But, 2dly. If the hæmoptyſis occur from eroſion of the veſſels, the cure will be much more difficult; for “in this caſe,” Aretæus obſerves, “an ulcer is produced, not a wound.” Hæmoptyſis may be known, it is added, to proceed from this cauſe, “if no external force has been applied; if a long irritating cough has preceded; if ſome pain has been felt in the inſide of the thorax; if the blood be ſpit out in ſmall quantities, but almoſt continually, or, at leaſt, if it often returns.” Now, the practical inference from theſe obſervations is ſound; but the exiſtence of a corroſive acrimony in the blood is purely hypothetical. Theſe preceding and concomitant ſymptoms juſtly intimate the danger of the hæmoptyſis; becauſe they imply a conſiderable progreſs of diſeaſe in the lungs towards a confirmed conſumption, of which the hæmoptyſis is at once a ſign and a conſequence. But, 3dly, a ſpitting of blood from *anaſtomoſis*, or dilatation of the mouths of the veſſels, was deemed far leſs dangerous; becauſe the veſſels, although dilated, were entire, and would contract again, it was believed, by their own elaſticity; and the fluids were at the ſame time healthy. This ſpecies of hæmoptyſis was ſaid by Aretæus to occur in women during a ſuppreſſion of the catamenia, of which it was vicarious: and Galen remarks, that it was altogether free from pain in the part affected, which occurred in the other two ſpecies. In this caſe again, although the inference of the comparative ſafety of a vicarious hæmoptyſis is in ſome degree correct, yet the ſuppoſition of the blood being diſcharged ſimply from the dilated mouths of the exhalent arteries, without any rupture of veſſels, is altogether gratuitous.

A more correct and uſeful view of the varieties of hæmoptyſis may be obtained if we lay aſide hypotheſis, and conſider the various conditions of the body in which theſe modifications appear, as well as the morbid ſtate of the lungs, which diſſection diſcovers to us in conſumptive diſeaſes, and which the ancients had not the opportunities of inveſtigating.

There are ſeveral obvious peculiarities of conſtitution, which appear to prediſpoſe the individual poſſeſſing them to the occurrence of hæmoptyſis. A general delicacy of habit, which is marked by a ſlender make, a delicate ſkin, fine complexion, a flaccidity and ſoftneſs of the muſcular parts, a long neck, and narrow cheſt, in which the veſſels of the lungs are equally delicate with thoſe of the other parts of the body, may be conſidered as conſtituting a particular prediſpoſition to hæmoptyſis. In ſuch a habit there is generally alſo a great degree of ſenſibility and irritability.

irritability, and therefore ſome acuteneſs of the mental faculties and cheerfulneſs of diſpoſition. This form and conſtitution are frequently hereditary. In addition to the general delicacy of ſuch a habit, it frequently has ſomewhat of a ſcrofulous taint, that is, any ſolution of parts, which it ſuffers, inſtead of readily healing by the adheſive inflammation, is liable to go on to an unfavourable ſuppuration. The narrowneſs of the cheſt, as Dr. Cullen obſerves, implies a ſmaller capacity of the lungs than in more hardy habits; whence there muſt be a faulty proportion between the capacity of the veſſels of tht lungs, and that of the veſſels of the reſt of the body, and conſequently a tendency to an habitual plethora of the lungs. Whenever, therefore, the balance of the circulation between the ſyſtems of the pulmonary artery and of the aorta is diſturbed, the danger of hæmoptyſis muſt occur.

Such being the condition of the body, it will appear, that a ſpitting of blood may be occaſioned from the mere circumſtance of the prediſpoſition, or prediſponent cauſe, ariſing to a conſiderable height; when, under the ordinary actions of life, the circulation is even ſlightly diſturbed. But in thoſe who are prediſpoſed to it, hæmoptyſis is readily brought on by various exciting cauſes. Thus expoſure to great external heat, as in manufacturers employed in furnaces, glaſs-houſes, &c.; all violent ſtrainings of the muſcles, ſuch as attempts to lift or carry burdens of great weight; blowing violently, as in playing on trumpets, or other wind inſtruments; great exertions, by which the circulation is hurried, as in wreſtling, running, jumping, aſcending declivities, and the like; in which the extreme congeſtion of the blood in the veſſels of the lungs is evinced by the ſhort and laborious breathing, the ſenſe of ſuffocation or of ſtuffing in the breaſt, and the violent efforts of the heart to overcome the reſiſtance. To the laborious exertion in climbing mountains, therefore, rather than to the rarity of the air, we ſhould be diſpoſed to aſcribe the occurrence of hæmoptyſis under ſuch circumſtances. Among other cauſes, which diſturb the balance of circulation, and occaſion a congeſtion of blood in the lungs, and hæmoptyſis in thoſe who are prediſpoſed to it, we may add exceſſive drinking of intoxicating liquors; violent emotions of the mind, eſpecially anger; and laſtly, all great and ſudden agitations of the cheſt, as by coughing, ſhouting, ſneezing, and the like.

It is to be obſerved, however, that this prediſpoſition of conſtitution, and this delicacy and diſproportion in the formation of the lungs, are frequently conjoined with actual diſeaſe in theſe organs, previous to the occurrence of hæmoptyſis. Diſſection has ſhewn, that, in individuals of the phthiſical temperament, the formation of tubercles had gone on to a conſiderable extent in the lungs, before the bleeding had taken place. Theſe little bodies, which are generally conſidered as of a ſcrofulous nature, contribute to diminiſh the already too contracted capacity of the cheſt, and to impede the free circulation; they are alſo liable to inflame from expoſure to cold; and their ordinary progreſs is to a ſlow and bad ſuppuration, forming ulcers of various extent. Thus the rupture of the minute veſſels is greatly endangered by the obſtruction of the circulation, by the partial inflammations, and is directly cauſed by the deſtruction of thoſe minute veſſels by the proceſs of ulceration. Theſe laſt modifications of hæmoptyſis are apparently thoſe included by the ancients under the hæmoptyſis by *diabroſis*; and the correctneſs of their unfavourable prognoſis, as well as of their diagnoſis, in ſuch caſes is thus ſatisfactorily explained. The ſpontaneous occurrence of the hæmorrhage, or at leaſt the "abſence of any external force," together with the "previous exiſtence of an irritating cough, and pain in the ſide," reſult from the actual previous diſeaſe of the lungs; and the greater danger of this ſpecies of hæmoptyſis neceſſarily follows from the tendency of this previous diſeaſe to go on to a bad ſuppuration, that is, to pulmonary conſumption.

This view of the ſubject likewiſe ſerves to explain why the hæmorrhage from the lungs in the two other ways abovementioned, namely, from mechanical rupture by external violence, and as vicarious of ſuppreſſed diſcharges, (ſuch as the catamenia, the piles, &c.) is much leſs dangerous than that from *diabroſis*. For, as they do not imply any previous malformation or phthiſical habit, the veſſels may heal, as in other caſes of hæmorrhage, as from the noſe, bowels, &c. and the healthy circulation be reſtored. And ſuch, in fact, is frequently the event. Nevertheleſs, there is always ſome degree of danger from a rupture of the veſſels of the lungs, however occaſioned. For the conſtant motion of the part, its unceaſing expoſure to the air inhaled in reſpiration, and the extreme delicacy and ſlight ſupport of the minute veſſels in the lungs, render the healing of thoſe veſſels more difficult than in other parts of the body; ſo that, where there is not very conſiderable vigour of conſtitution, or where the leaſt prediſpoſition to the diſeaſe exiſts, ſuch accidental injury to the veſſels may lay the foundation of conſumption, which under other circumſtances would not have occurred.

In whatever manner hæmoptyſis is occaſioned, it moſt commonly comes on with a ſenſe of weight and anxiety in the cheſt, ſome uneaſineſs in breathing, ſome pain of the breaſt or other parts of the thorax, and ſome ſenſe of heat under the ſternum or breaſt-bone; and very often, before the diſeaſe appears, a ſaltiſh taſte is perceived in the mouth. Immediately before the diſcharge of blood a degree of irritation is felt at the top of the larynx, to relieve which a hawking is made, which brings up a little blood, of a florid colour, and ſomewhat frothy. The irritation returns; and in the ſame manner more blood of a like kind is brought up, with ſome noiſe in the windpipe, as of air paſſing through a fluid. The blood iſſuing is ſometimes at firſt in very ſmall quantity, and ſoon diſappears altogether; but in other caſes, eſpecially when it repeatedly occurs, it is in greater quantity, and frequently continues to appear for ſeveral days together. It is ſometimes profuſe, but rarely in ſuch quantity as, either by its exceſs, or by its ſudden ſuffocation, to prove immediately mortal. It commonly either ceaſes ſpontaneouſly, or is ſtopped by the remedy employed.

With regard to the *diagnoſis*, it is very neceſſary, as we have already remarked, to diſtinguiſh the different parts from which blood, thrown out by the mouth, proceeds; whether from the internal ſurface of the mouth itſelf, from the fauces, or the adjoining cavities of the noſe, from the ſtomach, or from the lungs. In moſt inſtances this diſtinction may be made by attending to the following circumſtances.

When blood ſpit out proceeds from ſome part of the internal ſurface of the mouth itſelf, it comes out without any hawking or coughing; and generally, upon inſpection, the particular ſource of it becomes evident. When it proceeds from the throat or adjoining cavities of the noſe, it may be brought out by hawking, and ſometimes by coughing; ſo that, in this way, a doubt may ariſe concerning its real ſource. A patient often lays hold of theſe circumſtances to pleaſe himſelf with the opinion, that it comes from the fauces, and he may be allowed to do ſo; but a phyſician cannot readily be deceived, if he conſider, that a bleeding from the fauces is more rare than one from the lungs; that the former ſeldom happens but to perſons who have been before liable either to an hæmorrhagy of the noſe, or to ſome evident cauſe of eroſion ; and in moſt caſes, by looking into the fauces, the diſtillation of the blood, if it come from thence, will be perceived.

When vomiting accompanies the diſcharge of blood by the mouth, ſince vomiting and coughing often mutually excite each other, ſo they may be frequently joined, and render it doubtful, whether the blood thrown out proceeds from the lungs or from the ſtomach. We may generally decide, however, by conſidering, that blood does not ſo frequently proceed from the ſtomach as from the lungs ; that blood proceeding from the ſtomach commonly appears in greater quantity, than when it proceeds from the lungs ; that when it is diſcharged from the lungs, it is uſually of a florid colour and mixed with a little frothy mucus only ; whereas, when it proceeds from the ſtomach, it is commonly of a darker colour, more grumous, and mixed with the other contents of that organ ; and that the coughing or vomiting, according as the one or the other *firſt* ariſes, in the caſes in which they are afterwards joined, may ſometimes point out the ſource of the blood. Not to mention that the vomiting of blood happens moſt frequently to females. (See HÆMATEMESIS.) But when to all theſe conſiderations we add the obſervation of other circumſtances, which may concur to point out the lungs as the ſeat of the diſeaſe, the preſence of hæmoptyſis may commonly be ſufficiently aſcertained : theſe are the periods of life, between puberty and thirty-five ; the form and habit of body, and other marks of a prediſpoſition, already ſtated ; the actual previous exiſtence of cough, pain of the ſide, and other ſymptoms of diſorder in the cheſt ; and more eſpecially if, together with theſe, ſome of the exciting cauſes have immediately before been applied. (Cullen.)

Of the Cure of Hæmoptyſis.—As the hæmoptyſis, which occurs in thoſe who are prediſpoſed to the diſeaſe, is always accompanied by what has been termed a phlogiſtic diatheſis, or a certain degree of febrile action in the arterial ſyſtem, the principal indications of cure will be, firſt, to remove this diatheſis, and every ſpecies of irritation, which may contribute to keep it up ; after which we muſt endeavour to allay pain, and to procure an agreeable diſtribution of blood throughout the vaſcular ſyſtem, and thus to take off too great a determination of blood to particular parts. At the ſame time we muſt be careful to avoid or to remove ſuch occaſional cauſes, as may ſtill continue to operate.

It will be generally neceſſary, therefore, to purſue the antiphlogiſtic regimen, with more or leſs rigour, according to the ſtrength of the patient. When the temperament is ſanguine, and the ſtrength not impaired, it is ſometimes adviſable to reſort to blood-letting, in order ſpeedily to reduce the general inflammatory ſtate of the ſyſtem. This evacuation was formerly carried to a great extent, in conſequence of the appearance of the inflammatory cruſt, or buffy coat, upon the blood drawn : but farther experience has ſhewn that this buffy coat continues to appear on the blood, even to the laſt ſtage of conſumption, and, therefore, is no proper practical guide to the uſe of the lancet. Hence, although ſmall bleedings afford a temporary relief, yet, as they contribute to reduce the declining ſtrength of the patient, they are not generally reſorted to in the delicate habits, that are moſt frequently the ſubjects of hæmoptyſis. This inflammatory diatheſis may be more ſafely combatted by gentle laxatives, eſpecially of the ſaline claſs ; and by regulating the temperature of the apartment of the patient, ſo as to avoid the influence of external heat, by retaining a regular and moderate coolneſs, and alſo by avoiding the uſe of too much cloathing. Yet the irregular tranſition from heat to cold, or the contrary, by paſſing from a warm houſe to the cold and moiſture of a wintry or vernal atmoſphere, and *vice verſa*, is ſtill more pernicious, and ought to be ſcrupulouſly ſhunned.

The ſame object will be aided by the medicines, which are called refrigerants and ſedatives, or ſuch as allay the exceſſive irritability of the heart and arteries. Hence the uſe of the vegetable and mineral acids is frequently reſorted to ; and the neutral ſalts, eſpecially nitre, have been conſiderably extolled for their virtues in the cure of hæmoptyſis. Dr. Dickſon affirms, that, when nitre was given early in hæmoptyſis, he could almoſt equally depend upon it, as upon the Peruvian bark for the cure of an intermittent fever. (See Med. Obſ and Inquir. vol. iv. p. 209.) The elixir of vitriol, as it was formerly called, or the diluted ſulphuric acid, has alſo been an eſteemed remedy for ſpitting of blood ; and it is ſtill commonly preſcribed, and often with advantage, under the form of the infuſion of roſes (of the pharmacopœias). It muſt be obſerved, however, that hæmoptyſis is very liable to ceaſe ſpontaneouſly after a ſhort time, ſometimes to appear no more during the progreſs of the conſumption, which too often follows it, but often to return for a certain period, and ceaſe again : whence, it is eaſy for any medicine, which happens to be adminiſtered at the time, to gain the credit of the cure ; and our concluſions, reſpecting the efficacy of any medicine in the diſeaſe, ought, therefore, to be drawn with much caution.

The digitalis, or fox-glove, wich appears to be poſſeſſed of powerful ſedative properties upon the action of the vaſcular ſyſtem, has frequently, in the ſame manner, been followed by the ſpeedy ceſſation of hæmoptyſis, and is, doubtleſs, an uſeful auxiliary in repreſſing the diſeaſe. Ceruſſa acetata has alſo been employed for the ſame purpoſe, eſpecially by the continental phyſicians, and by ſome of them much extolled : but the deleterious conſequences which are known to reſult from the poiſon of lead, however introduced into the ſyſtem, have rendered Engliſh practitioners, in general, averſe to the employment of this medicine.

With a view to relieve pain, and procure an equable diſtribution of blood, the uſe of ſmall doſes of opium, (which, however, is prejudicial in very acute forms of the diſeaſe), hyoſcyamus, and conium, (formerly called cicuta,) is to be reſorted to, as well as that of gently relaxing diaphoretics. And although nothing is more neceſſary in hæmoptyſis than avoiding bodily exerciſe ; yet ſome kinds of geſtation, ſuch as ſailing, ſwinging, and travelling in an eaſy carriage, on ſmooth roads, have often proved a remedy ; probably by determining the flow of blood from the lungs to the ſurface and extremities. Bliſters applied to the breaſt, or back, are ſometimes beneficial.

Both during the preſence of hæmoptyſis, and after its ceſſation, the diet ſhould be exceedingly light, and free from any ſtimulant properties. Spirituous and fermented liquors ſhould be totally refrained from, as well as ſolid animal food ; the various preparations of milk, vegetables, the farinacea, and fruits, ſhould conſtitute the chief or ſole aliment of the patient. This plan is not leſs uſeful with a view to prevent a return, than to aid in the removal of the diſeaſe, when preſent.

We have ſaid nothing reſpecting the exhibition of cinchona and chalybeate medicines, which were formerly recommended, as experience ſeems to have proved them prejudicial to this diſeaſe. See Cullen, Firſt Lines, par. 830, et ſeq. Van Swieten. Aph. 1198, et ſeq.

HÆMORRHÆA PETECHIALIS, a diſeaſe which has received a variety of denominations, and appears to be a modification of the ſcurvy (ſcorbutus) ſtrictly ſo called.

This diſeaſe reſembles the ſea-ſcurvy in its leading ſymptoms, being chiefly characterized by the appearance of *petechiæ* and *vibices*, or purple ſpots, and livid effuſions, as from the ſtrokes of a whip, or bruiſes, unconnected with fever, and accompanied, in ſome caſes, with the diſcharge of conſiderable quantities of blood from various parts of the body. At the ſame time it differs from the ſcurvy, in the non-appearance of ſpongineſs in the gums, of fœtid ulcers on the extremities, &c. in originating independently of ſalted proviſions, and in not being curable by citric acid and freſh vegetables, and in the general courſe of the diſeaſe.

It has been denominated "land-ſcurvy;" "petechiæ ſine febre," (by Dr. Graaf, Göttingen, 1775,) a term moſt generally adopted; "Purpura," and "Purpura ſine febre," (by Cuſſon,) "Phænigmus petechialis," (by Sauvages,) and "Aimorrhæa," (by Dr. Duncan). The appellation of hæmorrhæa petechialis was given to it by Dr. Adair, in his inaugural diſſertation, Edin. 1789, and, as it deſignates the diſeaſe by its two leading ſymptoms, the paſſive hæmorrhage, and the petechiæ, it appears to be the moſt appropriate term. But as Dr. Willan's nomenclature of cutaneous diſeaſes, in which the old appellation of "Purpura" is retained, is likely to be generally adopted in the profeſſion, we ſhall defer the deſcription of this ſingular diſeaſe to that head.

HÆMORRHAGIA, or Hæmorrhage. See Hemorrhage.

HÆMORRHOIDS. See Hemorrhoids.

HÆMORRHOSCOPIA, formed of αιμα, *blood*, ρεω, *I flow*, σκοπεω, *I obſerve*, an old term, uſed by the writers in *Medicine*, to expreſs an examination of the blood drawn from a patient by phlebotomy, in order to judge of the nature of a diſeaſe by it.

HÆMORRHUS, in *Zoology*. See *Blood* Snake.

HÆMOSTASIA, formed of αιμα and στασις, *ſtation*, or *reſt*, occurs in ſome writers as the name of a diſeaſe occaſioning ſudden death; and it is ſaid to be a total ſtagnation of the whole maſs of blood from a plethora.

HÆMOSTATICA, formed of αιμα and ιστημι, *I ſtop*, a name given by ſome authors to medicines uſed to ſtop hæmorrhages, whether internally taken, or externally applied.

HÆMUS, in *Geography*, a mountain, rather a chain of mountains, of European Turkey, that ſeparates Servia from Macedonia. This chain has been much celebrated by the ancients, on account of its great elevation, as well as extent, as they infer from the numerous and large rivers which iſſue from its ſides. But Dr. Brown, who has viſited parts of this mountain, and who informs us that it is ſuppoſed to extend from the Euxine to the Adriatic, concludes that the elevation cannot be conſiderable, becauſe no ſummit of it is covered with perpetual ſnow. The middle parts of this chain were by the ancients called Scomius and Orbalus, while the Scardus may be conſidered as its furtheſt branch on the weſt. If with M. D'Anville we place the "Hæmi extrema," the fartheſt eaſtern point of the Hæmus at Emineh, and extend it thence above Filipopoli and Sofia to the S. of Servia, we ſhall find an extent of more than 400 miles, now known under various names, as Emineh, or Hemineh Dag, perhaps a remnant of the ancient appellation, on the E.; Bulkau and Samoco in the middle; Joan W.; while the Deſpeto Dag branches off to the S.E.; and may, perhaps, be the Rhodopé of the ancients. From the weſtern branch of the Hæmus ſeem to branch off two other extenſive chains; one running N.W. between Dalmatia on the W., and Boſnia and Servia on the E.; while the other paſſing S. forms the mountains of Albania, and the W. of Greece. The northern chain begins with the Scardus of the ancients, continued by the Buſſinius and the Albius. Pinkerton.

HAEN, Anthony de, in *Biography*, profeſſor of the practice of medicine in the univerſity of Vienna, was born at Leyden in 1704, and was one of the diſtinguiſhed pupils of the celebrated Boerhaave. After having received the degree of M. D. at his native place, he ſettled at the Hague, where he practiſed with conſiderable reputation and ſucceſs for nearly twenty years. Baron Van Swieten, however, being acquainted with the extent of his talents, invited him to remove to Vienna, with the view of uniting with him in the propoſed plan of reform, which he had prevailed on the empreſs to ſupport, in the medical faculty of that capital. De Haen accordingly repaired to that city in 1754; and his merits were found fully equal to the expectations that had been formed of them. At the expreſs command of Maria Thereſa, he undertook a ſyſtem of clinical education, in the hoſpital which he ſuperintended, as the moſt advantageous method of forming good phyſicians: the reſult of this duty was the collection of a great number of valuable obſervations, which were publiſhed in the ſucceſſive volumes of the work, entitled "Ratio Medendi in Noſocomio Practico," Vienna, 1757, which amounted ultimately to ſixteen. He died in the year 1776, at the age of ſeventy-two.

He left ſeveral other works, of which the following are the titles: "Hiſtoria Anatomico-Medica morbi incurabilis Medicos paſſim fallentis," Hague, 1744. "De Colica Pictonum Diſſertatio," ibidem, 1745. "De Deglutitione impeditâ." ibid. 1750. "Quæſtiones ſuper Methodo inoculandi Variolas," Vienna, 1757. "Theſes pathologicæ de Hæmorrhoidibus," ibid. 1759. "Refutation de l'Inoculation ſervant de reponſe à M. M. De la Condamine et Tiſſot," Vienna, 1759. "Theſes ſiſtentes febrium diviſiones," ibid. 1760. "Difficultates circa modernorum ſyſtema de ſenſibilitate et irritabilitate corporis humani," 1761. "Vindiciæ difficultatum circa, &c." ibid. 1762. "Lettre à un de ſes amis au ſujet de la Lettre de M. Tiſſot à M. Hirzel," 1758. "Reſponſio ad apologeticam Epiſtolam Balthaſaris-Ludovici Tralles, circa Variolarum Inoculationem, &c." ibid. 1764. "Epiſtola de Cicutâ, &c." ibid. 1765.

Gruner, in his Medical Almanac for 1782, ſays, "Van Haen was a man of great learning and practical knowledge, but an enemy to all new opinions, which he violently oppoſed; as appears from his diſpute with Haller on irritability and ſenſibility; with Tralles on inoculation; and with baron Von Storck, on the uſe of poiſonous plants in medicine; and from his obſervations on the nature and origin of malignant fevers, on the plague, &c.; in which, however, ſetting aſide the polemic part, the reader will find a great deal of uſeful information." See Eloy. Dict. Hiſt. Gen. Biog.

HÆPHESTITES Lapis, in *Natural Hiſtory*, a name given by authors to a ſtone of a reddiſh colour, and capable of a high poliſh. The ancients gave it this name, from its property of ſetting fire to dry ſubſtances by reflection, when formed into a concave ſpeculum. They hence called it the *Vulcanean-ſtone*, or *fire-ſtone*, not conſidering that the ſhape into which they formed it, and not the nature of the ſtone, was the cauſe of the effect; any ſtone being capable of the ſame, if hard enough to bear a proper poliſh. About Hilderſheim they have, at this time, a ſort of blackiſh-red coarſe jaſper, which they take to be the hæpheſtites of the ancients, and uſe it, at this day, for the ſame purpoſes, hollowing large pieces of it into ſpeculums, and ſetting them, when well poliſhed, in proper frames, and uſing them as burning-glaſſes.

HÆNEL, Jacob, Hændl, or Gallus, in *Biography*, mentioned by Walther under all theſe names, was chapel-maſter to the biſhop of Olmutz, and a publiſher of four books of ſpiritual cantatas or motets, at Prague, in four, five, and ſix parts; in the laſt ſet of which, a motet of his compoſition, in twenty-four parts, for four choirs, gained him great reputation among the admirers of polyphonic compoſition.

He was a native of Crain, in Germany, and flouriſhed about the middle of the ſixteenth century.

HÆREDE Abducto, in *Law*, is a writ which anciently lay for the lord, who, having by right the wardſhip of his tenant under age, could not obtain his body, as being conveyed away by another.

Hærede *deliberando alii qui habet cuſtodiam terræ*, a writ directed to the ſheriff, willing him to command one that had the body of him who was ward to another, to deliver him to the perſon whoſe ward he was on account of his land. See Ward.

Hærede *Rapto*. See Forcible *Abduction*, and Raviſhment *de Gard*.

HÆREDIPETA, in our *Ancient Law Books*, the next heir. See Heir.

"Et mellus hæredipeta ſuo propinquo vel extraneo periculoſa ſane cuſtodia committatur." Leg. Hen. I. cap. 70.

HÆREDITAS Jacens. See Abeyance and Occupancy.

HÆRESIARCH, Hæresiarcha, of the Greek, αιρεσιαρχης, an arch-heretic. See Heretic.

HÆRESIS, the ſeparation of a diſeaſed from a ſound part.

Hæresis, *Hereſy*. See Heresy.

HÆRETICO Comburendo, in *Law*, a writ which anciently lay againſt an heretic, who having once been convicted of hereſy by his biſhop, and having abjured it, afterwards falling into it again, or into ſome other, is thereupon committed to the ſecular power. This writ is thought by ſome to be as ancient as the common law itſelf; however, the conviction of hereſy by the common law was not in any petty eccleſiaſtical court, but before the archbiſhop himſelf in a provincial ſynod, and the delinquent was delivered over to the king, to do with him as he pleaſed: ſo that the crown had a controul over the ſpiritual power, and might pardon the convict by iſſuing no proceſs againſt him; the writ being not of courſe, but iſſuing by the ſpecial direction of the king in council. (1 Hal. P. C. 395.) But by 2 Hen. IV. cap. 15. the dioceſan alone, without the intervention of a ſynod, might convict of heretical tenets: and unleſs the convict abjured his opinions, or if after abjuration he relapſed, the ſheriff was bound *ex officio*, if required by the biſhop, to commit the unhappy victim to the flames, without waiting for the conſent of the crown. This writ remained in force, and was actually executed on two Anabaptiſts in the ſeventeenth of Elizabeth, and on two Arians in the ninth of James I.

Sir Edward Coke was of opinion, that this writ did not lie in his time; but it is now formally taken away by ſtatute 29 Car. II. cap. 9. But this ſtatute does not extend to take away or abridge the juriſdiction of Proteſtant archbiſhops or biſhops, or any other judges of any eccleſiaſtical courts, in caſes of atheiſm, blaſphemy, hereſy, or ſchiſm, and other damnable doctrines and opinions; but they may prove and puniſh the ſame according to his majeſty's eccleſiaſtical laws, by excommunication, deprivation, degradation, and other eccleſiaſtical cenſures, not extending to death, in ſuch ſort and no other, as they might have done before the making of this act. (Sec. 2.) See Heresy.

HÆRETICUS, Heretic. See Heretic.

HÆRINGHE, in *Geography*, a town of France, in the department of the Lys, and chief place of a canton, in the diſtrict of Furnes. The place contains 1309, and the canton 13,931 inhabitants, on a territory of 167½ kiliometres, in 13 communes.

HÆRLEBECKE, a town of France, in the department of the Lys, and chief place of a canton, in the diſtrict of Courtray. The place contains 2990, and the canton 14,457 inhabitants, on a territory of 85 kiliometres, in 5 communes.

HAERLEM, or Haarlem, a large, handſome, rich, and populous city, of Holland, the capital of a country called "Kemmer," ſituated about a league from the ſea, on the river Sparen. It is fortified, like Leyden, by old brick walls; and contains, beſides the church, which was once the cathedral, and which is reckoned the largeſt in the province of Holland, four Dutch churches, one French, one Lutheran, one Arminian, four Anabaptiſt, and alſo private houſes or chapels for the Roman Catholics. In the great church are preſerved the models of three ſhips, in which ſome cruſaders from Haerlem ſailed to Damietta in 1249, and in the ſteeple are two bells brought from that place. Its celebrated organ is more remarkable for power than ſweetneſs. The ſtadt-houſe is a grand building, ſituated at one end of the market-place; it contains many valuable pictures, and, among others, the firſt painting in oil by Eyck in 1437, ſold, during the ſiege in 1572, for a few ſtivers, and now valued at 2000*l.* The magiſtracy is compoſed of an eſcaut or bailiff, a penſionary, two burgomaſters, ſeven echevins, and 22 common-councilmen. The number of inhabitants is reckoned at about 40,000. Haerlem carries on conſiderable manufactures in linen, ribbands, and tapes, and exports a great quantity of beer to Frieſland, and other places. Here is alſo a great trade for flowers. The houſe of Laurence Coſter, to whom the Dutch aſcribe the invention of the art of printing, is ſituated near the great church; but their boaſt has been ſuperſeded in favour of Mentz; 10 miles W. of Amſterdam. N. lat. 52° 22′. E. long. 4° 37′.

This city is rendered intereſting to lovers of muſic by the fame of its organ in the great church.

In order to hear and examine which, we, thirty years ago, expreſsly viſited that city. Expectation, however, when raiſed very high, is not only apt to ſurpaſs probability, but poſſibility. Whether imaginary excellence diminiſhed the real, on this occaſion, we know not, but we were ſomewhat diſappointed upon hearing this inſtrument. In the firſt place, the perſon who plays it is not ſo great a performer as he imagines; and in the next, though the number of ſtops amounts to ſixty, the variety they afford is by no means equal to what might be expected. As to the *vox humana*, which is ſo celebrated, it does not at all reſemble a human voice, though a very good ſtop of the kind: but the world is very apt to be impoſed upon by names; the inſtant a common hearer is told that an organiſt is playing upon a ſtop which reſembles the human voice, he ſuppoſes it to be very fine, and never enquires into the propriety of the name, or exactneſs of the imitation. However, with reſpect to our own feelings, we muſt confeſs that of all the ſtops which we have yet heard, that have been honoured with the appellation of *vox humana*, no one in the treble part has ever reminded us of any thing human, ſo much as of the cracked voice of an old woman of ninety, or, in the lower parts, of Punch ſinging through a comb.

As this organ is not only ſaid to be the largeſt, but the beſt in Europe, that is, in the world, we ſhall in the article Organ give a liſt of the ſtops which it contains, with equivalent Engliſh names, to ſuch as are uſed in our country, and ſhort explanations of the reſt.

This inſtrument has ſixty ſtops, two tremulants, two couplings, or ſprings of communication, four ſeparations or valves to cloſe the wind-cheſt of a whole ſet of keys, in caſe of a *cipher*, and twelve pair of bellows.

Upon the whole, it is a ſtupendous ſtructure, though we think that given to the new church at Hamburgh is larger, and that of the old kirk, in Amſterdam, better-toned; but all theſe enormous machines ſeem loaded with uſeleſs ſtops, or ſuch as only contribute to augment noiſe, and to ſtiffen the touch.

Haerlem *Iſlands*, a cluſter of ſmall iſlands in a bay on the N. ſide of New Guinea. S. lat. 3° 42′. E. long. 13 6′.

Haerlem *Meer*, a large lake of Holland, between Amſterdam, Leyden, and Haerlem, navigable for boats

HÆRUCA, in *Zoology*, a genus of inteſtinal worms eſtabliſhed by Goëze, and which, according to that writer, has the body round, the anterior part two-necked, and ſurrounded by a row of prickles; and no proboſcis.

This genus is cloſely allied to that called by helminthologiſts *echinorynchus*, the principal difference conſiſting in the latter-mentioned tribe being furniſhed with a retractile proboſcis, while the hæruca is entirely deſtitute of that organ. It may be proper to obſerve that, notwithſtanding this obvious diſſimilarity, and the credit uſually aſcribed to the accuracy of Goëze, ſome continental writers reject his genus hæruca, and refer the ſpecies he deſcribes to the analogous genus *echinorynchus*; Gmelin neverthеleſs adopts it, the genus being inſerted in the laſt edition of the Linnæan Syſtema Naturæ. The ſpecies called by Goëze murio, was diſcovered by that naturaliſt in the inteſtines of the mouſe; the body is greyiſh-white, and wrinkled.

HAFAIVA, in *Geography*, one of the Friendly iſlands, about 6 leagues N.N.E. of Annamooka.

HAFAR, a town of Perſia, in the province of Chuſiſtan; 36 leagues S. of Suſa.

HAFDAEL, a town of Norway, in the dioceſe of Drontheim; 55 miles N.E. of Runſdal.

HAFENREFFER, Samuel, in *Biography*, a phyſician, was born in the duchy of Wirtemberg, and practiſed his profeſſion firſt at Kircheim, in Suabia, and afterwards at Tubingen, where he became a profeſſor, and taught with conſiderable reputation. He died in 1660, at the age of 73. He left ſeveral works, to moſt of which he gave the quaint titles peculiar to the times and the country in which he lived. Theſe are "Raphaël Artem Medicam feliciter cùm inchoandi, tum continuandi, &c.," Tubingen 1622, 12mo. reprinted at Francfort and Ulm. "Pandocheion æolodermon, ſive Noſodochium cutis, &c." ibid. 1630, 8vo.—"Vexillum Raphäeliticum, &c." ibid. 1631. "Monochordon ſymbolico-biomanticum, abſtruſiſſimam Pulſuum doctrinam ex harmoniis muſicis dilucidè, figuriſque oculariter demonſtrans. &c." Ulm, 1640, 8vo.—"Officina iatrica, continens pharmaca ſelecta, Hippocratico-Galenica et Hermetico-Paracelſica, &c." ibid. 1653, 8vo—Eloy Dict. Hiſt.

HAFFHERT, in *Ornithology*, the name of a bird deſcribed by Hoier, which is ſeen uſually at ſea, and is ſuppoſed to be a foreteller of ſtorms. See Procellaria *Glacialis*.

HAFIZI, or Hafizler, is a name given in Turkey to thoſe who learn the whole Alcoran by heart; and who, on this account, are held in great veneration by the people.

HAFLE, in *Ichthyology*, one of the names of the dolphin of the Portugueſe, and coryphæna hippurus of Linnæus.

HAFNER, in *Biography*, a muſical publiſher of Nuremberg, in Germany, who engraved muſic on copper during the laſt century, in a more neat manner than moſt other publiſhers in Europe. Many of the earlieſt and beſt works of Emanuel Bach have been delivered to the public from the ſhop of Hafner.

HAG, in *Rural Economy*, a term provincially applied to a coppice, or originally, perhaps, ſuch wood as was ſet apart for the purpoſe of fuel.

Hag-*Fiſh*, in *Ichthyology*. See Gastrobranchius.

HAGA, in our *Old Writers*, has different ſignifications. In Doomſday it is taken for a houſe in a city or borough. An ancient anonymous author ſays it is a houſe with a ſhop, *Domus cum ſhopa*.

HAGABLUM, the ſame with *gablum* or *gabel*.

HAGÆA, in *Botany*, in honour of M. Lahaye, a botanical gardener, who went out with the expedition in ſearch of De la Pérouſe, and found this plant on the Peak of Teneriffe. Lamarck had called it *Polycarpæa*, from its reſemblance to *Polycarpon*; but ſuch a name is altogether untenable, and Ventenat therefore rejected it for the above. Vent. Fabl. du Regne Veg. v. 3. 240. (Polycarpæa; Lamarck. in Journ. d'Hiſt. Nat. v. 2. 1. t. 25. Dict. v. 5. 482.)—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Caryophyllei*, Linn. Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of five lanceolate, concave, membranous-bordered, permanent leaves. *Cor.* Petals five, ovate-oblong, equal, rather ſhorter than the calyx, emarginate. *Stam.* Filaments five, awl-ſhaped, rather membranous at the baſe, alternate with the petals, and nearly as long; anthers ovate, of two cells. *Piſt.* Germen ſuperior, ovate, with three angles; ſtyle ſimple, the length of the ſtamens; ſtigma obtuſe. *Peric.* Capſule ovate, triangular, acute, of one cell, and perhaps three valves, encloſed in the permanent calyx. *Seeds* ſeveral, oval, a little compreſſed on one ſide, ſmooth, attached by threads to the baſe of the capſule.

Eſſ. Ch. Calyx of five leaves. Petals five, emarginate. Capſule three-ſided, of one cell, with ſeveral ſeeds.

1. H. *canarienſis*. (Illecebrum canarienſe; Linn. Suppl. 161. Willd Sp. Pl. v. 1. 1206. Polycarpæa teneriffæ; Lamarck, as above.)—Leaves ſpatulate, with a blunt point. Gathered by Mr. Maſſon and M. Lahaye in Teneriffe. Mr. Maſſon's own ſpecimen, in our hands, agrees exactly with ſome from the Paris garden, except that, being a wild one, its *ſtem* is more woody; which gave the younger Linnæus an idea of its being an arboreſcent plant, eſpecially as he was not aware of its growing proſtrate, though that circumſtance is evident on a due examination, even of this ſpecimen. We thus get rid of an uncouth ſpecific name, for one rather better and more uſual, though not excellent, all names of countries being liable to objection for ſuch a purpoſe. Many oppoſite, round, jointed, leafy, more or leſs downy, *branches* ſpring from the woody ſtem, which in their upper part are repeatedly forked in an alternate manner, and finally panicled, bearing innumerable crowded green and white *flowers* reſembling thoſe on *Illecebrum*, the ſilvery membranous *bracteas*, and borders of their calyx-leaves, giving them ſuch an appearance. The *leaves* are oppoſite, ſtalked, about an inch long, ſpatulate, entire, ſmooth, flat, with a little

blunt point, and are accompanied by axillary tufts of rather ſmaller ones. *Stipulas* numerous, ovate, long-pointed, membranous, jagged, ſmall, browniſh.

2. H. *indica.* (Polycarpæa indica; Lamarck. in Journ. d'Hiſt. Nat. v. 2. 8. Dict. edited by Pourret, v. 5. 483. Achyranthes corymboſa; Linn. Sp. Pl 296. Willd. Sp. Pl. v. 1. 1196. Polia arenaria; Lour. Cochinch. 164, not 204. Paronychia foliis ad genicula conſertis acutis, floribus umbellatis; Burm. Zeyl. 184. t. 65. f. 2. Amaranthus folio tenuiſſimo, incano, &c. Bocc. Muſ. 44. t. 39.)—Leaves linear, acute, ſomewhat awned.—Native of ſandy ſea ſhores in Ceylon, Coromandel, and probably other parts of the Eaſt Indies. The *root* is woody. *Stems* ſhrubby at the baſe, about a foot high, aſcending, round, downy, repeatedly forked, denſely corymboſe at the top. *Leaves* numerous, oppoſite or quaternate, ſcarcely an inch long, ſeſſile, linear, acute, often awned, entire, flat, glaucous or hoary, with a prominent rib beneath; they are accompanied by axillary tufts of ſmaller leaves, as in the firſt ſpecies. *Stipulas* ovate or lanceolate, white, pellucid, jagged, with a very ſlender point. *Flowers* numerous, white or reddiſh, with ſilvery bracteas. In ſtarved ſpecimens the leaves are ſometimes ſhorter, and rather broader. Such a variety is exhibited in Plukenet, t. 86. f. 5, while f. 6, bad as it is in the flowers, approaches more to the uſual habit of the plant.

HAGARSTOON, in *Geography*. See Elizabeth *town*.

HAGDANGER, a town of Sweden, in Angermaaland; eight miles S.S.W. of Hernoſand.

HAGE, a town of Eaſt Frieſland; 15 miles N. of Embden.

HAGEDORN, Frederic, in *Biography*, born at Hamburgh in the year 1708, received an excellent education, and diſcovered at a very early age a good talent for writing poetry. By the death of his father while he was very young, he had little elſe to truſt to, in making his way in the world, but his own exertions and induſtry. In 1726 he went to Jena, where he applied moſt diligently to the ſtudy of the law for about three years, and in 1729 he publiſhed a ſmall collection of poems. In the ſame year he repaired to London with good recommendations to the Daniſh ambaſſador, who treated him with great kindneſs, and introduced him to the ſociety of ſuch perſons as could render him any ſervice, and through whoſe influence he was, in the year 1733, appointed ſecretary to the ſociety of Britiſh merchants at Hamburgh, an office which rendered him eaſy with reſpect to pecuniary matters, and which gave him acceſs to the beſt company. In the year 1738 he publiſhed his firſt book of "Fables," which brought him into notice, and from this period he frequently appeared before the public as author of various light but elegant productions; and many of them on important moral ſubjects. He was, when in England, a great admirer of Pope, and in 1742 he publiſhed a good paraphraſe of his "Univerſal Prayer." He died in the forty-ſeventh year of his age. By ſome of his biographers he has been compared with Pope, by others with Prior, whom he has in ſome of his pieces endeavoured to imitate. Few poets have taken more pains to poliſh their works than Hagedorn, and he is called by Wieland the German Horace. His works were collected two years after his death, and publiſhed at Hamburgh, ſince which there have been ſeveral editions of them. Gen. Biog.

HAGEN, in *Geography*, a town of Weſtphalia, in the county of Mark, containing three churches and ſome manufactures of cloth; ſix miles N.W. of Altena.

Hagen, a town of the iſland of Rugen; 16 miles S.E. of Bergen.

HAGENAU, a town of Lower Saxony, in the duchy of Schwerin; 26 miles S.W. of Schwerin.

HAGENBURG, a town of Weſtphalia, in the county of Schauenburg; 15 miles W. of Hanover.—Alſo, a town of the archduchy of Auſtria; nine miles N.E. of Steyregg.

HAGENDORN, Erfroy, in *Biography*, a phyſician, was born at the little town of Wolaw, in Sileſia, in 1640. He graduated at Jena in 1668, and practiſed at Gorlitz with great reputation as an able phyſician, and a man of extenſive knowledge. Hence he was honoured with the appointment of phyſician to the court of Saxony, which he filled with great credit under the electors John-George II., III., and IV. He was attacked with a fit of apoplexy on the 27th of February, 1692, and died the ſame day, at the age of fifty-two years. He wrote ſeveral papers, which were printed in the memoirs of the Imperial academy, and alſo publiſhed the following works. "Martini Rulandi patris ſecreta ſpagyrica, &c." Jena, 1676, 12mo. "Tractatus phyſico-medicus de Catechu, ſive Terra Japonica," ibid. 1679, 8vo. "Cynoſbatologia," ibid. 1681, 8vo. "Hiſtoriæ phyſico-medicæ," 1690, 8vo. A poſthumous publication, entitled "Obſervationum et Hiſtoriarum medico-practicarum rariarum Centuriæ tres," appeared at Francfort and Leipſic, in 1698, in 8vo. Eloy. Dict. Hiſt.

HAGENIA, in *Botany*, ſo named by Lamarck in honour of Dr. Charles Godfrey Hagen, profeſſor at Koningſberg, author of a valuable work entitled *Tentamen Hiſtoriæ Lichenum, et præſertim Pruſſicorum*, and of an eſſay *De Ranunculis Pruſſicis*, the firſt publiſhed in 1782, the latter in 1784. Their author, born in 1749, is, as far as we know, ſtill living.—Lamarck. Illuſtr. t. 311. Willd. Sp. Pl. v. 2. 331. (Bankſia; Bruce's Travels, v. 5. 73, with a figure.)—Claſs and order, *Decandria Monogynia*. (*Octandria Monogynia*. Lamarck. Willd.) Nat. Ord. *Roſaceæ*, Juſſ.?

Eſſ. Ch. Calyx horizontal; its limb in five elliptical, permanent, enlarged ſegments. Petals five, acute, entire, four times ſhorter than the calyx. Stamens very ſhort.

1. H. *abyſſinica.* Willd. (Cuſſo, or Bankſia abyſſinica; Bruce, as above.)—A *tree*, whoſe branches are leafy at their extremities, and ſcaly with the baſes of footſtalks that are fallen. *Leaves* large, cluſtered, interruptedly pinnate, with an equal-ſized terminal leaflet; pinnæ five or ſix pair, nearly oppoſite, ſeſſile, lanceolate, a little unequal, ſerrated, hairy, heart-ſhaped at the baſe; the intermediate ones ſmall, round, notched, variable. *Stipula* membranous, entire, united to the footſtalk at each ſide. *Panicle* terminal, pendulous, ſtalked, about as long as the leaves, much branched, zig-zag, many-flowered. *Flowers* about an inch broad; their calyx pale yellowiſh-green; petals dull purpliſh-brown; anthers yellowiſh. We have no account of the fruit, and having never ſeen a ſpecimen, can only gueſs at the natural affinities of this very extraordinary plant, and attempt more correct botanical characters of it than have hitherto been given, for thoſe in Willdenow are certainly erroneous. That the genus is diſtinct from all hitherto known there can be no doubt, though Bruce was incompetent to give a ſcientific account of it, and no living or dried ſpecimens have as yet come under botanical inveſtigation.

HAGETMAU, in *Geography*, a town of France, in the department of the Landes, and chief place of a canton, in the diſtrict of St. Sever, 2½ leagues S. of St. Sever. The place contains 2392, and the canton 10,181 inhabitants, on a territory of 197½ kiliometres, in 20 communes.

HAGGAI, a canonical book of the Old Teſtament, ſo called from the prophet of that name, who in all probability was born at Babylon, from whence he returned with Zerubbabel.

This prophet, in the ſecond year of Darius, or the five hundred and twentieth before Chriſt, exhorted the Jews after their return from their captivity, to finiſh rebuilding the temple, which they had intermitted for fourteen years. His remonſtrances had the deſired effect; and to encourage them to proceed in the work, he aſſured them from God, that the glory of this latter houſe ſhould exceed the glory of the former; which was accordingly fulfilled when Chriſt honoured it with his preſence: for with reſpect to the building, this latter temple was not to be compared with the former. The ſtyle of this prophet is altogether proſaic.

HAGGARD, in *Falconry*, a hawk, or falcon, not taken in the neſt; but after ſhe had been enured to liberty, and preying for herſelf. The word is French, and ſignifies *fierce;* ſome derive it from the Latin *agreſte, wild;* others from the German *hag*, incloſure, fortified place. Whence Mr. Huet obſerves, the word haggard is ſometimes applied to a man who becomes hardy and proud, in confidence of the ſtrength of the place he is in.

Haggard hawks are hard to tame, and bring under diſcipline.

HAGGEIN, in *Geography*, a mountain of Switzerland, in the canton of Schweitz, remarkable for its triple-top and formidable aſpect; from it extends a chain, ſeparating this canton from Uri on the N. and Glaris on the E.

HAGGS, a kind of fiery meteor appearing on men's hair, or horſes' manes; now known to be electrical phenomena.

HAGI, or HADDI, in *Geography*, a kingdom of Africa, in the deſert of Zanhaga, on the borders of the river St. John, and near the Atlantic ocean.

HAGIAM, in the *Materia Medica*, a name given by ſome of the Arabian phyſicians to a kind of *ſchœnanth*, or camel's hay. The Greeks made ſeveral kinds of this, according to the places from whence they received it; the ſchœnanth of different countries differing in virtue: but the Perſian was, in many ages, eſteemed the beſt kind; and this is probably what the Arabs called *hagiam*. The interpreters of Avicenna leave this word wholly unexplained. Garcias, according to what ſkill he had in the Arabic, ſuppoſes it the city Damaſcus, and given to ſuch ſchœnanth as came from that part of the world; but this ſeems erroneous. The Arabs called all other nations barbarians; and this term gentiliſm, or barbariſm, was, in their language, expreſſed by the word *hagiam;* they hated the Perſians beyond all other nations in the world, and called them hagiam, by way of eminence, and therefore hagiam and Perſian were a ſort of ſynonymous words. It is probable they had their ſchœnanth principally from Perſia; and that this, whether better or worſe than the Nabatæan ſchœnanth of their own country, was diſtinguiſhed by the epithet of *foreign*, and that with the word by which they expreſſed Perſian.

HAGIAN, in *Geography*, a town of Arabia Petræa, near the ſcite of the ancient Petra.

HAGIAZ, a town of Arabia, in the province of Hedsjar; 120 miles N. of Medina.

HAGIBESTASH, a town of Aſiatic Turkey, in Caramania; 25 miles S. E. of Kirſhehr.

HAGIOGRAPHA, a name given to part of the books of Scripture, called by the Jews *Cetubim*. See CANON.

The word is compounded of ἅγιος, *holy*, and γράφω, *I write*. The name is very ancient: St. Jerom makes frequent mention of it: before him, St. Epiphanius called theſe books ſimply Γραφεῖα.

The Jews divide the ſacred writings into three claſſes: the Law, which comprehends the five books of Moſes; the Prophets, which they call *Neviim;* and the *Cetubim*, כתובים, called by the Greeks, &c. *Hagiographa;* comprehending the book of Pſalms, Proverbs, Job, Daniel, Ezra, including alſo the book of Nehemiah, Chronicles, Canticles, Ruth, the Lamentations, Eccleſiaſtes, and Eſther.

The Jews ſometims call theſe books the Writings, by way of eminence, as being written by immediate inſpiration of the Holy Spirit. Thus, ſays Kimchi, in his preface to the Pſalms, Maimonides in *More Nevoch*, and Elias Levita in his *Thiſbi*, under the word כתב.

They diſtinguiſh the hagiographers, however, from the prophets; in that the authors of the former did not receive the matters contained in them by the way called Prophecy, which conſiſts in dreams, viſions, whiſpers, extaſies, &c. but by mere inſpiration, and direction of the Spirit.

HAGIOSIDERON, or HAGIOSIDIRON, compounded of ἅγιος, *holy*, and σίδηρος, *iron*. The Greeks, who are under the dominion of the Turks, being prohibited the uſe of bells, made uſe of an iron wherewith to call people to church, called *hagioſideron*.

Magius gives us the deſcription of a hagioſideron which he had ſeen. It is a plate of iron, about three inches broad, and ſixteen long, faſtened by the middle to a chain or cord, whereby it is ſuſpended at the church-door. On this they ſtrike with an iron hammer, with ſome meaſure and cadence, ſo as to make no diſagreeable noiſe.

They alſo carry a hagioſideron before the prieſt, in a proceſſion of the ſacrament to any ſick perſon, beating on it from time to time, to advertiſe the people to adore it; much as in the Romiſh church they do with a bell.

HAGISA, in *Geography*, a town of Arabia, in the province of Hedsjar; 112 miles S.E. of Medina.

HAGLIAR, a town of Spain; 22 miles S.S.E. of Aleppo.

HAG-MASTER, in *Engineery*, is a perſon who undertakes the cutting of a length of canal, or other job of work by meaſure, and employs labourers or navigators, *by the day*, to execute it.

HAG'S-*Head*, in *Geography*, a cape of Ireland, in the county of Clare. N. lat. 52° 55′. W. long. 9° 23′.

HAGSHULT, a town of Sweden, in the province of Smaland; 25 miles S. of Jonkioping.

HAGSNARE, in *Rural Economy*, a term ſometimes employed, provincially, to ſignify a ſtool or ſtub, from off which coppice wood has been cut or felled.

HAGUE, in *Geography*, uſually eſteemed a village of Holland, though the number of its inhabitants has been eſtimated at 36,000. It is ſituated about two miles from the ſea, in former times the reſidence of the ſtadtholder, the ſtates-general, and the ſtates of the province. The court, or palace, contained ſeveral chambers allotted to the different branches of government, beſides the apartments of the ſtadtholder. The ſtates-general met in a room, which contained 26 chairs, for the uſual number of the members. The French have deſpoiled it of its cabinet of natural hiſtory, and probably of the moſt curious books and pictures. It has been ſaid, that this village contains more magnificent houſes, than occur in the like ſpace in any city of modern Europe. The ſtreets are long and ſpacious, and ſeveral of them adorned with rows of trees. It is governed by its own magiſtrates, which are a bailiff, whoſe office is for life, three burgomaſters, annually changed, ſeven echevins, 12 common council, a penſionary, ſecretary, and treaſurer. On the N. of the town is a noble grove, with alleys of oak and beech, leading to the palace of the (late) ſtadtholder; but the pleaſanteſt road is that to Schevening, a village on the ſhore, two miles to the N.W. through four rows of loſty elms. The Hague is pleaſantly ſituated, in a dry foil, upon ſomewhat of an eminence, compared with the reſt of the country; the air is pure, and the environs are delightful; 32 miles S.W. of Amſterdam, and 12 N.W. of Rotterdam. N. lat. 52° 4' 10''. E. long. 4° 17' 30''.

HAGUENAU, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the diſtrict of Straſburgh; 15 miles N. of Straſburgh. It is ſituated on the Motter, in the middle of a foreſt which bears its name; and it was fortified by Frederick I., who made it an imperial town, and called it the chamber of the empire, becauſe in it were preſerved the imperial ornaments, under the houſe of Swabia. The place contains 7094, and the canton 14,567 inhabitants, on a territory of 195 kiliometres, in 16 communes. The ſurrounding land is ſandy, and unproductive, and the commerce is inconſiderable: the principal articles being madder and tobacco. N. lat. 48° 50'. E. long. 7° 52'.

HAGWORM, in *Rural Economy*, a name which is ſometimes provincially applied to the adder, an animal which is venomous, and delights in ſituations of the new-cut coppice wood kinds.

HAHA, in *Geography*, a bay on the S. coaſt of Labrador. N. lat. 51 . W. long. 59° 10'.

HAHN, Simon Frederic, in *Biography*, was born at Bergen, in the duchy of Hanover, in the year 1692. He ſoon acquired an extenſive knowledge of the learned languages, and when he was only fourteen years of age, he pronounced, at the univerſity of Hall, a Latin harangue on the origin of the monaſtery of Bergen, which was printed. He next appeared as the continuator of the Chronicle of Bergen by Meibomius, and its charter from Otho the Great. His next work was lectures on hiſtory, which were publiſhed before he was twenty years of age, and which obtained for him a reputation that cauſed him to ſucceed the profeſſor Eccard in the profeſſorſhip of hiſtory at Helmſtadt. In 1725 he ſucceeded the ſame perſon as hiſtoriographer and librarian to the elector of Hanover. He died while in the diſcharge of theſe offices, at the age of thirty-ſeven. His principal works are "A Hiſtory of the Empire," in the German language, of which the firſt four volumes appeared in 1731; and "Collectio Monumentorum veterum et recent. ineditorum." Moreri.

HAHRAR, in *Geography*, a town of Egypt; 21 miles E. of Tineh.

HAI, a city of China, of the ſecond rank, in the province of Kiang-nan. N. lat. 34° 32'. E. long. 117° 0'.

HAJAR, a town of Arabia, in the province of Hedſjar; 150 miles N. of Medina.

HAICHAN-TAO, an iſland in the Chineſe ſea; near the S.W. coaſt of Corea. N. lat. 34° 30'. E. long. 124° 32'.

HAJE, in *Zoology*, the name of a viper that inhabits Egypt, and which, when irritated, inflates its throat. Some imagine this to be the true aſp of the ancients. See Coluber *Aſpis*, Linn.

HAIFAR, in *Geography*, a town of Paleſtine, near the coaſt of the Mediterranean, at the foot of mount Carmel, and on the S. ſide of a bay oppoſite to Acre. It has tolerably good anchorage, but no harbour. It has the remains of a caſtle, and of two churches, one ſerving for a magazine, and the other for a caravanſera; 5 miles S.E. of Acre.

HAIGERLOCH, a town of Germany, in the county of Hohenberg; 44 miles S.E. of Straſburgh. N. lat. 48 20'. E. long. 8° 54'.

HAIGH, a townſhip in the pariſh of Wigan, and county of Lancaſter, England, is chiefly worthy of notice, in a topographical point of view, for a ſingular ſpecies of coal obtained here, and called Cannel coal. This is generally found in large blocks, is as black as jet, and, from its hard compact ſubſtance, will bear a beautiful poliſh. The beds, or ſtrata, are about three feet thick; they dip one yard in twenty, and are at conſiderable depths, with a black maſs above and below. This coal is peculiarly pleaſant for burning, being very clean, and producing a vivid hot flame. It is often turned in a lathe, and manufactured in ſnuff-boxes, and various ornamental utenſils. At Haigh-hall is a ſummer-houſe, built entirely with this coal. For its mineralogical character, &c. ſee under the term Coal, ſection 11, family black-coal, vol. viii. of this work.—Haigh-hall, the ancient ſeat of the Bradſhaighs, now belongs to the earl of Balcarras. Haigh contained, in 1801, 118 houſes, and 798 inhabitants. See Beauties of England and Wales, vol. ix.

HAII, a name uſed by the Braſilians for an animal we call the ſloth or *ignavus*. The word ſeems pronounced by the creature itſelf, as its common note, and thence became uſed as its name. See Bradypus.

HAJIPOUR, in *Geography*, a town of Hindooſtan, in Meywar; 20 miles S. W. of Cheitore.

HAIL, or Hailstones, in *Meteorology*, conſiſt of drops of rain congealed in their deſcent. The occaſion of hail, and the extaordinary circumſtances which ſometimes accompany the phenomena, have excited the attention of philoſophers of ſucceſſive ages, and have produced many conjectures and opinions, which, in the preſent improved ſtate of the ſciences, are ſcarcely worthy of mention. Deſcartes imagined clouds to be frozen, and that portions of them were partially melted and detached; theſe, in their deſcent, were again frozen and became hail. The diſcoveries in electricity opened the way for a much more refined hypotheſis. Signior Beccaria ſuppoſes hail to be formed in the higher regions of the air, where the cold is intenſe, and where the electric fluid abounds. By the electric attraction a great many particles of water are brought together; theſe are frozen, and in their deſcent they collect other particles; theſe laſt form the outſide of the hailſtones, leſs denſe and hard than the central parts, becauſe the temperature in deſcending is more moderate. Agreeably to this hypotheſis, hailſtones and drops of rain are found to be leſs on the tops of mountains than in vallies; and both are larger, all other circumſtances the ſame, in proportion as the atmoſphere exhibits ſtrong marks of electrical agencies. Thus, large hailſtones and large drops of rain, are univerſally known to be the frequent concomitants of thunder and lightning. Beccaria obſerves, that as motion promotes freezing, ſo the rapid motion of the electrified clouds may promote that effect in the air. This laſt remark appears injudicious, as thunder-clouds have generally leſs motion than others.

Though the theory of Beccaria is incomparably more plauſible than that of Deſcartes; yet it contains much that is hypothetical. That hail is formed in the high and cold regions of the atmoſphere is unqueſtionable; and that the electric fluid abounds there as much as it abounds in the lower regions, is as probable as the contrary. But why ſhould the electrical attraction form an aggregate of particles of water? Are not they all electrified alike, and conſequently indifferent to each other in regard to attraction and repulſion? Or, if the effect of the electrical attraction is to collect the particles of water diffuſed through the air, how comes it to paſs that it ever allows them to ſeparate again? Theſe, and many other queſtions might be put, to which no anſwer could be given, or at beſt very unſatisfactory ones. But, waving all theſe objections, it ſhould appear from the hypotheſis, that hail is a natural and ordinary production, and might be expected as frequently as rain; whereas the quantity of hail, at an average, is not perhaps more than $\frac{1}{100}$ part of the quantity of rain, and muſt therefore be conſidered as a phenomenon out of the ordinary courſe of nature. Theſe conſiderations render the theory of Beccaria, as well as all other electrical theories, very inadequate to explain the phenomena.

Before we enter upon any other explanatory view, it may be proper to ſtate the general phenomena more minutely, as reſulting from obſervation.

Hail is moſt frequently attendant upon thunder; and it is upon ſuch occaſions that the hailſtones are ſometimes enormouſly large and deſtructive, as the experience of many people, and authentic records ſufficiently teſtify. Hiſtory indeed furniſhes us with ſome extravagant and incredible accounts of hail accompanying thunder. Mezeray, in the ſecond volume of his hiſtory of France, p. 339, mentions hailſtones that fell in Italy, 100lbs. in weight. Dr. Halley, in the Philoſophical Tranſactions, relates ſtorms in which the hailſtones weighed from five ounces to half a pound, and were 13 or 14 inches in circumference. No doubt ſuch accounts are frequently exaggerated; but it is probable that people are often deceived by taking up maſſes that have been aggregated and cemented by congelation after their fall. However this may be, hailſtones do frequently fall much exceeding any drops of rain in magnitude. Hailſtones are generally more or leſs opaque, hardeſt in the centre, and the outſide forms a kind of coating, not unlike the hoarfroſt on the ſurface of a veſſel containing a freezing mixture. The figure of hail is moſtly globular, but ſubject to conſiderable irregularities. Hail-ſhowers take place much the ſame in all ſeaſons of the year, but rather leſs frequently in ſummer; yet in that ſeaſon they are more violent when they do occur. Mr. Dalton obſerves (Meteorology, p. 46.), that the winds, which bring hail-ſhowers in the north of England, are always S.W. W. or N.W.; and the barometer is generally low. He ſtates the reſult of five years obſervations on hail-ſhowers, in the different months of the year, to be as follows:—

Months.	No. of days on which hail was obſerved.
January	11
February	7
March	5
April	8
May	11
June	6
July	2
Auguſt	1
September	6
October	7
November	7
December	13

It is preſumed that hail rarely, if ever, appears in the torrid zone; and it has been aſſerted that it rarely occurs in latitudes above 60°; probably it is confined chiefly to the temperate zones.

Now, as *rain* is the uſual form in which water is precipitated from the atmoſphere in ſummer, and *ſnow* that in winter, the general theory of the precipitation, or, more properly, of the *formation* of rain and ſnow in the atmoſphere, will be diſcuſſed under the heads of Rain and Snow. In the preſent inſtance, we have only to ſhew what are the extraordinary circumſtances which occaſionally convert the *rain* into *hail*; for, that the central part of every hailſtone originates in a drop of rain, according to the common opinion, is too obvious to require proof.

It is a well known fact in meteorology, that in ſerene weather the temperature of the atmoſphere gradually decreaſes above the ſurface of the earth in proportion as we aſcend. The quantity of variation is commonly about 1° for 300 feet perpendicular aſcent, or about 18° for one mile. Hence, then, in the ordinary courſe, when any precipitation takes place in the higher regions, it will gradually increaſe in temperature as it deſcends. Rain will continue to be rain during the whole deſcent; and ſnow to be ſnow, unleſs the increaſe of heat change it into rain. But if by ſome means the general law of temperature in the atmoſphere ſhould be inverted; if a warm, vapoury ſtratum of air ſhould, temporarily, become ſuperior in ſituation to a cold ſtratum, rain might be precipitated from the warm ſtratum, and this, in falling through the cold ſtratum, might be frozen into globules of ice; theſe would then have to deſcend through another inferior and warmer ſtratum of vapoury air, where the cold particles of ice would conſtantly condenſe more and more vapour on their ſurfaces; theſe ſurfaces would become leſs hard as the temperature approached the freezing point, and perfectly reſemble the opaque icy coating of a veſſel containing a freezing mixture, agreeably to obſervation.

Now, as hail is attended with a low barometer, and this uſually indicates ſqually or tempeſtuous weather, it is highly probable that ſuch inverſions of temperature in the atmoſphere may occur as have been pointed out. Particularly when the barometer is low, a ſudden influx of the air, which muſt always be tending from the equator toward the poles in the higher regions, may induce with it a higher temperature than the latitude and ſeaſon can ſupport; and in ſome caſes a temperature, ſuch as to be ſuperior to that of the ſtratum of air beneath. See Wind.

Another cauſe may ſubſiſt for the inverſion of temperature in the atmoſphere. If, on any occaſion, as during the heat of ſummer, a ſtratum of air next the earth's ſurface ſhould be heated, from local circumſtances of reflection, &c. beyond a certain point, it might become ſpecifically lighter than the incumbent ſtratum of air, and change places with it. This would produce a tumultuous agitation of the atmoſphere, and irregularities not otherwiſe to be obſerved. See Hurricane.

Thunder uſually accompanies violent hail-ſhowers; and thunder is well known to be moſt prevalent in that ſeaſon of the year when the atmoſphere is moſt replete with vapour. When the quantity of ſteam in the air is a maximum, any commotion or cauſe of precipitation muſt be ſuppoſed to produce a greater effect in that caſe than if the total quantity was only one-half or leſs, and all other circumſtances the ſame. Hence it ſhould ſeem that the extraordinary falls of hail are occaſioned, not ſo much from a ſuperabundance of electricity, as of ſteam in the atmoſphere. See Thunder, &c.

HAILE, a *ſea*-term, ſignifying either to call to a ſhip, to know from whence ſhe comes, and whither ſhe is bound, or elſe to ſalute her, and wiſh her well.

HAILLAN, Bernard de Girard du, in *Biography*, born at Bourdeaux, about the year 1535. He became known while he was a very young man, by his poems and tranſlations, but in 1571 he was appointed hiſtoriographer to Charles IX. of France; and on this occaſion he renounced the religion in which he had been educated, and embraced the tenets of the Roman Catholics. He was in the confidence of Henry III. before he came to the throne, and in 1576, dedicated to that prince his "Hiſtory of France" for which he received various honours and emoluments. He accompanied Noailles, biſhop of Acqs, on his embaſſies to England and Venice. He died in 1610, leaving behind him ſeveral works, but that by which he is principally known is his "Hiſtory of France from Pharamond to the death of Charles VII." which was the firſt body of French hiſtory written in that language. Moreri. Bayle.

HAILSHAM, in *Geography*, a pariſh and market town in the hundred of Dill, and rape of Pevenſey, Suſſex, England, is 12 miles from Lewes, the county town, and 57 from London. The town conſiſts of 132 houſes, inhabited by 897 perſons. Here is a ſmall weekly market on Wedneſdays. At Michelham, near this town, was a priory of black-canons, founded by Gilbert de Aquila in the time of king Henry III.

HAIMEN, in *Geography*, a town of the kingdom of Corea, in the province of Tchu-ſin; 90 miles S.W. of King-kitao. N. lat. 37° 48′. E. long. 126° 42′.—Alſo, a town of China, in the province of Tche-kiang; 20 miles S. of Tai-cheou.

HAIMER, Le, a town of Dar-fur; 50 miles N.N.E. of Cobbé.—Alſo, a town of Nubia; 60 miles S. of Syené.

HAIN, in *Agriculture*, a term ſometimes made uſe of to ſignify the ſhutting up paſture lands from being eaten by live ſtock. It likewiſe ſignifies the raiſing or heightening a rick or ditch on the borders of the ſea, in the county of Norfolk.

HAINAN, in *Geography*, an iſland of China, belonging to the province of Quang-tong, and bounded on the N. by the province of Quang-ſi, on the S. by the channel, formed between the bank Paracel and the eaſtern coaſt of Cochinchina, on the W. by the ſame kingdom and part of Tong-king, and on the E. by the Chineſe ſea. Its extent from E. to W. is between 60 and 70 leagues, and from N. to S. 45; ſo that it is about 160 leagues in circumference. Its capital is Kiun-tcheou-fou; which ſee. The natives of this iſland are very deformed, ſmall of ſtature, and of a copper-colour; both men and women wear their hair thruſt through a ring on their forehead; and above they have a ſmall ſtraw-hat, from which hang two ſtrings that are tied under the chin. Their dreſs conſiſts of a piece of black or dark-blue cotton cloth, which reaches from the girdle to their knees; the women have a kind of roller of the ſame ſtuff, and mark their faces from the eyes to the chin with blue ſtripes made with indigo. Among the animals of this iſland is a curious ſpecies of black apes, having the ſhape and features of a man; they are ſaid to be very fond of women; here are alſo crows with a white ring round their necks, ſtarlings, which have a ſmall creſcent on their bills, black-birds of a deep blue colour, with yellow ears riſing half an inch, and a multitude of other birds, remarkable for their colour or their ſong. Beſides mines of gold and lapis lazuli, which enrich this iſland, it produces an abundance of various kinds of curious and valuable wood; ſome of which has been tranſported to Peking, at an immenſe expence, to adorn an edifice, intended for a mauſoleum. The moſt valuable is called by the natives "Hoali," and by the Europeans, roſe or violet wood, from its ſmell; it is very durable, and of unrivalled beauty; and it is, therefore, reſerved for the uſe of the emperor. Hainan, on account of its ſituation, riches, and extent, deſerves to be ranked among the moſt conſiderable iſlands of Aſia. Not far from it is another ſmall iſland, commonly called "San-cian." It is celebrated by the death of St. Francis Xavier; whoſe tomb is ſtill to be ſeen on a ſmall hill, at the bottom of which is a plain, covered on one ſide with wood, and on the other ornamented with ſeveral gardens. This iſland contains five villages, inhabited by poor people, who ſubſiſt merely on rice and the fiſh they catch. N. lat. 18° 15′, to 20° 2′. E. long. 108° 4′, to 110° 20′.

HAINAUT, *County of*, late one of the provinces of the Catholic Netherlands, bounded on the N. by Flanders and Brabant, on the E. by Brabant, the county of Namur, and biſhopric of Liege, on the S. by France, and on the W. by France and Flanders. Its greateſt extent from N. to S. was about 48 miles, and from E. to W. 55. The air is temperate; the ſoil produces corn in abundance; the rich paſtures feed large herds of cattle, and the ſheep yield good wool. Its woods ſupply timber for building, and fuel for burning. It has mines of coal and iron, and quarries of beautiful marble, ſlate, and other uſeful ſtone. The principal rivers are the Scheldt, the Selle, the Haiſne, the Sambre, and the Dender. By the peace of Luneville, the whole of this county was ceded to France. The capital is Mons.

HAINBURG, or **Haimburg**, a town of Auſtria, on the Danube, having a manufacture of cloth; 20 miles E.S.E. of Vienna. N. lat. 48° 6′. E. long. 17°.

HAINFELDEN, a town of Auſtria; 20 miles S.W. of Vienna.

HAINGEN, a town of Germany; 21 miles W.S.W. of Ulm.

HAIR, or **Hayr**, a country of Africa, in the deſert of Sahara, E. of Zanhaga, and extending about 60 miles. The air is temperate, and the ſoil in many places fertile. In the ſouthern parts manna is collected. The chief town is called Hair or Terga. N. lat. 23° 30′ to 25° 20′. E. long. 1° to 4°.

Hair, in *Comparative Anatomy*, is the proper covering of the ſkin of mammalia, to which it appears to be excluſively confined. The hair-like tufts found on the bodies of young birds do not grow exactly like hair in general, but rather in the manner of feathers, to which they are in fact appendages. (See article Feathers.) The hairs of inſects are proceſſes of the ſhell or ſkin, which they reſemble in compoſition. The ſetæ of worms alſo do not appear to grow from a root, but to be placed in cells made by reflections of the ſkin; in the aphrodita aculeata, and other worms, we have obſerved that the hairs are caſt with the cuticle.

The common form of a hair is that of a round fibre, which is thickeſt next the root, and gradually diminiſhes until it ends in a point. The hairs on the tail of the *hippopotamus* are flattened, and thoſe on the body of the *great ant-eater*, (*myrmecophaga jubata*;) are broad and flat, and have a longitudinal furrow on both ſurfaces, ſo that each hair reſembles a blade of graſs. The whiſkers of the *ſeal* have ſomewhat a knotted appearance. When the hairs are ſtiff, and nearly of the ſame thickneſs throughout, as in the *hog*, &c. they are called *briſtles;* the hair of *negroes* and many of the *Biſulca* appears crimped or frizzled, and is thence called *wool*. *Fur* is the fine ſoft twiſted hair that is found on ſeveral of the *digitigrade* and *ſaltigrade* quadrupeds. The horny ſpines which diſtinguiſh the *porcupine, hedge-hog, tenrecs*, and *echidna*, and the ſcales of the genus *manis*, reſemble in their ſtructure and mode of growth common hair, although they differ much from it in external appearance. (See articles Scales and Spines.) Many other varieties might be mentioned; but the deſcription of the external form and the colour of hairs belongs to the natural hiſtorian.

All true hairs whatever may, by their ſigure, agree in certain circumſtances. They are all compoſed of a ſubſtance of a horny nature; they grow upon vaſcular pulps, which, with the tubular roots that ſurround them, are incloſed in bulb-ſhaped capſules or inveſtments, that are ſituated within the ſkin.

The minute parts which are concerned in the production of ſmall hairs, ſuch as thoſe which grow on the human head, or the bodies of quadrupeds in general, cannot be eaſily diſtinguiſhed. In theſe inſtances the bulbs appear to be ſhort tranſparent membranous tubes, which permit the root of the hair to be ſeen through them. They uſually contain a clear gelatinous fluid, and ſometimes a ſmall drop of blood. Theſe capſules have but a ſlight adherence to the ſub-cutaneous ſubſtance, or to the ſkin; as frequently on pulling out a hair the bulb comes along with it. The bulbs are larger in proportion as the hair is young. The pulp on which the hair is formed paſſes through the bottom of the capſule, in order to enter the tube of the hair, into which it penetrates for a ſhort diſtance, never in common hairs, reaching as far as the external ſurface of the ſkin.

The ſtructure and mode of growth of ſome large hairs, ſuch as the whiſkers of the digitigrade and ſaltigrade quadrupeds, can be clearly diſcerned with a common lens; and in the whiſkers of the *ſeal* and *walrus* they are ſufficiently plain to the naked eye. In all theſe inſtances, the bulb in which the whiſker is implanted is evidently compoſed of parts of different ſtructures. The external inveſtment is rather thin in the *ſeal,* but thick in the *hare* and *rabbit;* it is a tough fibrous ſubſtance, approaching, in the ſwimming mammalia, the nature of horn. It has but a ſlight connection with the adjoining cellular ſubſtance; it is very deficient in vaſcularity, and appears to be an envelope, in many reſpects analogous to the external ſheath of feathers.

The next inveſtment of the root of the whiſker is ſpongy in its texture; it is compoſed of an immenſe number of membranous cells, into which the numerous veſſels that are diſtributed to this part of the bulb appear to pour out their blood. In the genus *lepus* the cellular ſtructure is compact, irregular, and minute, and is formed by a fine reticulation of the membrane. In the *ſeal* nearly the firſt half of the ſpongy inveſtment is alſo of a cloſe reticulated ſtructure; about the middle of it there is a large circular cell, which is filled by a clotted fibrous maſs, reſembling a coagulum of blood, and the ſucceeding portion is compoſed of thin circular cells, formed by folds of the membrane arranged in a tranſverſe direction.

The ſpongy portion of the bulb is only united to the external envelope at the two ends.

In all whiſkered animals, the maxillary branches of the fifth pair of nerves are prodigiouſly large, and form a very intricate plexus beneath the integuments of the ſnout, the principal branches from which appear to terminate abruptly at the baſes of the bulbs of the whiſkers. Anatomiſts are not agreed with reſpect to the deſtination of the nerves of hairs; ſome have aſſerted that they entered the root of the hair; but Haller, Bichat, and others, were not ſatisfied that the nerves penetrated the bulb. We have, however, ſucceeded in tracing the courſe of the nerves of the whiſkers of the *ſeal* very diſtinctly. The large nerves, which arrive at the baſes of the bulbs, ſuddenly diminiſh in ſize, and are diſtributed in ſoft, fine branches, to the ſubſtance of the ſpongy inveſtment. The deſign of this organization is evidently to render the whiſkers delicate inſtruments of touch; it may, therefore, ſtill be queſtioned whether the bulbs of common hair are ſupplied by nerves in the ſame manner.

The third or internal inveſtment of the bulb forms the immediate ſheath to the root of the whiſker; it is thin and membranous, and is cloſely connected to the ſpongy portion of the bulb, to which it ſhould, perhaps, be conſidered as an internal tunic; their membranes ſeem to be continuous.

All the parts compoſing the bulb are perforated at each extremity; at the external end, to give paſſage to the ſhaft of the hair, and at the internal, to admit the pulp, which penetrates the cavity of the hair.

The bulbs of hogs' briſtles are very large and irregularly ſhaped at the root, and appear to be glandular in their ſtructure.

Duverney ſtates that the *pulp* ariſes from the bottom of the external envelope of the bulb, but it appears to us to be furniſhed by the ſub-cutaneous ſubſtance, in the ſame manner as the vaſcular pulps of feathers.

The pulp of whiſkers is a very elongated cone, with a ſpherical enlargement at its baſe. Its pointed extremity paſſes in the tube of the whiſker for ſome way beyond the ſurface of the ſkin; and hence when a whiſker is cut off cloſe to the ſkin, the pulp being wounded, the whiſker becomes deformed in its growth, producing a knob or bulb at its extremity.

The ſtructure of the pulp is evidently ſpongy. Duverney has deſcribed it as being compoſed of very fine membranous cells or valves, which permit the blood to aſcend in it, but not deſcend. The pulp is ſupplied by one artery, that divides into innumerable branches, which, when injected, render the whole perfectly red. The pulp far exceeds in vaſcularity the ſpongy envelope of the bulb, although the latter is deſcribed by Duverney as receiving numerous blood-veſſels, which ſend off millions of branches.

The office of the pulp is to ſecrete the matter of which the hair is compoſed.

The hair is originally contained within the cavity of the bulb. In the *elephant* there are many hairs which do not come out of the ſkin. When the hairs make their appearance, they carry with them a portion of the cuticle, which is afterwards caſt off in fine, branny ſcales. Bichat denies the fact of the hair elevating the cuticle upon it as it grows. He ſays the hair is as thick before it appears upon the ſkin as it is afterwards. That in pulling it out of the ſkin, provided it be detached at the root, no reſiſtance is experienced. That if the hair was enveloped by the epidermis it would be thrice its preſent thickneſs: and laſtly, that no appearance of the epidermis accompanying the hair is ſeen when the latter is pulled out of the ſkin; but on the contrary, a depreſſion is perceived at the place where the hair is extracted. Bichat has not taken into conſideration the neceſſary wearing and deſtruction of the cuticle elevated upon the hairs; and, conſequently, its ultimate diſappearance. The portion of a hair which is contained within the bulb is called the *root,* and that which projects beyond the ſkin the *ſhaft.* Although the one part is gradually converted into the other, they have apparently a different compoſition. The root, as long as the hair continues to grow, is ſoft and pulpy, and nearly colourleſs, while the ſhaft is hard and horny in its texture, and of ſome determined colour.

Every hair contains a tube, or is hollow interiorly, and admits, as before mentioned, the pulp for a greater or leſs diſtance. As the pulp is intended for the nutrition of the hair, it is found to extend only to that portion of the hair which is in a ſtate of growth; and in thoſe which are deciduous, or are caſt at particular ſeaſons of the year, ſuch as the hairs covering the bodies of quadrupeds, the pulp becomes entirely obliterated before the period of ſhedding the hair, and its root is converted into a ſolid pointed maſs. The end of a briſtle forms an irregular ſolid bulb before it is caſt, from which it is ſo well conſtructed for being employed as a needle by ſhoemakers.

The hair of the human head and pubis, that of the beards of man and quadrupeds, and the hair of the tails and manes of beaſts, are not deciduous, and therefore always have the roots ſoft and filled by the pulp.

All that portion of the tube of a hair to which the pulp does not extend, is filled with a dry pith or ſeries of cells containing air. Duverney ſays that when a hair is viewed tranſverſely in a microſcope, ſome of the bubbles of air are often perceived. He ſuppoſes that the air is furniſhed by the pulp for the nutrition of the hair, but there is every reaſon to believe that it is derived from the atmoſphere in conſequence of the vacuum produced by the degeneracy or retreat of the vaſcular pulp, in the ſame manner as the air of feathers is attracted from the external element. See Feathers.

The whiſkers of the *ſeal* ſhew the appearance of a tube almoſt to the very point: ſmall hairs are probably alſo hollow throughout, as every part of them has been moulded upon the pulp; every hair ſhould, therefore, be conſidered as a tube ſhut at the pointed extremity, and filled either with a vaſcular pulp, or a medulla formed of cells reſembling the dry pith of vegetables.

The ſubſtance of a hair perfectly reſembles horn in its compoſition. In briſtles and ſeveral other kinds of hair, this horny ſubſtance is arranged in fibres in the ſame manner as the woody fibres of a cane.

M. Bichat has given a different account than the above of the ſtructure of hairs. He deſcribes them as being compoſed of two diſtinct parts. The firſt is the external envelope, which he conſiders as having all the properties of the epidermis, that it does not poſſeſs vitality, is of an unperiſhable nature, and is devoid of colour. The ſecond he calls the interior ſubſtance of the hair, the nature of which he does not pretend to underſtand; but to it he aſcribes all the vital properties, the peculiar characters and colour of the hairs, and all the changes and diſeaſes to which it is liable. (Anatomie Generale, tome 4.) In this account Bichat has not ſhewn his uſual accuracy of obſervation. The only interior ſubſtance to be found in a hair, except the pulp towards the root, is the pith or medulla already mentioned; to which there is no reaſon to attribute any peculiar properties. The colouring matter certainly does not reſide in it, but pervades the ſubſtance of the horny tube of the hair, to which it communicates an uniform ſtain or dye, in the ſame manner as the ſubſtance of a horn or hoof is coloured.

Bichat ſuppoſes that there is a ſpecies of circulation in the interior ſubſtance of the hair, by which he explains the changes of colour, and the ſympathy which is well known to exiſt between the hair and many important organs of the body. If, however, theſe effects are produced by any vital action, it muſt go on likewiſe in the horny ſubſtance of the hair, which is the ſeat of many of thoſe effects. The fibrous ſtructure of the hair ſeems calculated to admit that ſort of movement or circulation of the juices which takes place in plants; and an organic action in the ſubſtance of hairs muſt be admitted to exiſt, in order to account for the changes to which it is ſubject. All hair undergoes ſome alteration in its colour. It firſt grows darker, and ultimately lighter. Theſe changes are to be obſerved even in thoſe hairs which are ſhed every year; but they are moſt remarkable in thoſe that continue to grow during the life of the animal. The hair of the human head is almoſt always lighter, and ſometimes of a different tint in childhood, than it becomes afterwards; and as old age advances, it experiences in moſt people who do not become bald the remarkable change into grey. In the permanent hair of quadrupeds, ſimilar alterations of the colour take place at the different ages of the animal; and even the ſucceſſive coats of deciduous hair are in a degree ſubject to the ſame variations; thus a horſe which is a dark grey when young, becomes white by age.

We have eſſayed to trace the progreſſion of the colour of hair, and the change of organization which accompanies it, but have not ſucceeded in ſatisfying ourſelves as to ſome points. In almoſt all the ſpecimens we have examined of human hair, during the proceſs of becoming grey, we have found the loſs of colour to commence at the point, and gradually to advance towards the root. In a few inſtances we have obſerved ſhort portions of the hair grey in the middle; and we have ſeen the hairs of the mane and tail of horſes becoming white at their roots; ſome hair-dreſſers alſo aſſert, that the hair of the human head occaſionally changes to grey firſt next the roots.

The term grey is not ſo proper as tranſparent would be, to hair that has undergone the change we ſpeak of, ſince it conſiſts not in an alteration of colour, but a total diſappearance of it, and which is not in the interior ſubſtance, as ſuppoſed by Bichat, but in the horny or external part of the hair. The ſilvery or gliſtening appearance of grey hair depends upon the light being refracted in paſſing through its tranſparent parietes, and ſtriking upon the cells of the pith in the interior.

It may be aſked, how is the colouring matter removed from the ſubſtance of the hair? There appears only two means by which it can be accompliſhed; it muſt either be diſſipated from the ſurface of the hair, or carried back into the ſyſtem by abſorption; the latter appears the moſt probable. If a hair become grey by the deſiccation or evaporation of any of its parts, the change would not be confined to particular portions of it, and the whole would afterwards appear withered or ſhrunk: weakly hairs, and thoſe which had their pulp obliterated, would likewiſe be the moſt apt to loſe their colour. The contrary of this, however, takes place. They are only permanent hairs that ever become grey. The ſtrongeſt and darkeſt coloured hairs are the moſt liable to the change, and afterwards generally appear to be ſtronger and thicker than before, and are longer in being ſhed than thoſe that have preſerved their colour. It may be added, that no means will have the effect of turning hairs grey, after they are removed from the body.

Many inſtances are recorded of the hair becoming ſuddenly grey before the uſual period, in conſequence of violent impreſſions made on the mind. The French revolution is ſaid to have furniſhed many examples of this kind. Bichat relates that he has known five or ſix caſes, in which the hair loſt its colour in leſs than eight days, and that he was acquainted with one perſon whoſe hair became almoſt entirely grey in the courſe of a ſingle night, in conſequence of hearing ſome diſtreſſing news. Climate has alſo a remarkable influence upon the colour of the hair, thus *hares, rabbits*, &c. have been known to become white during the winter, and to recover their natural colour again in the ſummer. Theſe facts leave no doubt with reſpect to the colour of the hair being changed by a vital operation. The growth of hair is abſolutely determined in ſome caſes by the evolution of other organs; thus the beard, the hair of the pubis, &c. depend upon the perfection of the organs of generation.

In the diſeaſe called plica polonica, the extraordinary magnitude of the hairs, and the hæmorrhage that follows cutting them, ſhew an inordinate action in the blood-veſſels of the pulp, which probably, in this diſeaſe, paſſes much farther into the tube of the hair than uſual. The influence which this diſeaſe has upon the conſtitution, points out the propriety of taking into conſideration the effects the common growth of hair may have upon other organs. The practice of cutting the hair of the head and the beard is attended with a prodigious increaſe of the ſecretion of the matter of hair. It is aſcertained, that a man of fifty years of age will have cut from his head above thirteen feet or twice his own length of hair, and of his beard in the laſt twenty-five years of the ſame period, above eight feet. The hair likewiſe, beſides this enormous length, will be thicker than if it had been left uncut, and muſt loſe moſt of its juices by evaporation, from having its tube and the ends of its fibres always expoſed.

The cuſtom of ſhaving the beard and cutting the hair of the head, has, we believe, been juſtly deprecated by ſome phyſiologiſts. The latter has been ſuppoſed, and with much apparent reaſon, to weaken the underſtanding, by diverting the blood from the brain to the ſurface of the head. The connection which exiſts between the beard and the organs of generation, and likewiſe between it and the muſcular ſtrength of the individual, would ſeem to render it improper to interfere with its natural mode of growth. Bichat attributes the ſuperior ſtrength of the ancients to their cuſtom of wearing their beards; and thoſe men who do not ſhave at preſent are diſtinguiſhed for rigour and hardihood. They are likewiſe reputed to have ſuperior capacity for venereal enjoyments. The extirpation of the beard by the North American Indians, as having the oppoſite effect to ſhaving, may contribute to the well-known ſtrength of theſe people.

The re-production of hairs, when they are either ſpontaneouſly caſt or loſt by accident, reſembles in ſome degree that of teeth; the pulp which ſuſtained the old hair degenerates, and is abſorbed; while another pulp has formed beſide it, on which the new hair is produced: this operation is carried on in the cavity of the bulb, which undergoes no change.

In the plate for exemplifying the ſtructure and growth of hairs, horns, and ſpines, *fig.* 1. ſhews the natural ſize of a hair of the human head, with the bulbous capſule in which the root is incloſed. *Fig.* 2. is the bulb of the *ſeal's* whiſker unopened, and ſome of the large nerves which go to it; *a* the bulb, *b* the nerve. *Fig.* 3. repreſents the bulb of the whiſker of the *ſeal* deſpoiled of its external tunic; *a*, the ſpongy inveſtment; *b*, trunk of the nerve of the whiſker; *c*, the branches of the nerve traced into the ſpongy inveſtment. *Fig* 4. is a longitudinal ſection of the pulp of the ſeal's whiſker, expoſing all its parts and the pulp; *a*, the external inveſtment; *b*, the ſpongy envelope; *c*, the internal tunic of the bulb; *d*, the pulp. *Fig.* 5. gives a magnified view of the root of a whiſker of the ſeal laid open; *a*, the pulp; *b*, the ſubſtance of the hair. *Fig.* 6. is an enlarged view of a longitudinal ſection of the whiſker of the ſeal; *a*, the root; *b*, the tube from whence the pulp had been removed; *c*, the remaining portion of the tube filled with pith. *Fig.* 7. ſhews a briſtle of a hog; *a*, the bulbous ſolid root, formed in conſequence of the pulp degenerating, before the whiſker is caſt. *Fig.* 8. exhibits an old hair about to be ſhed, and a young one coming forward to ſupply its place, and growing in the ſame bulb.

For the further account of the hair-like productions of the body of mammalia, ſee SPINES and SCALES.

The waſte or refuſe *hair* of different ſorts of animals has been found to be highly beneficial as a manure where they can be procured in ſufficient quantity, ſuch as that of hogs and various other ſorts of quadrupeds.

HAIR, *diſeaſes of*, &c. &c. Among the many remedies for diſeaſes of the hair, the following are recommended in the Philoſophical Tranſactions. To make hair grow, take a quantity of the largeſt and fineſt roots of the common burdock that can be collected; let them be taken out of the ground in the month of December; bruiſe them in a marble mortar, and boil them in a quantity of white wine till there only remains as much as will cover them; let this be carefully ſtrained off, and every night, going to bed, let the head be waſhed with ſome of it warm. The other preſcription is this: burn the ſlender twigs of vines to aſhes, and boil theſe aſhes in ſuch a quantity of common water as will make a ſtrong lye; let this be ſtrained clear off, and the head waſhed every night with ſome of it warm. When the hair is good, but in danger of falling off by degrees, the aſhes of the vine branches are to be boiled in red-wine inſtead of water, and this lye is to be uſed inſtead of the other. When the perſon wears powder, let ſome hermodactyls be reduced to fine flour and mixed with it: let this be the only powder uſed, and the liquor conſtantly applied in waſhing the head every night, and the falling of the hair will be wholly prevented. Phil. Tranſ. N° 288. p. 90.

Wulrerus, in Philoſophical Collections, gives an account of a woman, buried in Norimberg, whoſe grave being opened forty-three years after her death, there was hair found iſſuing out plentifully through the clefts of the coffin; inſomuch that there was reaſon to imagine, the coffin had ſome time been covered all over with hair. The cover being removed, the whole corpſe appeared in its perfect ſhape; but from the crown of the head to the ſole of the foot covered over with a thick-ſet hair, long and curled. The ſexton going to handle the upper part of the head with his fingers, the whole ſtructure fell at once, leaving nothing in his hand but a handful of hair: there was neither ſkull, nor any other bone left; yet the hair was ſolid, and ſtrong enough.

Mr. Arnold, in the ſame Collections, gives a relation of a man hanged for theft, who, in a little time, when he yet hung upon the gibbet, had his body ſtrangely covered over with hair.

It was eſteemed a peculiar honour among the ancient Gauls, to have long hair; and hence came the appellation *Gallia comata*. For this reaſon Julius Cæſar, upon ſubduing the Gauls, made them cut off their hair, as a token of ſubmiſſion. It was with a view to this, that ſuch as afterwards quitted the world, to go and live in cloiſters, procured their hair to be ſhaven off; to ſhew that they bid adieu to all earthly ornaments, and made a vow of perpetual ſubjection to their ſuperiors.

Greg. de Tours aſſures us, that, in the royal family of France, it was a long time the peculiar mark and privilege of king's and princes of the blood, to wear long hair, artfully dreſſed and curled: every body elſe were obliged to be polled, or cut round, in ſign of inferiority and obedience. Some writers aſſure us, that there were once different cuts of the hair for all the different qualities and conditions; from the prince, who wore it at full length, to the ſlave or villain, who was quite cropt. Hottoman treats at large of this privilege of the kings of France, Franco Gallia. cap. 11.

The cut of the hair of a ſon of France, under the firſt race of kings, was to declare him excluded from the right of ſucceeding to the crown, and reduced to the condition of a ſubject.

In the eighth century it was the cuſtom of people of quality, to have their children's hair cut the firſt time by perſons they had a particular honour and eſteem for; who, in virtue of this ceremony, were reputed a ſort of ſpiritual parents, or godfathers to them; though this practice appears to have been more ancient; inaſmuch as we read that Conſtantine ſent the pope the hair of his ſon Heraclius, as a token that he deſired him to be his adoptive father.

The parade of long hair became ſtill more and more obnoxious in the progreſs of Chriſtianity; as ſomething utterly inconſiſtent with the profeſſion of perſons who bore the croſs. Hence numerous injunctions and canons to the contrary. Pope Anicetus is commonly ſuppoſed to have been the firſt who forbad the clergy to wear long hair; but the prohibition is of older ſtanding in the churches of the Eaſt; and the letter wherein that decree is wrote, is of a much later date than that pope. The clerical tonſure is related, by Iſidore Hiſpalenſis, as of apoſtolical inſtitution.

Long hair was anciently held ſo odious, that there is a canon ſtill extant, of the year 1096, importing, that ſuch as wore long hair ſhould be excluded coming into church when living, and not be prayed for when dead.

We have a furious declamation of Luitprand againſt the emperor Phocas, for wearing long hair, after the manner of all the other emperors of the Eaſt, except Theophilus; who, being bald, enjoined all his ſubjects to ſhave their heads.

The French hiſtorians and antiquaries have been very exact in recording the heads of hair of their ſeveral kings. Charlemagne wore it very ſhort, his ſon ſhorter; Charles the Bald had none at all. Under Hugh Capet it began to appear again: this the eccleſiaſtics were diſpleaſed with, and excommunicated all who let their hair grow. Peter Lombard expoſtulated the matter ſo warmly with Charles the Young, that he cut off his own hair; and his ſucceſſors, for ſome generations, wore it very ſhort. A profeſſor of Utrecht, in 1650, wrote expreſsly on the queſtion, Whether it be lawful for men to wear long hair? And concluded for the negative. Another divine, named Reeves, who had wrote for the affirmative, replied to him.

The Greeks, and after their example, the Romans, wore falſe hair.

The cutting off the hair in mourning for the dead is an Eaſtern, as well as a Grecian cuſtom; and appears to have obtained in ancient times, as well as in later ages. Among the ancient Greeks, it was ſometimes laid upon the dead body, ſometimes caſt into the funeral pile, and ſometimes placed upon the grave. How the Jews diſpoſed of it we are not told; but that they cut it off we are aſſured. See Jer. xvi. 6. For other particulars, ſee BEARD.

HAIR makes a very conſiderable article in commerce; eſpecially ſince the mode of perukes has obtained: though among gentlemen this faſhion has of late very much ſubſided. But they were never more common among the fair ſex than at preſent.

The hair of the growth of the northern countries, as England, &c. is valued much beyond that of the more ſouthern ones; as Italy, Spain, the ſouth parts of France, &c.

The excellence of good hair conſiſts in its being well fed, and neither too coarſe nor too ſlender; the bigneſs rendering it leſs ſuſceptible of the artificial curl, and diſpoſing it rather to frizzle; and the ſmallneſs making its curl of too ſhort duration. Its length ſhould be about twenty-five inches; the more it falls ſhort of this, the leſs value it bears.

There is no certain price for hair; but it is ſold from five ſhillings to five pounds an ounce, according to its quality.

The ſcarceneſs of grey and white hair has put the dealers in that commodity upon the methods of reducing other colours to this. This is done by ſpreading the hair to bleach on the graſs like linen; after firſt waſhing it out in a lixivious water.

This lye, with the force of the ſun and air, brings the hair to ſo perfect a whiteneſs, that the moſt experienced perſon may be deceived therein; there being ſcarce any way of detecting the artifice, but by boiling and drying it, which leaves the hair of the colour of a dead walnut-tree leaf.

There is alſo a method of dyeing hair with biſmuth; which renders ſuch white hair as borders too much upon the yellow, of a bright ſilver colour; boiling is the proof of this too, the biſmuth not being able to ſtand it.

Hair, made perfectly clean, and moiſtened with the ſolution of ſilver in aqua fortis, expoſing it to the ſun, in order to haſten the appearance and deepen the colour, will be changed from red, grey, or other diſagreeable colours, to a brown or deep black. The ſolution for this purpoſe ſhould be fully ſaturated with the ſilver, diluted only with diſtilled water or pure rain water; and for the farther dulcification of the acid, it will be proper to add a little rectified ſpirits of wine. The liquids commonly ſold under the name of hair-waters, are in reality no more than ſolutions of ſilver, much diluted with water.

Hair which does not curl or buckle naturally, is brought to it by art; by firſt boiling, and then baking it in the following manner: after having picked and ſorted the hair, and diſpoſed it in parcels, according to lengths, they roll them up, and tie them tight down, upon little cylindrical inſtruments, either of wood or earthen ware, a quarter of an inch thick, and hollowed a little in the middle, called pipes; in which ſtate they are put in a pot over the fire, there to boil for about two hours. When taken out, they let them dry; and when dried, they ſpread them on a ſheet of brown paper, cover them with another, and thus ſend them to the paſtry-cook; who making a cruſt, or coffin, around them of common paſte, ſets them in an oven, till the cruſt is about three-fourths baked.

The end by which a hair grew to the head, is called the *head* of the hair; and the other, with which they begin to give the buckle, the *point*. Formerly the peruke-makers made no difference between the ends, but curled and wove them by either indifferently; but this made them unable to give a fine buckle; hair woven by the point never taking a right curl. Foreigners own themſelves obliged to the Engliſh for this diſcovery, which was firſt carried abroad by a peruke-maker of our country.

HAIR is alſo uſed in divers arts and manufactures.

The hair of beavers, hares, conies, &c. is the principal matter whereof hats are made.

Spread on the ground, and left to putrefy on corn-lands, hair, as all other animal ſubſtances, *viz.* horns, hoofs, blood, garbage, &c. proves good manure.

Hair alſo makes an ingredient in the compoſition of plaſter.

The hair of goats is uſed for the manufacture of fine ſtuffs and ſhawls in various parts of the Eaſt. (See ANGORA, ALEPPO, CASHEMIRE, &c.) Camels have alſo in ſome places yielded hair as fine as ſilk, and it has been employed in the manufacture of ſtuffs and ſhawls; though in general their hair is hard, and fit only for coarſe garments, and a kind of hair-cloths. Ælian relates (Hiſt. Anim. l. xvii. c. 34.) that there were camels on the Caſpian ſea whoſe wool was as fine as that of Miletus, and that the prieſts and richeſt people of the country wore the ſtuffs which were made of it. See CAMBLET and CAMEL.

Hair, in the *Manege*, and among *Farriers*, is popularly called the *coat*, and makes an object of principal conſideration in reſpect of horſes, &c.

If the hair of a horſe, eſpecially that about the neck, and parts uncovered, be ſleek and ſmooth, and cloſe, it is an indication of his being in health, and good caſe: if rough and ſtaring, or any way diſcoloured, it denotes a coldneſs, poverty, or ſome inward defect. To make the hair ſmooth, ſleek, and ſoft, he muſt be kept warm, ſweated often, and when ſweated, the coat muſt be well ſcraped, and rubbed down.

The hair growing on the fetlock, ſerves as a defence to the prominent parts thereof, in travelling on ſtony ways or in froſty weather.

If a place be bare, or thin of hair, or the hair be too ſhort, the ancient farriers uſed to waſh it with the urine of a young boy: and after that with the lye of unſlaked lime, ceruſe, and litharge. The moderns have various other ways: ſome waſh the part with the decoction of the roots of althæa; others with goat's milk, wherein agrimony has been pounded; others rub the part with nettle-ſeed, bruiſed with honey-water and ſalt; others anoint it with the juice of an onion, or radiſh; others with a mixture of alum, honey, goat's dung, and ſwine's blood; others with the root of white lily, boiled in oil; others with tar, oil of olives, and honey; and others with green walnut-ſhells, powdered, and mixed with honey, oil, and wine. To take off hair in any part, they apply a plaſter made of unſlaked lime, boiled in water, with orpiment added.

Hair-*balls*, maſſes of hair of different ſhapes and ſizes found in the ſtomachs of cows, oxen, calves, deer, and other animals. See Ægagropila, Balls, in *Zoology*, and Bezoar.

Hair-*bell*, in *Botany*. See Hyacinth.

Hair, *capillus*, is the firſt degree of the Linnæan ſcale for meaſuring plants, or the twelfth part of a line.

Hair-*cloths*, in *Military Affairs*, are large pieces of cloth made with half hair; they are uſed for covering the powder in waggons, or upon batteries; as alſo for covering charged bombs, or hand-grenades, and many other uſes in magazines.

Hair-*graſs*, in *Rural Economy*, the name of a coarſe ſort of graſs, of which there are ſeveral ſpecies, but which are very little uſed as cultivated graſſes, though ſome of them are eaten by cattle, and ſome other ſorts of live ſtock. See Aira.

Hair, *Maiden*, in *Botany*. See Adiantum.

Hair *Powder*. See Starch.

Hair-*ſtaring*, in *Rural Economy*, a certain ſtate or condition in the coats of horſes or other animals, in which they appear rough and ſtand in an erect ſort of poſition.

It is produced by various cauſes, ſuch as want of proper food, bad currying, and their not being covered ſufficiently, or kept in too cold ſtables or other places.

In order to preſerve the coats of theſe animals in a fine ſleek condition, it is neceſſary that they be kept perfectly well, and ſufficiently warm, having conſtantly good grooming in the ſtables while they are in work. By theſe means they generally ſoon become better coated and more ſleek.

Hairs of *Plants*, in *Vegetable Phyſiology*, are ſo called rather from a general reſemblance to thoſe of animals, than from any preciſe agreement in their ſtructure or mode of production. In their uſes they are ſo far ſimilar, that, forming a covering which is a bad conductor of heat, they ſerve to guard the vegetable body from the immoderate influence of external cold as well as heat; yet they are very frequently, and indeed moſt commonly, ſo thinly ſcattered, as to be of very little uſe in this way, and muſt doubtleſs anſwer other purpoſes. It is generally to be remarked that hairineſs is more abundant on the backs or under ſides of leaves, than on the upper, though the latter is moſt expoſed both to heat and cold; but this is only while the leaves are full grown and employed in their moſt important functions. In a young and unexpanded ſtate, the hairy covering of their backs and ribs, at that time moſt expoſed, may be of eminent ſervice, and there can be no doubt that the pubeſcence, with which buds of various kinds are often aſſiduouſly clothed and protected, may very materially guard their living principle and latent warmth from external injury.

Linnæus defines the hairs of plants to be excretory ducts of a briſtle-like form. Such they are in the nettle, and other ſtinging vegetables of the ſame nature, whoſe briſtles are tubular and pervious, emitting a venomous fluid into the minute wounds their points inflict, as is well explained by Mr. Curtis in his *Flora Londinenſis*, under *Urtica dioica*, faſc. 6. t. 69. "The naked eye," ſays that ingenious author, "readily perceives the inſtruments by which the nettle inſtils its poiſon; a microſcope of no great magnifying power more plainly diſcovers them to be rigid, tranſparent, tubular *ſetæ*, prickles, or ſtings, highly poliſhed and exquiſitely pointed, furniſhed at their baſe with a kind of bulb, in which the juice is principally contained, and which being preſſed on when the ſting enters the ſkin, forces the poiſon into the wound. Of the venomous quality of this liquid, and of the manner in which it is emitted, I have had ocular proof. Placing the footſtalk of a nettle leaf, *Urtica pilulifera* (the prickles being more manageable, and better adapted to the microſcope, than thoſe on the leaves or ſtalks), on the ſtage of the microſcope, ſo that the whole of the prickle was in the focus when horizontally extended, I preſſed on the bulb with a blunt-pointed pin, and, after ſome trials, found a liquid to aſcend in the prickle, ſomewhat as the quickſilver does when a warm hand is applied to the bulb of a thermometer. In ſome of the prickles I obſerved the liquid ſtationary. On preſſing ſuch in particular, I ſaw moſt plainly the liquor aſcend to, and flow copiouſly from, its very extremity. I was the more anxious to ſee this, as I ſuſpected the poiſon might proceed from an aperture in the ſide of the ſting, near the point, as in the forceps of the ſpider and tooth of the viper, where it appears to be placed, rather than at the extremity, that it may not take off from their neceſſary ſharpneſs. Pricking the ſkin of my hand with a needle, I placed ſome of the juice on the wound, which inſtantly inflamed, and put on all the appearance of a part ſtung by a nettle."

The cultivated Clary, *Salvia ſclarea*, like a multitude of other plants, is clothed with ſoft hairs, whoſe points exude a viſcid, and, in many inſtances, highly aromatic fluid. In ſuch the excretion is doubtleſs ſimilar to that of the nettle, varying only in proportion according to the health of the plant, warmth of the atmoſphere, or other cauſes. There is probably in theſe no particular reſervoir, to retain the liquor for occaſional emiſſion, as in the nettle; and yet perhaps the fragrance of ſome plants in the cool of the evening, which have exhaled no ſcent during the day, may be explained on a ſimilar principle. It is not abſurd to ſuppoſe that their aromatic ſecretions, elaborated in the heat of the day, may be lodged in their tubular pubeſcence, till forced out by the contracting power of the cold on its fine membranous ſubſtance.

The hairs which clothe many plants, however, neither ecrete nor diſcharge any fluids, or, at moſt, only while the parts they cover are very young and tender. In ſuch they can be conſidered merely as a defence againſt cold, heat, or inſects. Sometimes each particular hair is hooked, barbed, branched, forked, or ſtellated, and the whole are entangled or matted together, as in *Verbaſcum*. A ſtarry pubeſcence is often characteriſtic of a natural family of plants, as the *Columniferæ*, or Mallow tribe; while in others, as the genus *Ciſtus*, it ſerves at moſt but to mark a ſpecific difference. Forked hairs are not conſtant, even in the ſame ſpecies, in all circumſtances; witneſs *Hedypnois*. Rich nouriſhment, or much ſhade or ſhelter, have all a tendency to ſimplify, and partly to efface the pubeſcence of plants; while expoſure, and every thing that cauſes condenſation, or contraction of parts, multiplies and augments it.

It is difficult to account for the finely jointed ſtructure ſo general in the hairs of plants; nor can it be ſuppoſed that any fluid can paſs through ſuch, their tube being intercepted by ſeveral tranſverſe partitions. This kind of hairs, therefore, cannot be excretory ducts, and yet they belong to aromatic plants, as the *Didynamia Gymnoſpermia* of Linnæus, amongſt others. They are beſt ſeen in dried ſpecimens. Some ſpecies of *Begonia*, and a few ferns, bear flat ſtrap-like hairs, or more properly *ramenta*, ſhavings, which are commonly diſtant, but otherwiſe not different in nature from the cylindrical pubeſcence. The pubeſcence of many of the *Aſperifoliæ*, a tribe conſiſting of *Echium*, *Borago*, &c. is a beautiful and curious microſcopic object, each rigid poliſhed briſtle ſpringing from a knob or tubercle reſembling wrought ivory, of whoſe uſe we are ignorant. It is ſituated in the place of the bag of poiſon ſeen in the nettle; but the *aſperifoliæ*, though they often wound ſharply, do not ſting.

The pubeſcence of plants being, as we have ſaid, liable to vary in ſtructure and in degree, according to adventitious circumſtances, does therefore not, in thoſe reſpects, prove an infallible guide to ſpecific diſtinctions. Its direction, however, is found ſubject to no ſuch uncertainty, and has been made uſe of by the writer of this article in the genus *Mentha*, and by Dr. Roth in that of *Myoſotis*, to diſcriminate ſpecies not to be defined by any other means, but which, however they may vary in every other reſpect, are found conſtant in the direction of the hairs of their flower-ſtalks and calyx. In the intricate genus of *Galium* alſo, the ſame character ſerves us very unexceptionably in the briſtles of the ſurfaces or edges of their leaves. Jacquin has had recourſe to it; and we have followed him, in the fringes of the leaves, in ſome kinds of *Hæmanthus*. It is attended to with advantage on the ſtems of graſſes, as *Bromus*, and on thoſe of *Papaver piloſum*, Prod. Fl. Græc. n. 1202, contraſted with *P. orientale*. Doubtleſs, however, even this mark, like every other, muſt be employed with diſcretion; for the hairs of ſome plants, though erect in the living or freſh ſubject, will be found regularly depreſſed by drying. S.

Hair's *Breadth*. This is accounted the forty-eighth part of an inch.

HAIRHOUGH, a name commonly applied to cleavers.

HAIRIT, a term ſometimes provincially made uſe of to ſignify cleavers.

HAIRY Roots. See Fibrous *Roots*.

HAI-TAN-CHING, in *Geography*, a ſmall iſland near the coaſt of China, about 24 miles long, and 3 broad. N. lat. 25 35'. E long. 119 39'.

HAI-TIEN, a town of China, in the province of Pe-che-li, a little N.W. of Peking.

HAI-YEN, a town of China, of the third rank, in the province of Tche-kiang; 20 miles S.S.E. of Kià-hing.

HAJYGUNGE, a town of Hindooſtan, in Oude, on the Goomty; 40 miles N. of Manickpour.—Alſo, a town of Bengal; 38 miles S. of Dacca.

HAJYKAN. See Sindy.

HAJYPOUR, a circar of Hindooſtan, in Bahar, bounded on the N. by Bettiah, on the N E. by Tyroot, on the E. by Boglipour, on the S. by the Ganges, which ſeparates it from Bahar Proper, and on the W. by the circar of Sarun; about 100 miles long, and from 20 to 30 broad. Its capital, of the ſame name, is ſituated on the left bank of the Ganges, oppoſite to Patna.—Alſo, a town of Hindooſtan, in Mewat; 15 miles N. of Cotputly.—Alſo, a town of Hindooſtan, in Guzerat; 40 miles W. of Ahmedabad.

HAKAS, a town of Sweden, in the province of Jamtland; 20 miles S. of Froſon.

HAKE, in *Ichthyology*, the common Engliſh name of Gadus *Merlucius*; which ſee.

This fiſh was uſed of old, dried and ſalted. Hence the proverb obtains in Kent, *as dry as a hake*. Paroch. Antiq. 575.

Hake, *Forked*, a trivial Engliſh name for the Linnæan *Blennius phycis*. See Phycis.

HAKEA, in *Botany*, ſo named by profeſſor Schrader, in compliment to baron Hake, a patron of the botanic garden at Hanover; ſee Conchium. We have preſumed to retain the latter name, chiefly becauſe of its peculiar aptitude for the genus in queſtion, which is ſo great, as to be rarely equalled in ſcientific nomenclature, and it is much to be lamented that ſuch a name ſhould be ſuperſeded, though *Hakea* was printed, unknown to the author of *Conchium*, a few months before. To this preference of the latter, Ventenat, the younger Gærtner, and even Cavanilles, juſt before his death, aſſented; without any prejudice to the honours of baron Hake, for whom another genus might eaſily be ſelected out of many leſs worthily beſtowed. Above all, we diſclaim all intention of diſreſpect to the authority of the learned and amiable Schrader, which is of the firſt rank, and reverenced by no one more than ourſelves. Botanical nomenclature will never retain any ſhadow of claſſical excellence or purity, unleſs ſome ſenſe, judgment, and taſte be allowed now and then to take place of mere blind dictatorial authority of any kind; and it is the duty of thoſe, who have talents and power ſufficient, to cultivate and protect its advancement towards perfection. In this cauſe the great Linnæus long ſtruggled with barbariſm, and with barbarians, who, becauſe they could not eclipſe his fame, laboured to undermine his authority, careleſs whether the intereſts of ſcience ſuffered by it or not. If he at laſt occaſionally fainted in the conteſt, his followers ſhould copy his beſt efforts, not meanly ſubmit, becauſe he through inadvertence now and then made a falſe ſtep. S.

HAKEL, or Hatchel. See Hatchel.

Hakel, in *Geography*, a town of Arabia Felix, in the province of Yemen; 40 miles S.S.E. of Abu-Ariſch.

HAKELSDORF, a town of Bohemia, in the circle of Konigingratz; 16 miles N N.E. of Gitſchin.

HAKEM-BAMRILLAH, in *Biography*, the third of the Fatemite caliphs of Egypt, who ſucceeded to the throne in the year 996, at the age of eleven. Having been brought up without the neceſſary reſtraints impoſed by a good education, he was frantic with the power devolved upon him, and ſeemed equally regardleſs of God or man, and his whole reign was a wild mixture of vice and folly. Without attending to the ancient cuſtoms of Egypt he impoſed on the women an abſolute confinement, forbidding them, upon the ſevereſt penalties, the uſe of ſhoes, and prohibiting any perſons from manufacturing them as articles of dreſs. This reſtraint excited furious clamours from both ſexes, but their complaints provoked his fury, and he deſtroyed the great part of the capital, Cairo, by fire, and delivered the reſt to pillage, which cauſed the moſt bloody conteſts between the ſoldiery and thoſe inhabitants, who preferred death to the quiet reſignation of their property. At one time he affected a profound reverence for the Mahometan religion, and became the founder of moſques and colleges. He had upwards of twelve hundred copies of the Koran tranſcribed at his own expence in letters of gold, and he rooted up all the vines of Upper Egypt, in order to prevent the manufacture of wine, the uſe of which was prohibited by the prophet. His vanity ſoon induced him to aſpire to ſtill higher honours: he ſtyled himſelf the viſible image of the true God upon earth, claimed the honours of adoration to his perſon, and cauſed the myſteries of his worſhip to be performed on a mountain near Cairo. When kings and emperors become prophets, there is no fear but flatterers and fools will ſoon be converted to the faith promulgated from the royal throne; accordingly ſixteen thouſand perſons very ſoon ſanctioned, by their practices, the abſurdities of Hakem: but what is more extraordinary is this, that the Druſes of Mount Libanus, even at the preſent day, retain a perſuaſion of the divinity and exiſtence of the caliph, or, as they denominate him, the prophet Hakem. Under the maſk of a new religion, he perſecuted Jews and Chriſtians wherever his power extended. But in Egypt and Paleſtine his cruel and wanton conduct made martyrs of ſome believers, and apoſtates of others: the common rights and privileges of all who would not follow him in his abſurdities were equally diſregarded. He demoliſhed the church of the reſurrection at Jeruſalem, to its very foundations. After this he pretended ſome compunctions of conſcience, and ordered the reſtitution of the churches; but the people knowing that no dependence could be placed on his meaſures, when founded in juſtice, and being unable longer to endure his tyranny, put an end to his life and reign, by a conſpiracy, at the head of which was his own ſiſter. Gibbon.

HAKES, in *Agriculture*, a term ſometimes provincially applied to the copſe, or draught-iron of a plough.

HAKETON, in our *Old Writers*, a military coat of defence.

HAKEWELL, George, in *Biography*, was born at Exeter in the year 1579. Having laid a good foundation in elementary learning, he went firſt to St. Alban's hall college, Oxford, and then to Exeter college to purſue his ſtudies. At the latter he was elected fellow, and having taken his degrees, and being admitted to orders, he went abroad for farther improvement. In 1611, he took his degree of D.D., and was ſoon after appointed chaplain to prince Charles, which led to preferment in the church. When, however, a marriage was projected between his pupil and the infanta of Spain, he wrote a treatiſe againſt the intended union, which he ſhewed the prince in manuſcript, under the ſtrict injunction that it ſhould meet no other eye; the honour of a prince was not very binding, for in two hours he delivered it into the hands of his father, who inſtantly ordered the author to be taken into cuſtody. The impriſonment was of ſhort duration; but the tutor was never reſtored to his ſituation, nor to the king's favour. The high men of this world rarely forgive, and James was too lofty to make an exception to the general rule. Under the reign of Charles, he was promoted to the biſhopric of Worceſter, and elected rector of Exeter college. Upon the breaking out of the civil wars he ſubmitted to the authority of parliament, and retained his office as rector of the college till his death, in 1649. He was a great divine, a good philoſopher, and a celebrated preacher. As an author, his chief work was entitled "An Apology, or Declaration of the Power and Providence of God in the Government of the World, proving it doth not decay," folio: he publiſhed, likewiſe, twelve ſermons on David's vow to reform himſelf, his family, and his kingdom: "A Treatiſe on Confirmation," and many ſingle ſermons, and controverſial tracts. Biog. Brit. Toulmin's Edit. of Neale's Hiſt. of the Puritans.

HAKIAR, in *Geography*, a town of Curdiſtan; 20 miles N.E. of Gulamerik.—Alſo, a river of the ſame country, which runs into the Zab; 20 miles W. of Erbil.

HAKIMPOUR, a town of Bengal; 11 miles E.N.E. of Mahmudpour.

HAKLUYT, Richard, in *Biography*, was born in or near London about the year 1553. He was educated at Weſtminſter ſchool, and, being accuſtomed to viſit an uncle greatly attached to maritime purſuits, he acquired a taſte for geographical and naval enquiries, which at length became his ruling paſſion. During his ſtudies at Oxford, he rendered himſelf ſo conſpicuous by his vaſt knowledge on theſe kinds of ſubjects, that he was appointed to read public lectures upon coſmography and the ſciences connected with it. Of the particular plan of this courſe of lectures we have no account: of its utility and excellence there can be no doubt, ſince ſir Francis Drake not only acknowledged great obligations to it, but was deſirous of eſtabliſhing a lecture on navigation at Oxford. In 1582 Mr. Hakluyt publiſhed a ſmall "Collection of Voyages and Diſcoveries," which procured him a commiſſion from the ſecretary of ſtate to confer with ſome merchants of Briſtol reſpecting an expedition to Newfoundland and the adjacent parts. He next engaged as chaplain to ſir Edward Stafford, in an embaſſy to France, where he remained five years. Here he cultivated an acquaintance with all perſons eminent for the branches of ſcience to which he had attached himſelf, and procured a French account of Florida, which he tranſlated into Engliſh, and dedicated to ſir Walter Raleigh. He cauſed to be tranſlated into his native language, an improved edition of Peter Martyr's work "De Orbe novo," under the title of "The Hiſtory of the Weſt Indies," by Mr. Lock. Upon his return from the continent in 1588, he was nominated by ſir Walter Raleigh one of the corporation of adventurers, to whom he aſſigned his patent for the proſecution of diſcoveries in America. He immediately ſet about the collection and arrangement of all the accounts and documents of voyages by Engliſh navigators, and in the following year he publiſhed, in one volume folio, "The principal Navigations, Voyages, and Diſcoveries of the Engliſh Nation, made within theſe Fifteen hundred Years." This collection, which was augmented by two other volumes, contains the narratives of more than two hundred voyages, and is reckoned a highly valuable treaſury of facts. The laſt volume was publiſhed in the year 1600. In 1601 he publiſhed a tranſlation from the Portugueſe of "Antonio Galvano's Hiſtory of Diſcoveries," and in a few years after Ferdinand de Soto's "Deſcription of Florida." This was his laſt work: he died in the year 1616, and was buried in Weſtminſter Abbey. He had obtained preferment in the church, but to no great value. Biog. Brit.

HAKMAN, in *Geography*, a town of the iſland of Ceylon; 80 miles S. of Candy.

HAKSVIK, a town of Sweden, in the province of Weſt Gothland; 25 miles S. of Ulrichſhamn.

HAL, in *Entomology*, according to Dapper, the name by which the Africans diſtinguiſh the ſcorpion.

HALABOOR, in *Geography*, a town of Bootan; 58 miles N. of Dinagepour.

HALABI, one of the Kartan iſlands. See Kartan.

HALAVORD, a town of Perſia, in the province of Comis; 16 miles W. of Biſtain.

HALBARD, or HALBERT, in the *Art of War*, an offenſive weapon, conſiſting of a ſhaft, or ſtaff, five feet long; with a ſteel head, partly in form of a creſcent.

The word is formed of the German *hal*, *hall*; and *bard*, an *hatchet*. Voſſius derives it from the German *hallebaert*: of *hel*, *clarus*, *ſplendens*, and *baert*, ax.

The halbard was anciently a common weapon in the army; where there were companies of halberdeers. It is ſtill carried by the ſerjeants of foot.

It is called the Daniſh ax, becauſe firſt bore by the Danes: they carried it on the left ſhoulder. From the Danes it was derived to the Scots, and from the Scots to the Engliſh, and from them to the French.

HALBERSTADT, in *Geography*, a principality of Germany, extending from E. to W. about 36 miles, and 28 from N. to S. It is generally level, with ſome few hills. The ſoil is very fertile in grain and flax, and it has rich paſtures and meadows. Its large breeds of ſheep afford plenty of wool. Its coal pits are of no importance; and as their wood is diminiſhing, fuel is ſcarce; and as a ſubſtitute ſtraw and ſtubble are uſed. As it has no river of any conſiderable magnitude, fiſh is ſcarce. The inhabitants are moſtly Lutherans, diſtributed into 11 inſpections, under a general ſuperintendancy. The Calviniſts and Catholics are nearly equal in number. The Jews are tolerated within a certain number of families. The woollen manufactures thrive. By the treaty of Weſtphalia in 1648, this principality was transferred to the electoral houſe of Brandenburg; but by the late treaty of Tilſit, it was annexed to the kingdom of Weſtphalia.—Alſo, an ancient city of Weſtphalia of the ſame name, ſaid to have been built by the Cheruſci. The number of inhabitants is about 12,500; and the number of churches 16. The cathedral is an old but ſtately building, conſtructed of hard free-ſtone. The chapter is compoſed of a provoſt, dean, ſenior and ſubſenior, and 16 canons, four of whom are Catholics, the reſt Lutherans. The palace is converted into the townhouſe, toll, and exciſe offices. The increaſe of inhabitants has occaſioned the addition of three ſuburbs; 30 miles S.W. of Magdeburg. N. lat. 51° 54′. E. long. 11° 12′.

HALBERT, among *Farriers*, &c. is a piece of iron, an inch broad, and three or four inches long, ſoldered to the toe of a horſe's ſhoe, that jets out before; to hinder a lame horſe from reſting or treading upon his toe.

Halbert-ſhoes of neceſſity conſtrain a lame horſe to tread, or reſt on his heel, when he goes a moderate pace; which lengthens and draws out his back ſinew, that was ſomewhat ſhrunk before. Theſe halbert-ſhoes are uſually injurious.

HALCRYPTIUM, a name given by Dr. Hill to a peculiar ſalt diſcovered in the chalybeate waters, and mentioned by Hoffman and ſome other authors, though not before known by any peculiar name.

The word is derived from ἅλς, *ſalt*, and κρυπτω, *to hide*, it being the moſt latent, and with the greateſt difficulty diſcoverable or ſeparable, of the native ſalts. It is defined to be a ſalt found naturally in a fluid form, ſuſpended in ſmall quantities in certain waters, ſcarce diſcernible in them by its taſte, and very difficultly ſeparable from them; but by a proper evaporation to be procured in a dry form in extremely ſmall particles, in form of powder; which, when carefully prepared by a proper ſolution and evaporation, affords extremely minute, oblong, and quadrangular cryſtals. Hill, Hiſt. of Foſſ. p. 397.

The chalybeate waters all afford this ſalt in ſome degree, but none ſo plentifully as the Pyrmont.

This ſalt ſeems of the utmoſt importance to the water, in which it is contained, ſince it can be ſuppoſed to contain no other alkali, and without an alkali it is not eaſy to account for its properties; to which it may be added, that, by means of the common alkali of tartar, and a ſolution of the pyrites, or even of iron, in an acid mixed with common water, a liquor may be made, very much reſembling the natural Pyrmont water.

HALCYON, or KING-FISHER, in *Ornithology*. See ALCEDO.

HALCYON-*days*, *dies alcyonii*, a phraſe that frequently occurs among writers, to denote a time of peace and tranquillity.

The expreſſion takes its riſe from a ſea-fowl, called, among naturaliſts, *halcyon*, or *alcyon*, which is ſaid to build its neſt about the winter ſolſtice, when the weather is uſually obſerved to be ſtill and calm. See ALCEDO.

Halcyon-days, according to ancient tradition, are the ſeven days before, and as many after the brumal ſolſtice; called alſo *St. Martin's Summer*: theſe are famous for the calmneſs of the weather, which emboldens the halcyon to build, and brood its eggs on the rocks, on the very brink of the ſea.

Columella gives the denomination, *halcyonii dies*, to a number of days commencing on the eighth of the calends of March; on account of the great ſtillneſs of the Atlantic ocean, then uſually obſerved.

HALCZIN, in *Geography*, a town of Poland, in the palatinate of Braclaw; 20 miles E.S.E. of Braclaw.

HALDE, JOHN BAPTIST DU, in *Biography*, was born at Paris in the year 1674, was early initiated into the ſociety of the Jeſuits, and was entruſted with the care of collecting and arranging the letters ſent by the ſociety's miſſionaries into different parts of the world. Little is known of his hiſtory, except as it is connected with his works. He was ſecretary to father Le Tellier, the king's confeſſor. His great work was "Deſcription hiſtorique, geographique, et phyſique de l'Empire de la Chine, et de la Tartarie Chinoiſe," four vols. fol. This is eſteemed the moſt complete account of that vaſt empire that has ever appeared in Europe. We are well aware of the works of ſir George Staunton and Barrow, but they never were in poſſeſſion of the means of information which occurred to Du Halde. It has been tranſlated into our own language, but in an abridged ſtate. He died in the year 1743, leaving behind him a character eminent for mildneſs, piety, and unwearied induſtry. He was author of ſome Latin poems; and was diſtinguiſhed as the editor of the "Lettres Edifiantes," with a preface written by himſelf. Moreri.

In our article on CHINESE *Muſic*, drawn up from the moſt recent and authentic information, it will appear that the accounts which this learned and pious miſſionary has given of the muſic of this ancient and extenſive empire, is confirmed in almoſt every important circumſtance. See CHINESE *Muſic*.

HALDENSTEIN, in *Geography*, a barony of the Griſons in Switzerland, near Coire, which, as Mr. Coxe ſays, is the ſmalleſt ſovereignty in Europe. It was formerly under the protection of the ſeven ancient cantons of Switzerland, but ſince the year 1568, it has been an independent ſovereignty, under the protection of the three leagues. The whole barony conſiſts of a ſemicircular plain, between the Rhine and the bottom of the Calendar, about five miles in length, and ſcarcely one in breadth; and alſo occupies part of the mountain, which is too ſteep to be inhabited. It contains only two villages, Haldenſtein and Sewils, and the ſubjects amount to no more than between three and four hundred. The people were ſerfs, or vaſſals, until 1701, when they obtained ſeveral immunities. At preſent, or at leaſt before the French revolution, the lord has territorial juriſdiction, the excluſive privilege of hunting and fiſhing, a claim of two days' work annually from each of his ſubjects, and a load of dung from each peaſant. He appoints the judge in the criminal court, receives the fines for offences, from which he pays the expences of the proceſs, and has the power of pardoning. He nominates the preſident, and part of the jury in civil cauſes, and in all caſes of appeal, judges in the laſt reſort.

HALDESLEBEN, a town of Weſtphalia, in the duchy of Magdeburg; 12 miles N. of Magdeburg. N. lat. 52° 20′. E. long. 11° 34′.

HALDIMAN Township, a townſhip of Northumberland county, Upper Canada, to the W. of Cramake, and lake Ontario.

HALE, *Sir* Matthew, in *Biography*, a moſt eminent lawyer, was born in 1609 at Alderſley, in Glouceſterſhire. He was educated under a Puritanical clergyman; but in the early part of life he was not free from thoſe levities which uſually attach to youth, and his diſpoſition ſeemed rather for martial than literary exerciſes. It was not till he had arrived at the age of manhood, that he could be prevailed on to enter his name at Lincoln's Inn, but from this moment he ſeemed deſirous of redeeming his time, and bent the whole force of his genius to the profeſſion in which he had engaged. He is ſaid to have ſpent ſixteen hours a day in ſtudy for ſeveral years; he was, in truth, perfectly changed, became ſerious and devout, and omitted no opportunity of performing thoſe religious duties which become the creature to obſerve, in teſtimony of his dependence on the creator. The life he now led was entirely that of a recluſe, and he dedicated no hours to conviviality or even ſocial intercourſe. He did not content himſelf with the ſtudy of the law; he extended his inquiries to almoſt every object of human learning, and became well verſed in mathematics, philoſophy, hiſtory, and the theology of the age. He was called to the bar ſome time before the breaking out of the civil war, and when that unfortunate event occurred, he took the moſt honourable and uſeful courſe, though perhaps not the moſt prudent, *viz.* that he would engage with no party, but that he would be ever ready to aſſiſt thoſe that were loweſt. With this reſolution he was counſel for ſeveral of the oppreſſed loyaliſts, and for the king himſelf; yet he did not ſcruple to take the covenant, and to act as a lawyer in the concerns of parliament. He had a high reputation for honour and integrity, and on that account ſtood well with all thoſe who were actuated by good motives of each party. He was perſuaded in 1654 to accept of the office of chief juſtice, in which elevated ſtation he maintained the dignity of the laws, and the rights of the people, with a ſpirit that was not very pleaſing to the protector, who told him on his return from the circuit, "that he was not fit for a judge." Hale, with much modeſty, which Cromwell could not help feeling, ſaid "it was very true;" and thenceforth he refuſed to ſit upon criminal cauſes. He ſerved in the parliament of 1654 as one of the knights of the ſhire for Glouceſter, and daily attended to obſtruct ſome of the projects then ſet on foot by the enthuſiaſts. After the death of Oliver, he refuſed to take a commiſſion from his ſon Richard. When the courts of law were re-ſettled, he was in 1660 made chief baron of the Exchequer, and was knighted. He held that ſtation eleven years, with the univerſal character of one of the ableſt and moſt upright judges that ever adorned the Engliſh Bench. He would never converſe upon a cauſe that was likely to come before him in his judicial character. He refuſed to hear the ſtatement of a caſe, from a nobleman intereſted in the deciſion, which ſo offended the peer, that he forthwith went to the king to complain of the affront, as he called it, but the monarch, who underſtood the honourable motives of the judge, bid the nobleman to be contented, for he verily believed that ſir Matthew Hale would uſe him no better if he went to ſolicit him in a cauſe. Though judge Hale was a ſtrict member of the church of England, he was favourable to the rights of conſcience, and friendly to nonconformiſts. The moſt blameable part of his conduct was his condemnation of ſome ſuppoſed witches at Bury St. Edmonds in 1664. He was of great ſervice to the city of London at the period of their tremendous fire, by ſitting at Clifford's Inn, to aſſiſt in compromiſing differences between tenant and landlord. He was raiſed to the poſt of lord chief juſtice of the court of King's Bench in the year 1671, where his high reputation drew after him moſt of the buſineſs of the other courts. He died in February 1676, in the ſixty-ſeventh year of his age, and his remains were interred in the church-yard of Alderſley. He was author of many works on various ſubjects; but thoſe which are beſt known, are his "Contemplations Moral and Divine," three vols: "The Hiſtory of the Pleas of the Crown:" "The original Inſtitution, Power, and Juriſdiction of Parliaments." Burnet's Life of Hale. Biog. Brit.

Hale, in *Geography*, a river of England, in Cornwall, which runs into the ſea near St. Ives.—Alſo, a town of the duchy of Holſtein; ſix miles E. of Krempe.—Alſo, a river of Holſtein, which runs into the Eider; 10 miles S.W. of Renſburg.

Hale, in *Sea Language*, ſignifies *pull*: hence, to *hale* a ſhip, denotes to pull her on ſhore.

HALEBLI, in *Geography*, a town of Aſiatic Turkey, in Natolia; 24 miles S.W. of Eregri.

HALECULA, in *Ichthyology*, a name given by ſome authors to the anchovy. The word is a diminutive of halec, a name for the herring. See Encrasicholus.

HALELÆUM, formed of ἅλς, *ſalt*, and ελαιον, *oil*, a medicine compoſed of oil and ſalt, and recommended by the ancients for external uſe in caſes of tumours of the joints.

HALENESS, in *Geography*, a cape on the E. coaſt of Shetland. N. lat. 60° 2′. W. long. 1° 20′.

HALE's Key, a ſmall iſland in the gulf of Mexico, near the coaſt of Eaſt Florida. N. lat. 28° 4′. W. long. 82° 5′.

Hales, John, in *Biography*, uſually diſtinguiſhed by the appellation of "The ever memorable," was born at the city of Bath, in 1584, where he was educated in the elements of learning, and at thirteen years of age he was qualified for the univerſity, and was entered a ſcholar of Corpus Chriſti college. Here he diſtinguiſhed himſelf among his contemporaries for his ſuperior talents, and for his accurate knowledge of the Greek language. He was elected fellow of Merton college in 1605, and aſſiſted ſir Henry Saville in preparing his fine edition of the works of St. Chryſoſtom for the preſs. In 1612 he was appointed Greek lecturer in his college, and profeſſor of that language to the univerſity. In the following year he was admitted fellow of Eton college, and ſhortly after he accompanied Dudley Carleton, ambaſſador to the Hague, in the capacity of his chaplain. In this capacity he had the conſtant opportunity of attending the meetings at the ſynod of Dort, and became, on conviction, a convert from Calviniſm to Arminianiſm. In 1638, archbiſhop Laud appointed him to be his chaplain, and procured for him the canonry of Windſor. This was the more ſurpriſing, as he had on a former occaſion offended the prelate by his treatiſe on ſchiſm, which was handed to him in MS. This circumſtance occaſioned Mr. Hales to write to the archbiſhop that remarkable vindication of himſelf which was firſt printed by way of appendix to the 7th edition of biſhop

Hare's "Difficulties and Diſcouragements, which attend the Study of the Scriptures in the way of private Judgment," in which he declared, that the purſuit of truth had been his only care ever ſince he underſtood the meaning of the word. "For this," ſaid he, "I have forſaken all hopes, all friends, all deſires, which bias me, and hinder me from driving at what I aimed; for this, I have ſpent my money, my means, my youth, my age, and all that I have; that I might remove from myſelf that cenſure of Tertullian, "ſuo vitio quis quid ignorat:" if, with all this coſt and pains, my purchaſe is but error, I may ſafely ſay, to err hath coſt me more, than it has many to find the truth. And truth itſelf ſhall give me this teſtimony at laſt, that if I have miſſed her, it is not my fault, but my misfortune." He ſuffered ſevere hardſhips in the great rebellion, and was frequently reduced to the want even of the neceſſaries of life. He died in May 1656, when he had completed the ſeventy-ſecond year of his age. About three years after his death, there came out a collection of his works in quarto, entitled "Golden Remains of the ever memorable John Hales of Eton College." This collection conſiſts of ſermons, miſcellanies, and letters written on particular occaſions. In 1677 another collection of his works was publiſhed under the title of "Several Tracts by the ever memorable Mr. John Hales." The firſt uniform edition of his works was printed at Glaſgow in three volumes 12mo. The character given of this excellent man by biſhop Pearſon is as follows: "As a Chriſtian none was ever better acquainted with the nature of the goſpel, becauſe none more ſtudious of the knowledge of it, or more curious in the ſearch:—as he was liberal and candid himſelf, ſo he deteſted an impoſing, cenſorious, and intolerant ſpirit in others, and would often ſay, that he would renounce the religion of the church of England to-morrow, if it obliged him to believe that any other Chriſtians would be damned, who did not wiſh him to be ſo." Biog. Brit.

Hales, Alexander, who flouriſhed in the thirteenth century, was a native of Glouceſterſhire, who derived his name from a monaſtery in that county, in which he received the early part of his education. He was ſent to Paris to complete his ſtudies. Here he took his degree, commenced profeſſor of the ſciences of canon law and theology, and drew together a large crowd of pupils, among whom was the celebrated Dun Scotus, and John Fidanza, afterwards known to the world by the name of cardinal Bonaventure. So high was his reputation, and ſo profound was his knowledge, that he obtained the title of the "Irrefragable Doctor." In 1222 he embraced the monaſtic ſtate at Paris, where he ſpent the remainder of his days. He died in 1245, leaving behind him ſeveral publications, but of thoſe that remain no one can with certainty be pronounced as his, except the "Summa univerſæ Theologiæ," or Commentaries on the four Books of Sentences, which he undertook by order of pope Innocent IV. It has gone through many editions, and has been printed at different cities on the continent. Some of his manuſcripts are ſuppoſed to exiſt in the libraries at Milan, Oxford, and Lambeth. Gen. Biog.

Hales, Stephen, a pious and exemplary divine, and eminent natural philoſopher, particularly diſtinguiſhed by his experiments on the phyſiology of plants, was the ſixth ſon of Thomas Hales, eſq. of Beakeborn, or Beckeſbourn, Kent, where he was born in 1677. He was educated in Bene't college, Cambridge, of which he became a fellow in 1702. He afterwards took his degree of M. A. and entered into holy orders. The degree of doctor of divinity was conferred on him by the univerſity of Oxford in 1733. Botany and anatomy formed his ſtudies of relaxation while at Cambridge, his companion in which was the celebrated antiquary Dr. Stukeley. He was advanced ſucceſſively to the perpetual curacy of Teddington, Middleſex, and to the livings of Portlock, Somerſetſhire, and Farringdon, Hampſhire. He married the daughter of a clergyman, who died at the end of two years, leaving no iſſue, nor did he ever marry again. He reſided to the end of his life at Teddington, where he was viſited by perſons of rank and taſte, amongſt others by Frederick late prince of Wales, after whoſe death Dr. Hales was made clerk of the cloſet to the princeſs dowager, who always entertained a high reſpect for him, and after his deceaſe erected a handſome monument to his memory in Weſtminſter-abbey, near that of Handel. On this is his buſt in a large medallion, ſupported by a female figure repreſenting Botany, accompanied by Religion. The epitaph is in Latin. He refuſed a canonry of Windſor, that he might continue to devote himſelf to his parochial duties, and his favourite ſcientific purſuits, and as piety, truth, and virtue were the principles of his character, he lived in univerſal eſteem to the age of 84, dying at Teddington, January 4, 1761, where he was buried, under the church tower, which he had rebuilt at his own expence.

Dr. Hales, having been elected a fellow of the Royal Society in 1717, communicated to that learned body his firſt eſſay in Vegetable Phyſiology, containing an account of ſome experiments concerning the effect of the ſun's heat in raiſing the ſap. In 1727 appeared the firſt edition of his Vegetable Staticks, in 8vo. illuſtrated by plates, of which a ſecond edition was publiſhed in 1731, followed afterwards by ſeveral others. This work was tranſlated into French by Buffon in 1735, and into Italian by a Neapolitan lady named Ardinghelli, in 1756. There are alſo German and Dutch editions. The original book was, in fact, the firſt volume of a work, entitled Statical Eſſays, of which the ſecond, relating to the circulation of the blood in animals, was called Hemaſtaticks, and came out in 1733. In this the ſubject of the urinary calculus alſo is treated chemically and medically. With a laudable view of preventing, as well as curing, the ſufferings and crimes of his fellow-creatures, this good man publiſhed anonymouſly "a friendly admonition to the drinkers of gin, brandy, and other ſpirituous liquors," which has often been reprinted and diſtributed gratis, by thoſe who conſider the temporal and eternal intereſts of their fellow ſubjects, rather than the increaſe of a frequently miſuſed revenue. His invention of a ventilator for mines, priſons, hoſpitals, and the holds of ſhips, laid before the Royal Society in 1741, and applied alſo to the ventilation and conſequent preſervation of corn in granaries, has proved one of the moſt extenſively uſeful contrivances for the preſervation of health and human life. His philoſophy was not a barren accumulation for the ignorant to wonder at, or for its profeſſor to repoſe on in ſottiſh ſelf-ſufficiency and uſeleſſneſs; but an inexhauſtible bank, on which his piety and his benevolence were continually drawing. Such philoſophy and ſuch learning alone entitle their poſſeſſors to authority or reſpect, and ſuch are the beſt fruits of religion. In this inſtance at leaſt they were duly honoured, both at home and abroad. The fame of Hales was widely diffuſed throughout the learned world, of which he received a moſt diſtinguiſhed teſtimony, in being elected one of the eight foreign members of the French *Academie des Sciences*, in 1753, in the place of ſir Hans Sloane, who died that ſame year. In 1732 he had been appointed, by the Britiſh government, a truſtee for ſettling a colony in Georgia. He was well acquainted with Mr. Ellis, and other naturaliſts of his day, with whoſe views and purſuits of all kinds he ardently concurred (ſee Ellis); but it does not appear that his foreign correſpondence was extenſive. His name does not occur among the correſpondents of Haller, who nevertheleſs held him in the higheſt eſtimation, as a philoſopher and a man.

As a vegetable phyſiologiſt, Dr. Hales is entitled to the higheſt honour. His experiments and remarks led the way to thoſe of Du Hamel, Bonnet, and all that have followed. His accuracy of obſervation, and fidelity of relation, have never been impeached, and his ideas in phyſics, in many inſtances, went before the knowledge of his day, and anticipated future diſcoveries, ſuch are his obſervations relative to airs, and to vegetable ſecretions. One of his more able ſucceſſors in the ſtudy of vegetable phyſiology, has doubted the accuracy of one of his plates only, tab. 11, in which three trees, having been united by engrafting their branches, the intermediate one, by the earth being removed from its roots, is left hanging in the air. An experiment of the late Dr. Hope's at Edinburgh upon three willows, of which the writer of this article has been an eye-witneſs, and which was conducted with ſucceſs in imitation of this of Hales, puts his account beyond all doubt whatever. Aikin's Gen. Biogr. Haller, Bibl. Bot. Hales's works. S.

HALESIA, in *Botany*, ſo named by Ellis, in honour of that illuſtrious vegetable phyſiologiſt the Rev. Dr. Stephen Hales; ſee the preceding article.—Linn. Gen. 237. Schreb. 319. Willd. Sp. Pl. v. 2. 849. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 125. Juſſ. 156. Lamarck. Illuſtr. t. 404. Gærtn. t. 32.—Claſs and order, *Dodecandria Monogynia*. Nat. Ord. *Bicornes*, Linn. *Guaiacanæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, minute, of one leaf, with four teeth, permanent. *Cor.* of one petal, bell-ſhaped, inflated, deciduous, rather irregular; its limb in four, unequal, obtuſe, ſhallow, inflexed, or ſlightly ſpreading, lobes. *Stam.* Filaments 12, rarely 16, awl-ſhaped, equal, erect, rather ſhorter than the corolla, inſerted into its tube, and connected together at their baſe; anthers oblong, obtuſe, erect. *Piſt.* Germen inferior, oblong, angular; ſtyle thread-ſhaped, longer than the corolla; ſtigma ſimple. *Peric.* Drupa dry, obovate-oblong, with four ſides and four wings, ſometimes unequal. Nut ſolitary, obovate, pointed at each end, of four marginal cells. *Seeds* ſolitary from the bottom of each cell, oblong, ſlightly curved.

Eſſ. Ch. Calyx with four teeth, ſuperior. Corolla bell-ſhaped, four-cleft. Drupa dry, with four angles. Nut of four cells. Seeds ſolitary.

Obſ. It appears by the various deſcriptions that ſome of the ſeeds are frequently abortive. In our gardens the whole fruit is often altogether ſo.

1. H. *tetraptera*. Linn. Sp. Pl. 636. Cavan. Diſſ. 338. t. 186. Curt. Mag. t. 910. Ellis in Phil. Tranſ. v. 51. 931. t. 22. f. A.—Leaves ovate, pointed. Wings of the fruit equal.—A native of the ſhady margins of rivulets in South Carolina, where Cateſby obſerved it, and figured it in his vol. 1. t. 64. Dr. Garden ſent ſeeds to Mr. Ellis in 1756, when it was firſt raiſed in England, and named by the latter, who publiſhed a plate of it, different from that in the Phil. Tranſ. as remarked by the late Mr. Dryander in his accurate and laborious work, *Bibl. Banks.* v. 3. 282. It forms a moſt elegant ſhrub, known by the name of the Snow-drop tree, being very hardy, and covered in May with innumerable white or reddiſh bell-ſhaped drooping bloſſoms, excellently drawn by Mr. Edwards in Curtis's Magazine. Theſe indeed have no ſcent, but their profuſion and delicacy, as they decorate the naked branches while the leaves are puſhing forth above, render them highly conſpicuous and ornamental. The fineſt plant we know of the *Haleſia* grows in the *Arboretum* at Kew, as big as a wide-ſpreading apple-tree, and truly admirable when in bloom. The *leaves* do not come to their full ſize till the bloſſoms are fallen, and are alternate on downy footſtalks, ovate, pointed, two or three inches long, ſerrated, downy beneath when young, for afterwards they are nearly ſmooth, deciduous. *Fruit*, as well as the *flowers*, pendulous, crowned with the baſe of the ſtyle. It is ſaid the kernels are eatable and very pleaſant to the taſte, but they are very ſmall.

2. H. *diptera*. Linn. Sp. Pl. 636. Cavan. Diſſ. 338. t. 187. Ellis as above, t. 22. f. B.—Leaves ovate, acute. Two oppoſite wings of the fruit very narrow.—Native of the ſame country. We have already, in our biographical article GARDEN, adverted to the confuſion which attends this ſpecies, and indeed the preceding, in the Linnæan herbarium. We profeſs ourſelves entirely ignorant of every thing in this but the fruit, except from the plate in Cavanilles, who ſuſpects it to be a mere variety. The firſt botaniſts in this country were always in doubt concerning *H. diptera*, and the herbarium of Linnæus, when it arrived, was anxiouſly conſulted on this ſubject, but proved to contain nothing certain except the fruit, the leaves paſted by it being full-grown, *Styrax grandifolium*. Notwithſtanding theſe doubts, we find in Mr. Donn's *Hort. Cantab.* the *H. diptera*, ſaid to have been introduced in 1806, and it is to be hoped that ſome light may hereafter be derived from the gardens to diſſipate our uncertainty. We wiſh it may excite the attention of the excellent editor of the Botanical Magazine, as ſuch illuſtrations render that work truly valuable. S.

HALESOWEN, in *Geography*, a market-town and pariſh, ſituated partly in the county of Salop, and partly in that of Worceſter, from which circumſtance it has occaſioned much confuſion and error in general topographical works. The place is not noticed in the population report of 1801, and there being no hiſtory of Shropſhire hitherto publiſhed, its local hiſtory has never been accurately inveſtigated. Gough, in his additions to Camden's Britannia, ſtates, that the pariſh of Haleſowen is "divided into eight townſhips, and five ſubordinate manors." The ſoil is rich and fertile; here are ſome fine woods, and in the manor of Frankley is the ſpring head of the river Stour. Coals have been obtained in the hill townſhip, and in 1745 was dug up "a vaſt foſſil oak." The poſt-way, ſuppoſed to be part of the Icknield-ſtreet, paſſes through part of this pariſh. Oldbury, one of the hamlets, indicates, by its name, its antiquity; and tradition fixes a caſtle and town here. Soon after the Norman conqueſt, the Shropſhire part of this pariſh was given to Roger de Montgomery. In the time of Henry I. it was forfeited to the crown; but king John granted it to Peter de Rutebus, who founded an abbey here. A market and fair were afterwards conferred by Henry III. who alſo inveſted the town with the privileges of a borough, and appointed a high and low bailiff to govern the ſame. Leland ſays, "the tounelet of Haleſowen had a priory of Premonſtratenſians, valued at 280*l.* 13*s.* 2*d.*" This church diſplays ſome parts of ancient architecture, and contains a few monumental memorials. In it were interred John, lord Botetourt, baron of Weoleigh, in the time of Richard II.; ſir Hugh Burnell, a great favourite with that monarch; and ſir William Lyttleton, who lived in the time of Henry VII. Some fragments of the abbey ſtill remain. In this pariſh was born Dr. Adam Littleton, author of a Latin dictionary; alſo William Shenſtone, the poet. The latter reſided many years of his life at a villa called the Leaſowes, in the immediate vicinity. This ſmall eſtate he embelliſhed with plantations, and interſperſed theſe with winding-walks, urns, inſcribed tablets, waterfalls, &c. As the poet was admired for the ſimple paſtoral turn of his poems, ſo the place became noted, for its accordance with the maxims there contained. Wheatly, who wrote an intereſting little volume on landſcape-gardening, ſpeaking of the Leaſowes, ſays, "It is a perfect picture of Shenſtone's mind—ſimple, elegant, and amiable; and will always ſuggeſt a doubt whether the ſpot inſpired his verſe, or whether, in the ſcenes which he formed, he only realized the paſtoral images which abound in his ſongs." Shenſtone's own lines thus characterize the place:

"———— Calm delight,
Verdant vales, and fountains bright;
Trees that nod on ſloping hills,
Caves that echo tinkling rills."

HALESWORTH, a market-town and pariſh in the hundred of Blything and county of Suffolk, England, is ſeated on the river Blythe, within ten miles of the eaſtern coaſt. The townſhip contains 62 houſes, and 1676 inhabitants, the greater part of whom are employed in manufactures, particularly the ſpinning of worſted. Camden ſays this place was anciently called Healsworda, and was an "old town of the Argentons, now Arlingtons, for which Richard Argenton procured the grant of a market from Henry III." The river is rendered navigable to the ſeaport-town of Southwold. In the neighbourhood, ſeveral fields are appropriated to the growth of hemp. In the town is a neat church, alſo a charity-ſchool. Here are a weekly market on Tueſdays, and three annual fairs. The living, with Chedeſton, is a diſcharged rectory.

HALETA, a town of Perſia, in Farſiſtan, on the coaſt of the Perſian gulf; ten miles S.S.E. of Buſheer.

HALEYSBURG, a poſt-town of America, in Luneburg county, Virginia; 235 miles from Waſhington.

HALFAIA, a town of Nubia; ten miles S. of Gerri. N. lat. 15° 45′. E. long. 32° 57′.

HALF-Beams, in *Ship-building*, are to ſupport the deck in large openings, occaſioned by hatch-ways, maſt-rooms, &c. and over the tillar in the gun-room.

HALF-BLOOD, in *Law*. See BLOOD, *whole* and *half*.

HALF-BLOOM. See *Half*-BLOOM.

HALF-CASTLE *Bay*, in *Geography*, a bay on the S. coaſt of the iſland of St. Chriſtopher; two miles W. of Baſſeterre.

HALF-FILES. See FILE.

HALF-HUSBANDRY, in *Agriculture*, a term uſed to ſignify that kind of arable practice, in which two ſorts of crops are grown and cultivated upon the ground at the ſame time; ſuch as oats, potatoes, wheat and potatoes, and ſeveral other ſimilar crops. By the experiments of the late Mr. Cloſe, as detailed in the third volume of the papers of the Bath Society, it was found to be a method which anſwered well in ſome caſes; and it is particularly adviſed as beneficial where the lands are at a conſiderable diſtance from the ſtables, yards, and cow-ſheds, and where the object of carting is of much importance. It muſt, however, in general, be an inconvenient ſort of huſbandry. See HUSBANDRY.

HALF-GRUNIE *Iſland*, in *Geography*, one of the ſmaller Shetland iſlands in the North ſea; two miles S. of the iſland of Unſt.

HALF-HYDE *Bay*, a bay on the W. coaſt of the iſland of Antigua; two miles S. of Reed Point.

HALF-MARK, *dimidia mercæ*, in *Law*, is a noble.

Fitzherbert ſays, that in caſe a writ be brought, and the ſeiſin of the demandant, or his anceſtor, alleged; the ſeiſin is not traverſable by the defendant, but he muſt tender the half-mark for the enquiry of the ſeiſin; which is, in plainer terms, that the defendant ſhall not be admitted to deny that the poſſeſſor, or his anceſtor, was ſeiſed of the land in queſtion, and to prove his denial; but that he ſhould be admitted to tender half a mark in money, to have an enquiry made, whether the demandant, &c. were ſeiſed or not.

HALF-MOON, in *Fortification*. See DEMI-LUNE and RAVELIN.

HALF-MOON, in *Geography*, an extenſive townſhip of America, in Albany county, New York; containing 3851 inhabitants.

HALF-MOON *Bay*, a bay on the W. coaſt of Jamaica; two miles N. of Orange-bay.—Alſo, a bay on the N. coaſt of St. Chriſtopher; two miles S.E. of Ragged Point.

HALF-MOON *Fort*, a fort on the iſland of Barbadoes; four miles N. of Speight's Town.

HALF-MOON *Key*, a ſmall iſland near the S. coaſt of Jamaica; three miles E.N.E. of Portland Point.—Alſo, a ſmall iſland in the bay of Honduras. N. lat. 17° 10′. W. long. 89°.—Alſo, a ſmall iſland in the bay of Honduras, near the E. coaſt of Guanajo. N. lat. 16° 30′. W. long. 86° 20′.

HALF-MOON *Shoal*, a ſhoal on the Mergui Archipelago, near the E. coaſt of Sullivan's iſland. N. lat. 11° 7′.

HALF-NOTE, in *Muſic*, the elementary minor ſecond of the Iſotonic, or equal temperament ſyſtem, the mean ſemitone of Sauveur, is $\frac{1}{12}$th part of the octave, or $1 \div \sqrt[12]{2} = 51.003275\Sigma + f + 4m$, or $51\Sigma + f + 4\frac{1}{12}m$; whoſe common logarithm is .9749141.6703, and binary or Euler's log. $= .083333 = 4.64980$ major commas.

HALF-NOTE, or ſemi-tone of the finger-key intervals, are the intervals between the next adjacent notes of a common keyed inſtrument; theſe are not only unequal among themſelves in any propoſed ſyſtem of temperament, but they differ alſo in value or magnitude in every different ſyſtem of tuning. The ſecond term, or f in Mr. Farey's notation, always ſhews to what finger-key a note, forming any interval above C, is to be referred, as obſerved in the article FINGER-KEYED *Intervals*; ſee alſo TEMPERAMENT.

HALF-NOTE, *Greater*, of Holden, is the hemitone or ſemitone major, whoſe ratio is $\frac{15}{16} = 57\Sigma + f + 5m$. See SEMITONE *Major*.

HALF-NOTE, *Leſſer*, of Holden, is the ſemitone minor, $= \frac{24}{25} = 36\Sigma + f + 3m$.

HALF-PENNY, a copper coin, whoſe value is expreſſed by its name, in reference to the penny.

HALF-PIECE, a meaſure of linen, cambric, or French lawn, (38 Geo. III. c. 76.) = 6½ ells.

HALF-PORTS, in a *Ship*, are portable ſhutters, made of deal, &c. fitted into the ſtops of gun-ports, which have no hanging lids, and though they have a hole cut in them for the gun to go through, yet they keep the water from coming into the ſhip.

HALF-SEAL, is that uſed in chancery, for the ſealing of commiſſions to delegates appointed upon any appeal in eccleſiaſtical or marine cauſes.

HALF-TANGENTS, on a ſcale. See SCALE and GUNTER.

HALF-TEINT, in *Painting*, is, preciſely ſpeaking, the teint which lies exactly mid-way between the extreme light and the extreme dark which any colour is capable of receiving and reflecting. But painters uſe it in a far more general ſenſe, *viz.* as incluſive of almoſt all the intermediate gradations between theſe two points; and therefore regard all objects, in what relates to colour and chiaro-oſcuro, as compoſed of theſe three—light, dark, and middle teint, or half teint.

How much of the viſion of objects is included within the ſphere of half-teint, may be illuſtrated by imagining a ball of ivory placed oppoſite the ſun, and viewed in nearly the ſame direction. In this ſituation a ſmall portion of it will reflect an image of the ſun to the eye of the obſerver, which image, in the language of artiſts, will be termed its high-light. Towards its lower part a very ſmall portion will be loſt in ſhade. The far greater part of the ball, not reflecting light enough to come under the former of theſe denominations, nor being ſufficiently deprived of it to receive the latter, is recognized under the one we are now diſcuſſing.

When pictures therefore repreſent the ordinary effect of day-light, where the illumination produces breadth of light, as the ſun does, and ſtill more in that kind of light produced by an illumined atmoſphere when the ſun is not clearly ſeen, it is evident that half-teint muſt be the reigning portion of tone and colour in them. Add to this, that as objects recede in the plane of the picture from the ſource of light, they fall into comparative half-teint, their high-lights and ſhadows participating of the hue with which the intervening atmoſphere envelopes them. From both theſe cauſes it may fairly be reckoned that nine-tenths at leaſt, and a greater proportion occaſionally, in ſubjects of this nature, will be half-teint, unleſs artificial ſhadows are introduced.

This being the caſe, too much attention cannot be given to it, as it produces the prevailing tone of colour in the picture. The difficulty lies in giving each colour introduced a gradation participating of the ſame hue, but at the ſame time preſerving the true characters of the original colours in the whole. The reaſon of blending this one hue with all colours is made evident by conſidering the mode of operation adopted by nature, in which all gradations of ſhade are the effect of privation of light, and conſequently of colour which depends upon it, till at laſt every colour is loſt in one dark hue by the total lack of illumination; and that hue is alike with all. It is that hue, therefore, in different degrees, which produces the gradation from extreme light to dark, and which, acting equally on all, produces harmony in the effects by breaking each with a participation of itſelf.

This is the ſimpleſt mode of producing the half-teint, and maintaining it with an harmonious effect throughout the various parts of a picture. It will of courſe allow of intermixtures of reflections, either from parts of the ſame body, as in the folds of draperies, or from different coloured objects acting upon each other; and thus with its ſimplicity, richneſs and variety may be combined. What the hue of the dark ſhade, with which it is produced, may be, depends entirely upon the taſte of the painter and the nature of the illumination. One only regulation can effectively be given. It ought, in its mixture with the light, or local colour, to produce a teint more cool than that, in its hue.

The ſyſtem here propoſed is the beſt for works where minuteneſs of imitation is not required, but rather a greatneſs and ſimplicity of effect. It will not, however, fully reach the richneſs which takes place in nature, particularly in fleſh. There a great degree of colour appears in the half-teints of diverſified hues, of which no ſyſtem will ever produce the exact imitation; and there extreme delicacy and variety are united with ſo much ſubtlety as to be utterly beyond the power of words to convey an idea of. Practice alone and a good eye muſt be the painter's guide in this; and he will find the beſt exemplars of it in the works of Corregio, Rubens, and ſir Joſhua Reynolds. From them he muſt learn to "ſnatch a grace beyond the rules of art."

In pictures of grand, ſublime, or ſerious ſubjects, too large a proportion of half-teint ought not to be introduced. There, large maſſes of ſhade, deep, but clear, are abſolutely requiſite to produce the deſired impreſſion on the mind of the obſerver. Such, for inſtance, is the arrangement in St. Peter Martyr, by Titian; the Deſcent from the Croſs, by Rubens; the Transfiguration, by Raphael, &c.; but in works of a lighter kind, and more agreeable nature, intended to convey the uſual impreſſions produced by common events, it may reign triumphant; particularly where the ſcene is out of doors. The works of Teniers beautifully and ſufficiently illuſtrate this.

Half-timbers, in *Ship-building*, are the ſhort timbers forward and aft in the cant bodies, which anſwer to the futtocks nearer the lower midſhips.

Half-tone, in *Muſic*, or hemitone of the ancients, an interval whoſe ratio is $\frac{243}{256} = 46\,\Sigma + f + 4\,m$, or the Limma. See that article.

Half-tone, hemitone, or chromatic toniæum of Ariſtoxenus and Holden, half the tone major, $= 2\sqrt{2} \div 3 = 52.003932\,\Sigma + f + 4\,m$, or $52\,\Sigma + f + 4\tfrac{1}{2}\,m$; whoſe common logarithm is .9744237,3877, and its Euler's log. = .084962, ſuch being its decimal relation to the octave 1. It is = 4.740705 major commas.

Half-tone, *Mean*, or half-tone of Dr. Smith (Harmonics, p. 204. ſecond edit.), one-fourth of the major third, $= \sqrt{2} \div \sqrt[4]{5}$, $= 49.251966\,\Sigma + f + 4\,m$, or $49\tfrac{1}{4}\,\Sigma + f + 4\tfrac{1}{4}\,m$; whoſe common logarithm is .9757724,9675, and its binary log. or decimal of the octave = .080482, and it contains 4.490705 major commas, or $\frac{1}{4}\,c$ leſs than the laſt. See Note and Tone.

Half-tongue, *Medietas linguæ*. See Medietas *linguæ*.

Half-working, in *Mining*, is a name for the works in a coal-pit, where the face or length-way joints of the coal croſs the level nearly at an angle of 45°, ſuch being otherwiſe called diagonal works, or horn-coal.

HALI, in *Geography*, a town of Arabia, in the province of Hedjas, near the coaſt of the Red ſea, belonging to the ſheriffe of Mecca; 170 miles N.N.W. of Loheia. N. lat. 18° 40′.

HALIAËTOS, in *Ornithology*, the Greek name given by Ariſtotle to the bald buzzard. See Falco *halietos*.

HALIETUS, a ſpecies of eagle which frequents the ſea, and feeds on fiſhes, called alſo the *aquila marina*, *oſſifraga*, or oſprey, and the *falco oſſifragus* of Linnæus, which ſee.

HALI-BEIGH, in *Biography*, who flouriſhed about the middle of the 17th century, was a native of Poland, whoſe original name was Albert Bobouſki. At an early age he was taken priſoner by the Tartars, who ſold him to the Turks, by whom he was inſtructed in the religion and ceremonies of the eaſtern prophet. He had a great facility of acquiring languages, and was able to converſe with fluency and accuracy in eighteen tongues. In many of them he was as much at home as the natives themſelves. Hence he became interpreter at the grand Seignor's court. In this ſituation he undertook, at the requeſt of Dr. Smith, chaplain to the Engliſh embaſſy at the Porte, to draw up a treatiſe "concerning the Liturgy of the Turks, their Pilgrimage to Mecca, their Circumciſion, viſiting the Sick, &c." which that gentleman preſented to Dr. Hyde, who publiſhed a Latin verſion of it at Oxford in 1691. Hali tranſlated the Church of England Catechiſm into the Turkiſh language; and afterwards, ſuch were his induſtry and perſeverance, he tranſlated the whole Bible into the ſame tongue, which was ſent in MS. to Leyden, where it ſtill remains in the library belonging to the univerſity. He publiſhed a grammar and dictionary of the Turkiſh language; he furniſhed ſir Paul Rycaut with much valuable information for his work, entitled, "The Preſent State of the Ottoman Empire;" he alſo wrote "A Treatiſe on the Seraglio," in the Italian language, and put into verſe a conſiderable part of the book of Pſalms, to which he added many muſical notes. Moreri. Bayle.

HALIBUT-Head, in *Geography*, a lofty mountain, forming the ſouthern extremity of the peninſula of Alaſhka, in the N. Pacific ocean, diſcovered by captain Cook in the year 1778. N. lat. 54° 27′. E. long. 197°.

HALIBUT-*Iſland*, an iſland in the N. Pacific Ocean, about ſeven or eight leagues in circumference; ſix miles from Halibut-head.

HALICACABUM, in *Botany*, from ἁλικος, *maritime*, or *the produce of the ſea-ſhore*, and κακαβη, or κακκαβος, *a red earthen pot*. This name was firſt given to the common winter cherry, *Phyſalis Alkekengi*; nor does the latter part of it, at leaſt, ill apply to the red inflated calyx, which covers that fruit in a ſtate of maturity. But the winter cherry is not a maritime plant; and it is not impoſſible that the firſt part of the word may refer, as Ambroſini ſuſpected, to ἁλς, *ſalt*; in which caſe *halicacabum* will mean a red earthen ſalt-pot, of a particular kind perhaps, with which the inventor of the name, whoever he was, might be converſant, and to which he meant to compare the calyx of the winter cherry. But, like many other names, that of which we are treating has long loſt ſight of its original application and meaning. Fuchſius having called the *Cardioſpermum* of Linnæus, *Halicacabum peregrinum*, becauſe of its inflated calyx, which bears in that reſpect a reſemblance to the above, but has no likeneſs, in colour or ſhape, to any earthen veſſel, this unfortunate name is now retained as the ſpecific appellation of a plant, with which it has no proper connexion, *Cardioſpermum Halicacabum*.

HALICARNASSUS, in *Ancient Geography*, a city of Aſia Minor, formerly the capital of Caria, was ſituated towards the extreme point of the Ceramic gulf, N. of the iſthmus of the peninſula of Cnidus, oppoſite to, and N. of the iſland of Cos. It had a port, excellent fortifications, and great riches. It was particularly diſtinguiſhed by the palace, and various public monuments with which the wealthy Mauſolus, king of Caria, embelliſhed it. Vitruvius has deſcribed the ſuperb edifices which it contained, and which did honour to the munificence of its ſovereign. He cauſed to be conſtructed a commodious port, a temple of Mars, and alſo of Venus and Mercury, and other buildings, which, beſides the magnificent palace in which he reſided, rendered Halicarnaſſus one of the ſtrongeſt and moſt celebrated cities of Aſia. It was particularly famous for the mauſoleum, or tomb, built by Artemiſia, the ſiſter and wife of Mauſolus, who ſucceeded him on the throne. This noble ſtructure, which was reckoned one of the ſeven wonders of the world, was conſtructed by the following artiſts, *viz.* Scopas, Bryaxis, Timotheus, and Leochares. Although the queen died before it was finiſhed, the artiſts, who had undertaken it, perſevered in their labour till they accompliſhed it. This city was alſo celebrated as the birth-place of the hiſtorians Herodotus and Dionyſius, and of the poets Heraclitus and Callimachus. Halicarnaſſus for a long time maintained its liberty and independence. It was firſt ſubjected to Crœſus, king of Lydia; and, among other Greek colonies which were deſpoiled by Cyrus, this city was compelled to ſubmit to the Perſians. Alexander beſieged and took it after a vigorous reſiſtance on the part of the Perſian commanders, Orontobates and Memnon, and a numerous garriſon. Upon the diviſion of the empire it fell to the ſhare of Antigonus, and from him was transferred to the Lagidæ; but it availed itſelf of the opportunity afforded it by the war of Antiochus for recovering its liberty, which was ſecured to it by the Romans in a treaty with Philip. It is now a heap of ruins, and known by the name of "Neſi."

HALICK, a town of Perſia, in the province of Segeſtan; 222 miles S.E. of Zareng.

HALICZ, or HALITSCH, a town of Auſtria, in Poland, a capital of a ſmall country of the ſame name, in the palatinate of Lemburg in Galicia; 58 miles S.E. of Lemburg. N. lat. 49° 5′. E. long. 24° 46′.

HALIEUTICS, HALIEUTICA, ΑΛΕΙΥΤΙΚΑ, formed of ἁλιευς, *fiſherman*, which is derived from ἁλς, *ſea*; books treating of fiſhes, or the art of fiſhing.

We have ſtill extant the *Halieutics* of Oppian.

HALIFAX, in *Geography*, an ancient, populous market town and pariſh, in that diviſion of the Weſt-riding of Yorkſhire called Morley-wapentake, England, is, according to Camden, "a very famous town on the ſlope of a hill, extending from weſt to eaſt. It has not had this name many ages, being before called Horton." By ſome it was alſo called Chapel-in-the-grove. A monkiſh tradition aſcribes the preſent name to an incident that occurred here at a remote period. A prieſt cut off the head of a young woman, and hung it upon a yew tree. This excited the attention of the credulous, and numerous pilgrimages were performed by religious perſons in the vicinity, to this ſpot. The tree was pronounced to be holy, and the place took the new name of Haliz-ſæa, or Hali-ſex. In latter times the town acquired particular note from another circumſtance. "The inhabitants within Hardwicke foreſt claimed a right or cuſtom, from time immemorial, that if a felon be taken with goods to the amount of 13½d. ſtolen within their liberty, after being carried before the lord's bailiff, and tried by four frithburgers, from four towns within the ſaid precinct, he was, on condemnation, to be executed on the next market day, after having been ſet in the ſtocks firſt; and after his execution a coroner was to take the verdict of a jury, and ſometimes of thoſe who condemned him. He was to be taken either *handabend*, *i. e.* in the act of ſtealing, or *backberond*, having the goods about him, or confeſſioned." [Gough in addition to Camden.] The mode of execution was ſingular and expeditious. The criminal was placed on a ſcaffold or ſtage, with his head reſting on a block between two vertical poles with grooves: through theſe a heavy axe deſcended and inſtantly ſevered the head from the body. This inſtrument was ſimilar to the noted French guillotine. At Halifax 49 perſons were beheaded between the years 1541 and 1651. The inſtrument or proceſs of execution was denominated "Halifax-gibbet-law." (See a full account of this ancient cuſtom, &c. in Bentley's "Halifax, and its gibbet-law placed in a true light." 12mo. 1761.—Alſo, Wright's "Antiquities of Halifax." 12mo. 1738. and Watſon's "Hiſtory, &c. of Halifax," 4to. 1775."

Halifax was noticed as a mart of manufacture and trade in the reign of Henry VI.: and from its favourable ſituation with reſpect to ſtreams for mills, and contiguity to towns for the diſpoſal of its manufactured goods, it has progreſſively increaſed in houſes and population. The woollen trade may be conſidered its ſtaple article; but various fancy-works are made here. Shalloons and figured ſtuffs are manufactured to a conſiderable extent. The weavers of the ſurrounding villages and hamlets uſually bring their goods undreſſed to the market. The principal articles made here are ſhalloons, plain and figured laſtings, plain and diced ruſſets or florentines, ſerge, ſerge imperial, moorcens, tammies, plain calimancoes, &c. The principal foreign trade of this place was formerly tranſacted through the medium of London merchants, but latterly the manufacturers have exported their own goods from the port of Hull. In the year 1758 there were 34 fulling mills within this pariſh; beſides others for corn. For the convenience of the manufacturers, a large edifice called the Cloth-hall, has been erected here. The building occupies a ſpace of 10,000 ſquare yards, and is divided into 315 rooms or apartments, which are appropriated to the lodgement of goods.

The progreſſive advance of this town will develope its proſperity. Camden ſays, that about 1443 it contained but 13 houſes. In 1763 and 1764, according to the vicar's Eaſter-books, in the pariſh were 8244 families. According to the population report of 1801 the town contained 1913 houſes, and 8886 inhabitants, of whom 1840 were deſcribed as being employed in trade and manufactures. The pariſh of Halifax is ſaid to extend from S.E. to N.W. nearly 20 miles in length by about ſeven miles in width, from E. to W. It conſiſts of 26 townſhips or hamlets. Camden ſays it is "famous for the largeneſs of the pariſh, having 11 chapels, (of which two are parochial ones,) and about 12,00 ſouls." The chief buildings of the town are ſeated in a deep valley, and the ſtreets are moſtly very narrow. Here is a weekly market, held by preſcription. The town was repreſented in parliament in the years 1656 and 1658. The church is a large ancient edifice, and contains ſome monuments of eminent perſons. On the north ſide is a chapel or chantry, built by Dr. William Rokely, vicar of this place, and archbiſhop of Dublin in 1511, whoſe body was interred at his cathedral, and heart in the chapel founded by him here. In the town is an alms-houſe, founded in 1641, by Nathaniel Waterhouſe, for 12 old people. The ſame perſon alſo founded a blue-coat hoſpital for 20 children. Halifax gave the title of viſcount 10th Charles II., and of marquis, 1684, to George Saville. Several eminent characters have been born here, among whom may be named the following; John de Sacro Boſco, an eminent mathematician; Dr. Henry Briggs, geometrical profeſſor of Greſham college; Dr. Robert Farrar, biſhop of St. David's, who was burnt in 1555; Dr. David Hartley; Dr. Lake, biſhop of Chicheſter; Sir John Saville, baron of the exchequer, 1598; and Dr. Tillotſon, archbiſhop of Canterbury.

Halifax, a county of Nova Scotia, ſituated in the eaſtern part of the province, and containing, beſides the capital of the ſame name, the townſhips of Londonderry, Truro, Onſlow, Colcheſter, Lawrence, Southampton, Canſo, and Tinmouth. It has numerous bays and rivers; and of the latter the principal are Shabbenacadie, the Petit-codiac, Memramcook, &c.—Alſo, the capital of the above-mentioned county, and of the province of Nova Scotia, ſettled by a colony of Britiſh ſubjects in the year 1749, and ſituated on the bay of Chebucto, which is commodious and ſpacious, of eaſy entrance, and capable of accommodating in perfect ſafety 1000 of the largeſt ſhips. The town ſtands on the weſt ſide of the harbour, on the declivity of a hill, the ſummit of which is 236 feet above the level of the ſea. It is laid out in oblong ſquares, and the ſtreets are parallel, and at right angles. The town, including the ſuburbs, is about two miles in length, and the average breadth is about a quarter of a mile. It is intrenched with forts of timber, and is ſaid to contain 15 or 16,000 inhabitants. On the northern extremity of the town is the king's naval yard, well built and amply ſupplied with ſtores. The harbour is acceſſible at all ſeaſons of the year, and on account of its entrance, ſituation, proximity to the bay of Fundi, and communication by land or water with other parts of the province, and New Brunſwick, it is convenient for fiſhing veſſels, which are protected by a ſmall ſquadron of ſhips of war, which are ſtationed here. It is the reſidence of a governor and other officers. It has an eaſy communication with Pictou, 68 miles to the N.E. on the gulf of St. Lawrence, by a good cart road, finiſhed in 1792. N. lat. 44° 42'. W. long. 63° 26'.—Alſo, a townſhip in Plymouth county, Maſſachuſetts, 35 miles S.E. of Boſton, incorporated in 1734, and containing 612 inhabitants.—Alſo, a townſhip of Windham county, in the ſtate of Vermont, 23 miles E. by S. of Bennington, containing 1600 inhabitants.—Alſo, one of the middle diſtricts of N. Carolina, bounded N. by Virginia, E. by Edenton diſtrict, W. by Hillſborough, and S. by Newbern. This diſtrict is divided into ſeven counties, *viz.* Northampton, Halifax, Martin, Edgcomb, Warren, Franklin, and Naſh, which contain 69,136 inhabitants, including 31,445 ſlaves. The county of the ſame name is bounded N. by Northampton, S. by Edgcomb, E. by Bertie, and W. by Warren, and contains 13,563 inhabitants, of whom 7020 are ſlaves. The chief town, called alſo Halifax, is a poſt town, pleaſantly ſituated on the weſtern bank of the Roanoke, is regularly laid out, and contains, beſides dwelling houſes, a court houſe and goal, 383 miles S.W. by S. of Philadelphia. N. lat. 36° 14'. W. long. 77° 40'.—Alſo, a county of Virginia, bordering on the ſtate of N. Carolina, about 42 miles long and 39 broad, and containing 11,466 free inhabitants and 7911 ſlaves.

Halifax *Bay*, a bay on the N.E. coaſt of New Holland. S. lat. 18° 49'.—Alſo, a bay on the E. coaſt of the iſland of Dominica. N. lat. 15° 40'. W. long. 61° 20'.—Alſo, a bay on the S. coaſt of the iſland of St. John, in the gulf of St. Lawrence. N. lat. 46° 20'. W. long. 63° 30'.

HALIFGOON, a town of Nubia; 25 miles E. of Gerri. N. lat. 15° 35'. E. long. 32° 57'.

HALIGAW, a town of Samogitia; 45 miles N.W. of Miedniki.

HALIGEMOTE. See Halymote.

HALIKARKARA, a town of Turkiſh Armenia, in the government of Erzerum; 20 miles S.S.W. of Cars.

HALIKO, in *Geography*, a town of Sweden, in the government of Abo; 24 miles E. of Abo.

HALILA, a town of Sweden, in Eaſt Bothnia; 40 miles S.E. of Waſa.

HALIMUS, in *Botany*, ἅλιμος, *belonging to the ſea*, the name of a plant in Dioſcorides, whoſe deſcription anſwers well to one or more ſpecies of *Atriplex*. See Atriplex *Halimus*, which is, moſt probably, the very plant originally intended, though Matthiolus has figured the ſecond ſpecies, *A. portulacoides*, as being perhaps the only one to which he had acceſs in Italy; but Cluſius in his *Hiſtoria Plantarum*, v. 1. 53, has given a good repreſentation of the genuine *A. halimus*.

HALING, in *Geography*, a ſmall iſland in the Engliſh channel, ſeparated from the coaſt of Hampſhire, by a narrow channel, in its form triangular, about 5½ miles long, from N. to S., and about two broad, containing three villages, and ſeveral creeks on the E. coaſt. N. lat. 50° 48'. W. long. 0° 57'.

HALIOTIS, in *Conchology*, a genus of univalves, the ſhell of which is dilated, ear-ſhaped, and furniſhed on one ſide with a longitudinal row of orifices; ſpire lateral and nearly concealed.

The animal of the haliotides (or *ſea-ears*) according to Linnæus, is of the limax kind; the head is large, truncated at the extremity, furniſhed with a mouth and two horns of unequal ſize, the one large, conic, and longer than the head, the other ſmall, thick, and priſm-form, and bearing an eye at the tip; the legs are extremely large, elliptic, and the edges appear fringed when the animal is in motion. The ſea-ears have the ſame habits as the limpets, living on the rocks within reach of the regular overflow of the tide at high water. Like the limpet, the animal is defenceleſs beneath, but ſtrongly protected above, by means of its ſhelly covering, and when it moves it is in a ſlow progreſs, the limbs being cautiouſly protruded as occaſion requires, and inſtantly withdrawn on the leaſt diſturbance beneath the ſhell. When quieſcent, it adheres ſo firmly to the rocks, that it cannot be removed without force ſufficient to deſtroy it, unleſs when off its guard, and then it may be ſtruck off the rock by one dextrous blow. The fleſh is not in much eſteem, though ſometimes eaten, being very hard and tough.

Helbins divides the haliotides into two diſtinct genera, namely, haliotis and ſtomatia, the firſt compriſing thoſe which accord with the Linnæan character, in having the longitudinal row of pores on one ſide of the ſhell, the other, ſuch as are deſtitute of this very eſſential diſtinction. This diviſion of the genus, which cannot but be approved, is followed by Lamarck, and moſt other naturaliſts.

* Genus Haliotis. Shell dilated, ear-ſhaped, with very low ſpire, and a row of perforations in a line on one ſide; aperture ample, and longer than broad.

Species.

Tuberculata. Shell ſub-ovate, the outſide tranſverſely grooved, rugged and tuberculated. Linn. Fn. Suec. *Auris marina*, Rondel. *Patella major ſ. fera*, Geſn. *Ormier*, Adanſ. *Common ſea-ear*, Donov. Br. Shells.

An inhabitant of the European, Atlantic, and Indian ſeas; the length from four to five inches; the external aſpect rugged, more or leſs tuberculated; tranſverſely wrinkled, and greyiſh, varied with ferruginous; colour within pearly, gloſſed with green; the perforations or orifices between twenty and thirty in number, from four to ſeven of which are pervious.

This ſpecies, the only one of its genus found in the European ſeas, is moſt abundant on the ſhores of Southern Europe, diſappearing gradually towards the north. On the French coaſts the ear-ſhell is very common, as it is alſo in the iſles of Jerſey and Guernſey, from whence it becomes more ſparingly diffuſed, and is even rarely ſeen on the Britiſh ſhores moſt contiguous to thoſe iſles; it is not ſuppoſed to inhabit any of the Britiſh ſeas more to the northward, nor is it met with, we believe, in any higher northern latitudes than thoſe of Denmark and Sweden. There are many varieties of this ſpecies, the principal difference of which conſiſts in the ſize and colours with which the ſhells are variegated.

Striata. Shell ovate, ferruginous, tranſverſely wrinkled, and longitudinally ſtriated. Linn.

Inhabits Aſia and Barbary, and reſembles the former, but is ſmaller, with the wrinkles more regular, and not tuberculated; colour ferruginous red, or green ſpotted with white, or red and green varied. The orifices about thirty-eight, of which four or five are pervious.

Gigantea. Shell oval, rugged, varied with white and red ſpotted; within margaritaceous; ſpire depreſſed, Chemn.

Native of New Holland; the ſhell from four to ſix inches long, and three inches and a half in breadth; inner lip with a deep margin; the open orifices from three to ſeven.

Iris. Shell ventricoſe; fine brown, with tranſverſe wrinkles, and longitudinal tuberous plaits; within irideſcent. Favanne, &c.

Inhabits New Zealand; the length four inches and a half; breadth three inches; orifices ſix.

Midæ. Shell roundiſh, with both ſides poliſhed. Liſter, &c.

A large ſpecies, being ſix or eight inches in length, found in the Indian and African oceans. The ſhell is thick, the outſide longitudinally wrinkled, of a dirty greeniſh colour, and the ſurface uſually incruſted with various marine ſubſtances; the orifices about ten in number.

Varia. Shell ovate, with longitudinal ſtriæ, the larger ones tuberculated. Linn.

The ſhell of this kind is white, or yellowiſh brown, clouded with dirty green; the ſtriæ elevated, curved parallel, and becoming larger towards the ſpire; orifices twenty or thirty, about five of which are open; the margin unequal. Inhabits India.

Marmorata. Shell oval, with longitudinal ſtriæ, obſoletely croſſed by others in a tranſverſe direction. Linn.

Varied with brown and white, or brown white and green, or brown, white, green, and red; orifices about thirty, four or five of which are open.

Native of Africa and India. Length from two to four inches.

Asinum. Shell ſmoothiſh, oblong, with a ſomewhat falcated margin, and elevated nerves on the outſide. Linn.

About three inches long; ſhell marked on the outſide with fine longitudinal ſtriæ, the colour white, green, and brown; the inſide green and pearly; the orifices elevated, about thirty, ſix or ſeven of which are open; all the ſtriæ are granulated near the ſpire, and often dotted with red. The ſpecies inhabits India.

Parva. Shell ovate, red, with an elevated angle on the ventricoſe part. Linn.

Native of the African and Indian ſeas; the ſhell ſometimes yellowiſh, with decuſſated ſtriæ, and a few tranſverſe plaits; orifices about thirty, about four or five of which are open.

Bistreata. Shell ovate, greeniſh, ſpotted with brown; tranſverſe ſtriæ elevated and double. Linn.

Shell with a pale purple ſpot under the ſpire, branching into arched rays of the ſame down the back, the right margin acute and ſinuous; within ſilvery; ſix of the orifices open. Native of the African ſeas.

Australis. Shell varied with grey, blueiſh, and red, ovate, convex, and cancellated; ſpire prominent, and inflated.

Length three inches and a quarter, breadth an inch leſs; the inſide of the ſhell red and yellow, with a margaritaceous hue; orifices approximate, from ſeven to nine of which are pervious. Inhabits New Zealand.

Guineensis. Shell ovate, ſub-convex, and ſolid, with decuſſated ſtriæ. Schroct.

Native of Guinea, the ſize about two inches and a half long, and two broad; colour dull green, ſpotted with white, and cheſnut towards the ſpire, ſometimes varied with green, red, and white; the inſide margaritaceous, tinged red and greeniſh; margin acute and ſtraight; orifices flattened, and ſix of them open.

Glabra. Shell ovate, ſmoothiſh, ſolid, varied with white and green; ſpire placed low. Chemn.

Length two inches and a half; breadth an inch and three quarters; inner lip very broad; orifices ſix, open. Native place unknown.

Pulcherima. Shell roundiſh, varied with roſy and white; ſtriæ granulated, the ſpire exſerted. Chemn.

A ſmall ſpecies, found in the South ſeas, the length of which is about half an inch; colour within ſilvery, the inner margin very broad, outer lip crenated; orifices thirty, ſix of which are pervious.

Virginea. Shell ovate, with decuſſate undulated ſtriæ; colour dull green, with whitiſh ſpots and bands; within irideſcent. Chemn.

Native of New Zealand; ſhell an inch broad, and an inch and a half in length, with about ſix open orifices.

Ovina. Shell ſomewhat orbicular, depreſſed, wrinkled, varied with white, cheſnut, and yellowiſh, with pervious orifices in the middle, the ſpire open. Chemn.

Country unknown. Shell ſurrounded with a triple elevated circle, and covered with tubercles behind the wrinkles; inner lip broad.

* Genus Stomatia. Shell dilated, ear-ſhaped, with raiſed ſpire, and without perforations; opening ſimple, entire, and longer than broad.

Phymotis. Ovate, with prickly ribs. Helbins, &c. *Haliotis imperforata*, Gmel.

A rare ſpecies, about an inch in length, found in the Indian ſeas; the ſhell is cinereous, the middle ſpines on the ribs ſtronger, and the margin rather thin and acute.

Another ſpecies of the ſtomatia genus occurs in a foſſil ſtate, and is deſcribed by Gmelin under the name of *Haliotis perverſa*: this, with the recent kind before mentioned, are the only ſpecies of the genus at preſent known.

HALITUS Ignei. See Vapour.

HALKI, in *Geography*, one of the Kartan *Iſlands*, which ſee.

HALKSHEAD, a cape on the E. coaſt of the duchy of Sleſwick, in the Little Belt; 10 miles E.S.E. of Haderſleben. N. lat. 55° 12′. E. long. 9° 42.

HALL, a word anciently uſed for a manſion-houſe, or habitation.

Hall, *ſalle*, in *Architecture*, is a large room at the entrance of a fine houſe, palace, or the like.

Vitruvius mentions three ſorts of halls: the *tetraſtyle*, which has four columns ſupporting the plafond, or cieling; the *Corinthian*, which has columns all round, let into the wall, and is vaulted over; and the *Egyptian*, which had a periſtyle of inſulated Corinthian columns, bearing a ſecond order with a cieling: theſe are called *oeci*. The hall is properly the firſt and fineſt partition, or member of an apartment; and in houſes of miniſters of ſtate, public magiſtrates, &c. is that wherein they diſpatch buſineſs, and give audience.

In very magnificent buildings, where the hall is larger and loftier than ordinary, and placed in the middle of the houſe, it is called a *ſaloon*.

The length of a hall ſhould be at leaſt twice and a quarter its breadth, and in great buildings three times its breadth. As to the height of halls, it may be two-thirds of the breadth; and if made with an arched cieling, it will be rendered much handſomer, and leſs ſubject to fire. In this caſe its height is found by dividing its breadth into ſix parts, five of which will be the height from the floor to the under ſide of the key of the arch.

A royal apartment is ſaid to conſiſt of a hall, or chamber of guards, *aula prætoriana*; an ante-chamber, *procamera*; a chamber, *camera*; a cabinet, *conclave*; and a gallery, *porticus*.

Hall is alſo a public building erected for the adminiſtration of the policy and juſtice of a city or corporation.

In this ſenſe we ſay, the *town-hall*, a *company's hall*, &c.

A ſtately building in the city of London, and the great court of judicature for that city, is called *Guild-hall*.

Hall is alſo particularly uſed for a court of juſtice; or an edifice wherein there is one, or more, tribunals.

In Weſtminſter-hall are held the great courts of this kingdom, *viz.* the King's Bench, Chancery, Common-Pleas, and Exchequer.

In adjoining apartments is likewiſe held the high court of parliament. Weſtminſter-hall was the royal palace, or place of reſidence of our ancient kings; who ordinarily held their parliaments, and courts of judicature, in their dwelling-houſes, (as is ſtill done by the king of Spain,) and frequently ſat in perſon in the courts of judicature, as they ſtill do in parliament.

A great part of this palace was burnt under Henry VIII. what remains is ſtill reſerved for the ſaid judicatories.

The great hall, wherein the court of King's Bench, &c. are kept, is ſaid to have been built by William Rufus; others ſay, by Richard I. or II. It is reckoned ſuperior, in point of dimenſions, to any hall in Europe; being 300 feet long, and 100 broad.

Hall, Joseph, in *Biography*, a learned Engliſh prelate, was born in 1574 at Aſhby-de-la-Zouch, in Leiceſterſhire, where he received the elementary parts of his education, and from whence he was ſent to Emanuel college, Cambridge, of which he was choſen ſcholar. In due time he took the degrees, received orders, and obtained the rectory of Halſted in Suffolk. In 1597 he publiſhed a collection of ſatires in verſe, entitled "Virgidemiarum," which was the firſt thing by which he was brought into public notice. In 1605 he went with ſir Edmund Bacon to the Spa, in which journey he took a cloſe view of the Romiſh religion, and held a conference with a Jeſuit, at Bruſſels. Upon his return he was nominated one of the prince Henry's chaplains, obtained the donative of Waltham Abbey, in Eſſex, whither he removed, and about the ſame time took the degree of D.D. He next attended upon the viſcount Doncaſter, in his embaſſy to France, and while he was on that miſſion his ſovereign preſented him to the deanery of Worceſter, and when James viſited Scotland in the following year Dr. Hall waited upon him as his chaplain. He was in 1618 appointed to be one of the divines to attend the ſynod of Dort. His want of health obliged him to return in a ſhort time, but before he took leave he preached a Latin diſcourſe before the ſynod, the members of which were ſo highly pleaſed with the compoſition, that they teſtified their reſpect for him by the preſent of a valuable gold medal. Dr. Hall wiſhed, if poſſible, to ſteer the middle courſe in the diſputes between the Arminians and Gomariſts, for he thought that thoſe who agreed in the main point, of ſeparation from the church of Rome, ought not haſtily to differ among one another on points of comparatively trifling importance. He accepted the biſhopric of Exeter in 1627, and was a great favourer of thoſe miniſters, whoſe piety and diligence in the diſcharge of their duties made them ſubject to the charge of Puritaniſm. On this account he was frequently accuſed of hereſy himſelf, and endured much vexation, through the violence of archbiſhop Laud. Nevertheleſs, in the civil wars, when epiſcopacy was brought into danger, he ſtood forth manfully the vindicator of its rights, and principles from the preſs. In 1641 he was tranſlated to the ſee of Norwich, and at the cloſe of the ſame year he was ſufficiently obnoxious to the ruling powers to be noticed and impriſoned in the Tower. His confinement did not laſt long; he was liberated in 1642, when he withdrew to his dioceſe, where he lived in retirement, and highly reſpected by all thoſe who had an opportunity of being acquainted with him. At length he was deprived of his property, but no power, however tyrannical, could take from him the deſire and the will to do good. Out of a mere pittance he contrived to diſtribute a weekly charity to ſeveral poor widows. He died in his eighty-ſecond year, leaving behind him a truly meritorious character. He ranks high among the Engliſh poets of that age, being the firſt who gave a ſpecimen of regular ſatires in our language. The ſatires are ſaid to have more wit than poetry in their compoſition, nevertheleſs Pope ſpoke well of them and admitted their merit. They have been ſeveral times reprinted. On account of his moral writings, he has ſometimes obtained the title of the Engliſh Seneca. The collection of his works amounts to five volumes, of which three were printed before his death. A ſmall tract, "De Modo ambulandi cum Deo," was printed at Oxford in 1762. Biog. Brit.

Hall, or *Halle*, in *Geography*, a town of the county of Tyrol, on the the river Inn, with conſiderable ſalt-works. The ſalt is dug in large blocks out of a mountain, and after having been cleanſed of its impurities in ſalt-pits, is conveyed in a fluid ſtate, by wooden canals to Innſpruck, where it is boiled to a due conſiſtence in iron pans. It is ſaid to produce a nett profit of 200,000 crowns yearly; 6 miles N.E. of Innſpruck. N. lat. 47° 16′. E. long. 11° 35′.—Alſo, a town of Wurtemberg, late imperial, ſituated on the river Kocher, and ſurrounded with mountains, which abound with ſalt-ſprings; aſſigned to Wurtemberg in 1801; 30 miles N.E. of Stuttgart. N. lat. 49° 7′. E. long 9° 50′.—Alſo, a town of Sweden, in the province of Upland; 20 miles N.E. of Stockholm.

Hall's *Key*, a ſmall iſland in the bay of Honduras N. lat. 16° 10′. W. long. 89° 10′.

HALLAGE, a fee due for cloth brought for ſale to Blackwell-hall in London.

The word is alſo uſed for a toll paid to the lord of a fair, or market, for commodities ſold in the common hall of the place.

HALLAM, in *Geography*, a townſhip of America, in York county, Pennſylvania, containing 1000 inhabitants.

HALLAMAS, in our *Old Writers*, the day of *All-Hallows* or *All-Saints*, *viz.* Nov. 1. It is one of the croſs-quarters of the year, which was computed, in ancient writings, from Hallamas to Candlemas.

HALLAND, in *Geography*, a province of Sweden, bounded N. by Weſt Gothland, E. by Smaland, S. by Skone, and W. by the North ſea. It is generally mountainous, and clothed with oak and birch trees. The corn produced is inſufficient for the inhabitants; but the rivers abound with fiſh, particularly ſalmon. The chief article of trade is cattle; and the employment of the people is grazing and fiſhing. The principal towns are Laholm, Halmſtadt, Falkenburg, and Wardberg.

HALLAREN, a lake of Sweden, in Weſtmanland; 25 miles N. of Upſal.

HALLATON, or Halloughton, a ſmall market town and pariſh in the hundred of Gartree and county of Leiceſter, England, conſiſts of 149 houſes and 548 inhabitants. Mr. Nichols, in his elaborate hiſtory of Leiceſterſhire, ſays, this place "has been fancifully called a Half-town, or Holy-town." Leland denominates it "a pretty townlet." By an act of parliament, paſſed in 1770, for dividing and incloſing the common fields of Hallaton, they are eſtimated to conſiſt of 3000 acres. A market, which had been long diſcontinued, was revived here in 1767. Here are alſo two annual fairs. Hallaton is diſtinguiſhed by a ſingular and ridiculous ancient annual cuſtom. A piece of land was bequeathed to the uſe and advantage of the rector; who, by the ſame beque ſt, was to provide "two hare-pies, a quantity of ale, and two dozen of penny loaves, to be ſcrambled for on Eaſter Monday, annually." This cuſtom is ſtill continued, but inſtead of hare-pies, the clergyman provides two, made with veal and bacon. About one mile weſt of the town is an encampment called Hallaton-caſtle-hill, which conſiſts of a circular intrenchment, with a lofty conical mount, or keep. Other embankments are connected with, and in the vicinity of this. The church at Hallaton is a large handſome edifice, with a town and ſpire. Nichols's Hiſtory of Leiceſterſhire, vol. xi. folio, 1798.

HALLE, a town of France, in the department of the Dyle, and chief place of a canton, in the diſtrict of Bruſſels, ſituated on the river Senne; 8 miles S. S. W. of Bruſſels. The place contains 3746, and the canton 12,974 inhabitants, on a territory of 102½ kiliometres, in 15 communes.—Alſo, a town of the duchy of Magdeburg, ſituated on the Saale, and divided into four quarters. This town contains three Lutheran churches, beſides places of worſhip for Calviniſts and Roman Catholics, and a ſynagogue for the Jews. The univerſity, formed out of a military academy, and conſecrated in the year 1694, deſerves particular mention. The number of ſtudents in 1802 was 634, and it has had the honour of educating many of the nobility and even princes. The number of houſes that pay taxes has been eſtimated at 1100, and that of the inhabitants, without including the ſtudents and garriſon, at 13 or 14 thouſand. The magiſtrates enjoy many privileges and conſiderable poſſeſſions. The manufactures of the place are gloves, worſted and ſilk ſtockings, cloth, flannel, fuſtian, linen, tobacco-pipes, china, Hungary water, ſtarch, ribbands, red and yellow Turkey leather, &c. But it has been principally indebted for its origin and celebrity to its ſalt-ſprings. Of theſe there are four, richly productive, in the lower part of the town, called the vale of Halle, and lying on the Saale. This quarter contains from 90 to 100 houſes, where the water from the Saale is boiled for the manufacture of ſalt. It is boiled with pit-coal. The perſons for whoſe profit it is boiled are called "Pfanners," and it is required that they ſhould be freemen of Halle.

The boiling is performed by Hallers, who are deſcendants of the Wends, a people who anciently inhabited the country, and ſtill retain their dreſs, language, and cuſtoms. Halle is an ancient place; mention having been made of it ſo early as the beginning of the ninth century, and it appears that in the year 965 or 966 it was given by the emperor Otho I. to the church of Magdeburg; and by Otho II. it was enlarged and endowed with a charter. It is diſtant 56 miles S. from Magdeburg. N. lat. 51° 31′. E. long. 12 8.

HALLEEPUTTAH, a town of Bengal; 50 miles N. N. W. of Midnapour.

HALLEGANDHE, a town of Hindooſtan, in the country of Nuſſerpour, on the left bank of the Indus; 25 miles N. N. E. of Nuſſerpour.

HALLEIN, a town of the archbiſhopric of Salzburg, on the Salza, famous for the ſalt-ſprings which riſe in the mountain of Durnberg, near the town; from which are annually made 750,000 quintals; 8 miles S. E. of Salzburg.

HALLELUJAH, a term of rejoicing, ſometime ſung, or rehearſed, at the end of verſes on ſuch occaſions.

The word is Hebrew, or rather, it is compoſed of two Hebrew words joined together: one of them הללו, *hallelu*, and the other יה, *jah*; an abridgment of the name of God, יהוה, *Jehovah*. The firſt ſignifies *laudate*, *praiſe ye*; and the other *Dominum*, *the Lord*.

St. Jerom firſt introduced the word hallelujah into the church ſervice: for a conſiderable time it was only uſed once a year in the Latin church, *viz.* at Eaſter; but in the Greek church it was much more frequent. St. Jerom mentions its being ſung at the interments of the dead, which ſtill continues to be in that church, as alſo on ſome occaſions, in the time of Lent.

In the time of Gregory the Great, it was appointed to be ſung all the year round, in the Latin church, which raiſed ſome complaints againſt that pope; as giving too much into the Greek way, and introducing the ceremonies of the church of Conſtantinople into that of Rome. But he excuſed himſelf,

ſelf, by alleging, that this had been the ancient uſe of Rome; and that it had been brought from Conſtantinople at the time when the word hallelujah was firſt introdued under pope Damaſus.

Hallelujah has been ſet to muſic by all the great maſters of eccleſiaſtical harmony; but by none with that ſpirit and divine energy of Handel, in many of his anthems and oratorios: and ſtill with greater ſublimity in the Meſſiah.

HALLENBERG, in *Geography*, a town of Weſtphalia; 30 miles W. S. W. of Caſſel. N. lat. 51° 7′. E. long. 8° 43′.

HALLENCOURT, a town of France, in the department of the Somme, and chief place of a canton, in the diſtrict of Abbeville; 9 miles S. of it. The place contains 1253, and the canton 9580 inhabitants, on a territory of 137½ kiliometres, in 18 communes.

HALLER, ALBERT, in *Biography*, one of the moſt illuſtrious characters of his age in literature and ſcience, was born at Berne, in Switzerland, on the 18th of October, 1709, where his father was an advocate. The accounts of his diſplay of talents, in his very infancy, are as extraordinary as any upon record. Before five years of age, he was accuſtomed to write down all the new words which he had heard during the day. He afterwards formed, for his own uſe, rules in grammar, arithmetic, and other ſciences; and when nine years old, he had compoſed, for the ſame purpoſe, a Greek and Hebrew lexicon, and a Chaldaic grammar, and had likewiſe compiled an hiſtorical dictionary, containing more than two thouſand lives, extracted from Bayle and Moreri. At the age of ten, he wrote a ſatire in Latin verſe againſt his tutor, a pedant of great harſhneſs and ſeverity. When thirteen he loſt his father, who intended him for the church; and while he thus acquired the liberty of chooſing his ſtudies, he learned alſo the neceſſity of depending entirely upon himſelf. He was ſent for a ſhort time to a public ſchool, where he paſſed his claſſical examinations, before the age preſcribed, and tranſlated into Greek the theme which was required of him only in Latin. In 1723, he ſpent ſome time at Bienne with a phyſician, for the ſtudy of philoſophy, where he was taught the ſyſtem of Deſcartes. Here the ſurrounding beauties of nature awakened in him a poetic enthuſiaſm; and he produced ſeveral compoſitions in German verſe, the preludes of his more mature poems. At this place he commenced the practice, which he continued through life, undiverted by the viciſſitudes of fortune, and which was the foundation of his immenſe literary collections, that of always reading with the pen in his hand, making extracts of every thing memorable in his author, and adding his own judgment of the work. He now decided upon the medical profeſſion, which would enable him to gratify his deſire of inveſtigating the phenomena of nature without reſerve. Towards the end of the ſame year, he went to Tubingen, where he diſſected and ſtudied under Duvernoi and Camerarius with great ardour, and obtained a taſte for a better philoſophy than that of Deſcartes. Here, likewiſe, though but in his ſixteenth year, he renounced wine for ever, and adopted great ſtrictneſs of manners, as a guard againſt future ſeduction, in conſequence of having once been induced to join a party of fellow ſtudents in a debauch. Attracted by the reputation of Boerhaave, he went to Leyden in May 1725; and he has expreſſed, in the moſt affectionate terms, the pleaſure which he derived from the clearneſs, candour, and unaffected eloquence of that admirable preceptor. He alſo diſſected with Albinus, and paid frequent viſits to Ruyſch. On his return to Tubingen he maintained a theſis for his degree, "De Ductu Salivali Coſchwiziano;" a ſubject which he farther purſued at Leyden, in 1727. In this year he viſited England, where he was much noticed by ſir Hans Sloane, Douglas, Cheſelden, and others; and thence went to Paris, and diſſected under Le Dran; but he was ſoon obliged to leave that capital, in conſequence of an information of his having bodies to diſſect in his own apartment being laid againſt him. He proceeded to Baſle, where he went a conſiderable length into the ſtudy of mathematics, under John Bernouilli; and alſo imbibed a deſire to ſtudy botany, to which he had hitherto conceived an averſion: his ardour was excited, he ſays, by the genius of the place, where the Bauhins had reſided, and Stahalin lived; and, what evinces the enthuſiaſm of his mind, as ſoon as he had begun to collect plants, he projected the plan of his great work on the botany of Switzerland, (which was not completed till many years afterwards,) at a time when, he declares, he ſcarcely knew the moſt common plants. Between the years 1728 and 1736 he made ſeveral botanical excurſions, traverſing the Alps of the Valais, Savoy, and Berne. But he did not ſurvey theſe ſcenes with the eye of a naturaliſt only; they awakened all his poetical enthuſiaſm; and his "Poem on the Alps," compoſed in his twenty-firſt year, which was followed by various ethic epiſtles, and other pieces, placed his name high among the votaries of the German muſe. Indeed, he is conſidered as the firſt who gave ſublimity, richneſs, and harmony to the poetical language of Germany; and twenty-two ſucceſſive editions of his poems in the original, with the tranſlations into other languages, ſufficiently atteſt the general applauſe with which they were received.

Having ſettled in his native city about 1730, he employed himſelf in giving public lectures on anatomy: but his ſucceſs among his countrymen was very limited; and his ſatirical poems, although now deſtroyed, were not forgotten, he perceived, by his rivals and enemies; and theſe, together with ſome irritability of temper, did not tend to acquire him friends. In 1731 he married a young lady of good family, who entered readily into his taſte and purſuits, and conſtituted the great happineſs of his life: ſhe brought him three children. The publication of ſome detached pieces in anatomy and botany had gained him conſiderable reputation abroad; and in 1736, he received an invitation from the king of Great Britain, George II., to undertake the profeſſorſhip of anatomy, ſurgery, and botany in the univerſity which he had recently founded at Göttingen. With great reluctance at abandoning his native country, and eſpecially in ſeparating his wife from her connections, he deemed it prudent to accept this advantageous offer. But his arrival at Göttingen was rendered melancholy by the death of his beloved wife, from the conſequence of ſome injury which ſhe had received by the overturning of the carriage on the road. With a view to relieve his grief, he commenced at once the duties of his office, and entered with great ardour into the purſuits of his pupils; the moſt induſtrious of whom he encouraged to take ſome ſingle object of the animal economy for their inveſtigation, and to devote themſelves to experimental inquiries reſpecting it, in which he gave his aſſiſtance. At the ſame time he was indefatigable, during the ſeventeen years which he ſpent at Göttingen, in the proſecution of ſimilar reſearches; having conſtantly in view that great reform in phyſiology, which his writings ultimately effected. For he knew, that by multiplied obſervation and experiment alone could that maſs of metaphyſical and chemical jargon be expunged from the doctrines of the animal economy, and phyſiology be rendered as certain as the other phyſical ſciences. During theſe labours in the cauſe of ſcience, he obtained the friendſhip and patronage of baron de Munchauſen, prime miniſter in the electorate of Hanover, who even anticipated his wiſhes, in promoting the welfare of the univerſity of Göttingen. Through this miniſter's influence with the king, Haller obtained for the univerſity the eſtabliſhment of a botanic garden, an anatomical theatre, a ſchool for ſurgery, and for midwifery, with a hoſpital for lying-in-women, a ſchool for deſign, with a view to the accurate delineation of the objects of natural hiſtory; and he alſo formed the plan of an academy of ſciences, of which he was appointed perpetual preſident. He received many honourable teſtimonies of his fame during his reſidence at Göttingen; being elected into the Royal Society of Stockholm in 1748, and into that of London in 1749; and having the titles of phyſician to George II. and of king's counſellor, conferred upon him by that monarch, at whoſe requeſt he was alſo raiſed to the rank of nobility, by the emperor Francis, in 1749, with the title of baron Von Haller. This title, however, he always declined; for although it might have been advantageous to his family at Göttingen, it would be deſpiſed as a badge of vanity and an odious diſtinction in Switzerland.

We may be excuſed from enumerating here the titles of all the diſſertations, on particular topics of anatomy and phyſiology, which Haller publiſhed during his reſidence at Göttingen; many of theſe were collected, reviſed, and reprinted in 1751, under the title of "Opuſcula Anatomica, de reſpiratione, de monſtris, aliaque minora, quæ recenſuit, emendavit, auxit. Addidit alia inedita, et novas icones," Gottingæ, 8vo. The principal publications within the period juſt mentioned were, 1. His great work on the botany of Switzerland, the firſt edition of which appeared in 1742, under the title of "Enumeratio methodica Stirpium Helvetiæ indigenarum, &c." folio; which, after undergoing conſiderable corrections and augmentations, was given under its perfect form, entitled "Hiſtoria Stirpium Helvetiæ indigenarum," in 1768, in three vols. folio, with many plates. This admirable work, which was the moſt copious then publiſhed, was remarkably accurate in ſpecific diſtinctions, and very full upon the economical and medicinal uſes of the plants. The arrangement was peculiar to himſelf, and he ſhewed an unwillingneſs to adopt the improvements of Linnæus.—2. "Commentarii ad Hermanni Boerhaave Prælectiones Academicas, &c." which appeared in ſeven ſucceſſive volumes, 8vo., between the years 1739 and 1744. Immediately after the death of his venerable preceptor, Boerhaave, in 1738, Haller undertook to publiſh his "Prelections," from a MS. copy of his own, collated with others.—3. In 1743, he began to publiſh faſciculi of anatomical plates in folio, particularly relative to the blood-veſſels *in ſitu*, which are among the moſt valuable of theſe helps to the ſtudy of the human frame. They were entitled "Iconum Anatomicarum, quibus præcipuæ partes corporis humani delineatæ continentur, Faſcic." The plates amount to thirty-ſix in number.—4. The firſt edition of his excellent little work, "Primæ Lineæ Phyſiologiæ in uſum Prælectionum Academicarum," was publiſhed in 1747, 8vo. It paſſed through many ſubſequent editions, and ſeveral tranſlations, and is an outline of the ſyſtem afterwards developed in his larger work.—5. In 1751 he publiſhed at Amſterdam another work of great labour and reſearch, *viz.* an edition of Boerhaave's "Methodus Studii Medici," with ſo many additions, that by much the greater part was his own; it may be conſidered as a prelude to his later "Bibliothecæ."—6. He delivered two academical diſcourſes in 1752, in which he propoſed his peculiar opinions reſpecting the properties of ſenſibility and irritability in living bodies; they were written in French, (of which language he had a perfect command,) under the title of "Diſſertation ſur les Parties ſenſibles et irritables des Animaux," 12mo. Lauſanne. Beſides theſe works, he printed a catalogue of plants, growing in the botanic garden, and in the diſtrict of Göttingen;—obſervations made in a journey to the Hercynian foreſt in 1738, and an "Iter Helveticum, anni 1739;" and likewiſe a number of botanical papers, which were collected in his "Opuſcula Botanica," 1749, 8vo., or contained in the memoirs of the Göttingen academy, and other periodical works.

After a reſidence of about ſeventeen years at Göttingen, Haller reſolved upon reviſiting his native country; and in 1753 he returned to Berne, where he eſtabliſhed himſelf, and was received by his countrymen with much gratulation. He had been elected a member of the ſovereign council in 1745, and now became one of the magiſtrates by lot, and entered with ardour into the duties of a citizen. In 1757 he was deputed to effect a reform in the academy of Lauſanne; and in the year following was appointed director of the ſalt-works for ſix years, during which he reſided at La Roche. In this ſervice he contributed to the public benefit, by introducing many improvements, which at once diminiſhed the price of ſalt, and amended its quality. On his return from La Roche, he was elected a member of the ſupreme conſiſtory, and of the chamber of appeals for the German part of the canton; he was alſo made perpetual aſſeſſor of the council of health, and was choſen one of the three deputies of the grand council to ſettle the differences with Geneva. He was active in the formation of an hoſpital for orphans, laid the plan of a ſchool for the more opulent citizens, and he prevailed upon the government of Berne to augment the ſalaries of the clergy of the Pays de Vaud, and was intruſted with the diſtribution of them. While occupied in theſe concerns, his pen was alſo employed for the public ſervice, in drawing up a variety of ſtate memoirs, and writing many public letters. His mind had not been long turned to political objects, when he wrote three political romances in German, exhibiting his views of the nature of government, which were at once profound, ingenious, and humane. In the firſt, entitled "Uſong," he gave the picture of a virtuous, but deſpotic monarch: in the ſecond, or "Alfred," he repreſented a limited monarchy, like that of England, in which both the nobles and the people have preſerved their right to a ſhare in the government; and in the third, or "Fabius and Cato," he drew the picture of a well regulated ariſtocracy, the form to which he was moſt partial. To complete the plan, he ſhould have deſcribed a perfect democracy; but this would probably have given offence to the ariſtocratic ſpirit of the inhabitants of Berne. Theſe works were compoſed between the years 1771 and 1774.

Yet, amidſt all the exertions which his duty as a magiſtrate induced him to make, his profeſſional ſtudies were unremitted. In 1755 he publiſhed his "Opuſcula Pathologica, quibus ſectiones cadaverum morboſorum potiſſimum continentur," at Lauſanne, 8vo. In the following year he printed "Deux Mémoires ſur le Mouvement du Sang, et ſur les Effets de la Saignée, &c.;" and a continuation of his inquiries reſpecting irritability and ſenſibility, entitled "Memoires ſur la Nature ſenſible et irritable des Parties du Corps Animal," Lauſanne, 4 vols. 12mo.—He likewiſe ſent to the preſs a collection of theſes, under the title of "Diſputationes Chirurgicæ ſelectæ," ibid. 1755—6, in five vols. 4to. Soon afterwards his great work, "Elementa Phyſiologiæ Corporis Humani," began to make its appearance: the firſt volume, in quarto, having been publiſhed at

Lauſanne in 1757, and the eighth and laſt in 1766. Such a vaſt collection of well authenticated facts, with ſo much accurate deſcription and truly ſcientific argumentation, ſo well arranged, was never perhaps brought together upon any ſubject; and of this the author's own diſcoveries made a very conſpicuous part. His other anatomical writings are principally compriſed in his "Opera anatomica minora," in three vols. quarto, 1762—68. He had publiſhed in 1758, "Deux Mémoires ſur la Formation du Cœur dans le Poulet, &c." containing the reſult of three years' experiments at Berne, in which he traced, hour after hour, the developement of the parts of the chick *in ovo*, and eſpecially of the heart. There are beſides many ſeparate tracts, which it would be tedious to enumerate.

But before we complete the catalogue of the labours of Haller in favour of medical ſcience, we have to notice a ſeries of volumes, which alone would have entitled him to the praiſe of a life well ſpent in the ſervice of his profeſſion. Theſe were his "Bibliothecæ," containing a chronological liſt of every book, of every age, country, and language, reſpecting ſubjects connected with medicine, which had come to his knowledge; with brief analyſes, and enumerations of novelties and peculiarities of all the principal works. Of theſe he publiſhed "Bibliotheca Botanica," two vols. 4to. 1771;—"Bibliotheca Chirurgica," two vols. 4to. 1774;—"Bibliotheca Anatomica," two vols. 4to. 1774;—"Bibliotheca Medicinæ Practicæ," 4 vols. 4to. 1776—88; of which laſt only two were publiſhed by himſelf, the other two by Drs. Tribolet and Brandis, from his papers, with additions. In examining theſe works, we ſtand aſtoniſhed at the compaſs of his reading, which has embraced not only all the beſt known publications of all countries, but many which are probably unknown by name to moſt ſtudents of the ſame nation. They form indeed a moſt invaluable body of bibliography in their ſeveral claſſes, and are of extenſive utility to the biographer.

He ultimately received every teſtimony of the general eſtimation in which he was held throughout Europe. The king of England requeſted him to accept of the chancellorſhip of the univerſity of Göttingen; the king of Pruſſia offered him that of Halle; and the ſovereign of Ruſſia propoſed to him an eſtabliſhment at Peterſburgh; but theſe he reſpectfully declined. The learned ſocieties of Europe vied with each other in evincing their regard for him, and fourteen of theſe enrolled him among their members. Indeed ſuch was the eſteem in which he was held, wherever the ſciences were cultivated, that all ſtrangers, even the ſovereign princes, who travelled into Switzerland, paid a kind of homage to his reputation and learning, by perſonally viſiting him. The king of Sweden ſent him the order of the Polar Star, accompanied with the warmeſt aſſurances of his eſteem.

From his earlieſt youth, Haller had evinced a high ſenſe of the value of religion to ſociety and to perſonal happineſs, and had made it the object of his moſt ſerious inquiries. He compoſed, in German, "Letters to his Daughter, on the Truth of the Chriſtian Religion," and ſome other tracts; and all his writings are expreſſive of his love of virtue. His religious ſentiments, however, were not entirely capable of tranquillizing the irritability of temper which ever accompanied him. He was impatient under the attacks of painful diſeaſe, and reſorted to violent methods to remove them; this, however, ſeemed to ariſe from the interruptions which they occaſioned in his literary occupations, which were in a manner neceſſary to his exiſtence. His conſtitution, though delicate, was ſtrengthened by temperance; and notwithſtanding his intenſe application to ſtudy, at all hours, his life was prolonged to the ſeventieth year. He had been ſubject to inflammatory diſorders; but in his laſt years he was afflicted with a diſeaſe in the bladder, the exceſſive pain of which was only to be palliated by large and continued doſes of opium, and which finally proved fatal. The laſt ſcene was perfectly tranquil and collected: he marked the gradual decay of his organs, and, with his finger on his wriſt, he ſaid to M. Roſelet, his phyſician, "My friend, I am dying,—the artery no longer beats:" and immediately expired. This took place on the 12th of December, 1777.

Baron Haller was one of the moſt univerſally informed men in Europe. He wrote and ſpoke with equal facility the German, French, and Latin languages, and read all the other tongues of civilized Europe, except the Sclavonic dialects. His acquaintance with books was ſo extenſive, that it would be difficult to point out any of the leaſt note, whether inſtructive or entertaining, which he had not peruſed, and of which the contents did not dwell upon his memory. Beſides the maſs of writings already mentioned, he maintained a very extenſive correſpondence with the learned of different countries. Of letters written to him, ſix volumes in Latin, and three in German have been publiſhed; but his own have only caſually appeared. In his perſon he was tall and well proportioned: his countenance, which had acquired a ſerious caſt, from his ſhort ſight and habitual tenſion of the muſcles, was full of expreſſion. His elocution was free, ſtrong and conciſe. Haller had eleven children, eight of whom he lived to ſee eſtabliſhed. His firſt wife, we have already obſerved, died on their arrival at Göttingen. Two years afterwards, he married a ſecond wife of his own country, who died in child-bed; and he contracted a third marriage, with a German lady, which proved more fortunate, for ſhe was the companion of the remainder of his life. His eldeſt ſon, Gottlieb Emanuel, was a member of the ſovereign council of Berne, and diſtinguiſhed himſelf in the purſuit of ſcience. See Henry's Mem. of Albert de Haller. Gen. Biog. Eloy. Dict. Hiſt.

Haller, Gottlieb Emanuel, ſon of the preceding, was born at Nyon, in the canton of Berne, in the year 1735, and diſtinguiſhed himſelf by an extenſive knowledge in the hiſtory of his native country, and of numiſmatics, which, by the treatiſes that he gave to the public, ſeem to have been the favourite objects of his purſuit. He was author of ſeveral works, of which, the one entitled "Library of the Hiſtory of Switzerland, and of every thing relating to it, ſyſtematically arranged, and in chronological order," is ſaid to be a laſting monument of the author's aſſiduity as well as accuracy, and one that may prove of great uſe to the future hiſtorian. Another valuable work was entitled "Cabinet of Swiſs Coins and Medals." He died at Berne in 1786, in the fifty-firſt year of his age. Gen. Biog.

HALLERIA, in *Botany*, ſo named by Linnæus as a juſt compliment to the ſubſequently famous Haller, at that time his confidential friend, though afterwards eſtranged from him by feelings of rivalſhip, which Linnæus, on their firſt appearance, ingenuouſly and moſt affectionately deprecated, though in vain. See his letter publiſhed by Haller himſelf in *Epiſt. ad Hallerum*, v. 1. 284; in the preceding part of which, moreover, the naming of the *Halleria*, in the *Hortus Cliffortianus*, is announced.—Linn. Gen. 314. Schreb. 411. Willd. Sp. Pl. v. 3. 310. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2 349. Juſſ. 118. Lamarck. Illuſtr. t. 546.—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Perſonatæ*, Linn. *Scrophulariæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, flattiſh, ſpreading, permanent, divided half way down into three very obtuſe ſegments, the upper one twice the breadth of the others, ſometimes cloven. *Cor.* of one petal, ringent; tube roundiſh at the baſe, inflated and incurved in the upper part; limb oblique, erect, four-cleft, its upper ſegment rather the longeſt, obtuſe, notched, lateral ones ſhorter, broader, and ſharper, loweſt very ſhort, ovate, acute. *Stam.* Filaments four, briſtle-ſhaped, ſtraight, inſerted into the tube, all longer than the corolla, two longer than the reſt; anthers roundiſh, two lobed. *Piſt.* Germen ſuperior, ovate, pointed; ſtyle thread-ſhaped, longer than the ſtamens; ſtigma ſimple. *Peric.* Berry roundiſh, pointed, of two cells, its baſe encompaſſed with the permanent calyx. *Seeds* ſeveral, ſmall, round, and, according to Fabricius, bordered.

Eſſ. Ch. Calyx three-lobed, ſpreading, permanent. Corolla tubular, curved, inflated, unequally four-cleft. Berry ſuperior, pointed, of two cells. Seeds numerous, bordered.

Obſ. We cannot account for the evident error of Linnæus in deſcribing the germen as inferior. Juſſieu is led by analogy to ſuſpect the fruit to be rather a pulpy capſule, than a true berry, which we can neither verify nor refute, having never ſeen it at all advancing towards maturity in any collection.

1. H. *lucida.* Linn. Sp. Pl. 872. Thunb. Nov. Act. Upſ. v. 6. 39. (Lonicera foliis lucidis acuminatis dentatis, fructu rotundo; Burm. Afric. 244. t. 89. f. 2.)—Leaves ovate, pointed, finely ſerrated. Calyx three-cleft.—Found in woods at the Cape of Good Hope. A ſmooth, upright *ſhrub*, with numerous, oppoſite, elongated, twiggy, ſquariſh *branches*. *Leaves* oppoſite, ſtalked, ovate, pointed, an inch long, thin, ſhining, ſmooth, veiny, finely and ſharply ſerrated, the tips of the ſerratures rather callous. *Stipulas* none. *Flower-ſtalks* axillary, two or three together in the lower parts of the branches, rather longer than the footſtalks, ſimple, drooping, each bearing a pair of ſmall acute *bracteas*. *Flowers* crimſon, ſcarcely an inch long, their *calyx*, according to Thunberg, three-cleft, as we find it, though he, through inadvertence, ſays "three-leaved." This ſhrub is kept in green-houſes rather for the ſake of its name than its beauty, the flowers being ſparingly produced, and not at all ſtriking. Its habit moreover is looſe and ſtraggling. This is the ſpecies figured in Lamarck.

2. H. *elliptica.* Thunb. ibid. (H. lucida β; Linn. Sp. Pl. 872. Lonicera folio acuto ſerrato, flore pendulo, fructu oblongo; Burm. Afric. 243. t. 89. f. 1.)—Leaves elliptical, acute, ſtrongly ſerrated. Calyx four-cleft.—Common, according to Thunberg, in woods at the Cape of Good Hope, eſpecially on the brinks of rivulets below the Table mountain and others, flowering in July. He deſcribes the *leaves* as thicker than the former, tapering at each end, and much more coarſely ſerrated, with rounded ſinuſes betwixt their teeth. *Corolla* leſs curved. We have ſeen no ſpecimen, but the plant may poſſibly be found by chance in ſome garden. Willdenow ſays the calyx of this was four-cleft in every flower that he examined, which is much more probable than Thunberg's account of its being five-cleft, and would naturally ariſe from the broadeſt lobe being cloven, which in the other ſpecies is undivided.—The preciſe length of the ſtamens is perhaps variable in both.

HALLERIA, in *Gardening*, comprehends a plant of the ſhrubby evergreen kind, of which the ſpecies is the African fly honeyſuckle, (H. lucida.)

Method of Culture.—It is capable of being increaſed by means of cuttings, which ſhould be carefully planted in pots filled with light earth, during the ſummer ſeaſon. When the plants are come up they may remain expoſed during the warm ſummer months, plentiful ſupplies of water being given them, but in the winter ſeaſon they ſhould be houſed at the ſame time with myrtles and other ſimilar plants, of the hardy exotic claſs, that demand much free air when the weather is mild and open.

Plants of this kind are alſo capable of being propagated, by ſowing the ſeeds well ripened in pots of light friable mould, plunging them in the hot-bed, by which practice they frequently ſucceed in a perfect manner.

Theſe plants are found to afford ornament and variety in collections of the green-houſe kind. See GREEN-HOUSE *Plants*.

HALLERMUND, in *Geography*, a country of Weſtphalia, incorporated with the principality of Calenberg.

HALLEROW HEAD, a cape on the E. coaſt of the iſland of South Ronaldſha, N. lat. 58° 38′. W. long. 2° 47′.

HALLET, JOSEPH, in *Biography*, was born at Exeter in the year 1692, and was educated under the care of Mr. Pierce, who was co-paſtor with the elder Mr. Hallet, to a congregation of Proteſtant diſſenters in that city. Joſeph was admitted to the exerciſe of the miniſtry in the year 1713, and in 1722 he ſucceeded his father as co-paſtor with Mr. Pierce. Prior to this event he had engaged in the controverſy, then warmly carried on in the weſt of England, concerning the Trinity: he had, in the year 1720, ſtood forth the vindicator of the ſcripture doctrine of the unity of God, in a treatiſe entitled "The Unity of God not inconſiſtent with the Divinity of Chriſt; being Remarks upon Dr. Waterland's Vindication, relating to the Unity of God, and to the Object of Worſhip." The author intended this piece as an introduction, for the unlearned reader, to the true nature of the controverſy indicated in the title; taking himſelf the ſame ſide of the queſtion as that maintained by Dr. Clarke. He publiſhed other pieces on the ſame ſubject, but his reputation is chiefly founded on his work, entitled "A free and impartial ſtudy of the Holy Scriptures recommended, being Notes on ſome peculiar Texts, with Diſcourſes and Obſervations." This work conſiſts of three volumes, but they were publiſhed at different times. They furniſh much intereſting matter, and the diſcourſes and obſervations, beſides diſplaying extenſive learning, an intimate acquaintance with eccleſiaſtical antiquities, and much ingenious reaſoning on important and very uſeful topics, will alſo gratify a reader's curioſity by remarks and diſquiſitions on ſome ſubjects of ſpeculative enquiry. Our author publiſhed many other works which were highly eſteemed by his contemporaries; ſome of theſe were practical, and concerned all Chriſtians, and ſome were on controverſial ſubjects, in which he defended the principles of our holy religion, in oppoſition to the unbelievers of that period. Mr. Hallet died in 1744, when he was about fifty-two years of age. He poſſeſſed a great ſhare of learning, which he applied to the valuable purpoſe of explaining and defending our common Chriſtianity, and his "Notes," &c. were held in high eſtimation by biblical ſtudents of all claſſes, and they introduced him to the acquaintance of many perſons, eminent for learning and knowledge in his time, both at home and abroad. As a miniſter of the goſpel he diſcharged the various duties incumbent upon him, with exemplary diligence and fidelity, and in private life he ſecured the eſteem and regard of all who knew him. Biog. Brit.

HALLEY, EDMUND, was born at Haggerſton, in the vicinity of London, in the year 1656. He was educated at St. Paul's ſchool, under the care of the learned Dr. Thomas Gale, where he diſtinguiſhed himſelf for his claſſical attainments, and for the advances which he made in mathematics. In 1673 he was entered a gentleman commoner of Queen's college, Oxford, where he applied himſelf with all the zeal, of which a great mind is capable, to the ſtudies of the place, particularly to mathematics and aſtronomy. Of his ſkill in the latter he exhibited a ſtriking proof, when he was only nineteen years of age, by communicating to the world, his "Direct and Geometrical Method of finding the Aphelia and Excentricity of the Planets." In the month of June, 1675, he made ſome curious obſervations on an eclipſe of the moon, and in the following year he communicated certain diſcoveries reſpecting a ſpot in the ſun, by which the rotation of that body, on its axis, was fully aſcertained. He, about the ſame period, obſerved an occultation of Mars by the moon, which he afterwards applied, with others, in fixing upon the longitude of the Cape of Good Hope. He paid great attention to the motions of Jupiter and Saturn, and by his obſervations was enabled to correct the beſt aſtronomical tables then extant. Having formed the deſign of completing the ſcheme of the heavens, by the addition of the ſtars near the ſouth pole, he went in 1676 to St. Helena, and perfected his catalogue, which at his return he preſented to king Charles II., who gave him a mandamus to the univerſity of Oxford for the degree of M. A. At the ſame time he was elected fellow of the royal ſociety, and in 1679 he went to Dantzic to confer with Hevelius about the diſpute between him and Dr. Hooke, reſpecting the preference of plain or glaſs ſights in aſtronomical inſtruments. He arrived at that city in May, and immediately entered upon ſome obſervations with the Poliſh aſtronomer, which were cloſely continued till the middle of July, when he returned to England. Before he left Dantzic, he gave the ſtrongeſt teſtimonies of his candour, by writing to Hevelius, acknowledging the ſurpriſing accuracy of his obſervations, and voluntarily offering himſelf as a witneſs of the almoſt incredible perfection of his inſtruments, againſt any perſon who ſhould call the matter in queſtion. In 1680 appeared the great comet, which Mr. Halley firſt obſerved in his paſſage from Dover to Calais. He afterwards completed his obſervations upon it at the Royal Obſervatory. From thence he went to Italy with his friend and ſchool-fellow Mr. Nelſon, and in their journey Mr. Halley had a ſight of the comet, as it appeared for the ſecond time, in its return from the ſun. So highly were Mr. Halley's talents appreciated, that Mr. Newton committed to his care, in 1686, the publication of the "Principia," to which the editor prefixed a copy of verſes. He had, previouſly to this, turned his thoughts to the ſubject of Kepler's problem, and, after ſome reflection, he concluded from it, that the centripetal force muſt decreaſe in the inverſe proportion of the ſquares of the diſtances. As, however, he was enabled to give a demonſtration of the fact, he applied firſt to ſir Chriſtopher Wren, and afterwards to Newton, by whom he had all his difficulties ſolved. About this period he publiſhed "The Hiſtory and phyſical Cauſe of the Trade Winds and Monſoons, together with a chart repreſenting their direction, &c." In 1687 he undertook to explain the cauſe of a natural phenomenon, which had till then baffled the reſearches of ſcientific men. It had been obſerved that the Mediterranean never ſwells, although there is no viſible diſcharge of the prodigious quantity of water that runs into it from nine large rivers, beſides ſeveral ſmall ones, and the conſtant ſetting in of the current at the mouth of the ſtrait: this he ſhewed, by a vaſt number of experiments, was occaſioned by evaporation cauſed by the ſun and wind. The circulation he ſuppoſed was carried on by the winds driving theſe vapours to the mountains, where, being collected, they form ſprings, the ſtreams from which uniting become rivulets, and many of theſe meeting together in the valleys become rivers, which at length empty themſelves into the ſea. Hence there is an equilibrium between the expenditure and receipt in the ocean. Mr. Halley's was a moſt active life, his purſuits about this period are mentioned with applauſe and admiration by a French eulogiſt, M. Mairan: after noticing his papers on the "Winds," and on "Gunnery," which had been read before the Royal Society, ſoon after he became the aſſiſtant ſecretary to that learned body, he ſaid, "theſe were followed by queſtions on the nature of light and tranſparent bodies; a determination of the degrees of mortality, in order to adjuſt the valuation of annuities on lives; and many other works, in almoſt all ſciences; aſtronomy, geometry, and algebra; optics and dioptrics; balliſtics, and artillery; ſpeculative and experimental philoſophy; natural hiſtory, antiquities, phyſiology, and criticiſm; being about twenty-five or thirty diſſertations, which he produced during ten years of his reſidence at London, and all abounding with ideas new, ſingular, and uſeful." In the year 1692, Mr. Halley reſigned his office as aſſiſtant ſecretary to the Royal Society, and in 1696, upon the eſtabliſhment of five different mints, for the re-coinage of the ſilver ſpecie, he was conſtituted comptroller of the office of Cheſter. In the year 1701 he publiſhed "A general Chart, ſhewing at one View the Variation of the Compaſs in all thoſe Seas where the Engliſh Navigators were acquainted." This valuable work was the reſult of actual obſervation, for which he traverſed the vaſt ocean: in one of his voyages he ſailed acroſs the two hemiſpheres, till the ice in the cold regions of the ſouth obſtructed his navigation; and on his voyage home touched at St. Helena, the coaſt of Brazil, Barbadoes, Cape Verde, Madeira, the Canaries, and the coaſt of Barbary. This chart laid a ſure foundation for the diſcovery of the law by which the variation changes in all parts of the world. After this he was employed by the king to obſerve the courſe of the tides, with the longitude and latitude of the principal headlands in the Britiſh channel. In 1702, he was ſent by queen Anne to take a ſurvey of the ports in Dalmatia, with a view of forming a ſafe and convenient harbour for ſhipping in the Auſtrian territories on the Adriatic. Being introduced to the emperor, he gave him an account of two harbours on the Iſtrian coaſt, and was preſented by his majeſty with a valuable diamond ring, taken from his own finger, and alſo with a letter, ſtrongly recommending him to queen Anne, written with the emperer's own hand. In 1703 he was appointed Savilian profeſſor of geometry at Oxford, in the room of Dr. Wallis, deceaſed, and on this occaſion he was honoured by the univerſity with the degree of doctor of laws. He now undertook and completed a tranſlation from the Arabic into Latin, of "Apollonius de ſectione Rationis," which had been begun by Dr. Edward Bernard. He next, in conjunction with Dr. Gregory, ſet about preparing for the preſs "Apollonius's Conics;" to this he added the treatiſe of "Serenus on the Section of the Cylinder and Cone." He publiſhed, in 1708, his "Miſcellanea Curioſa," in three volumes 8vo., containing many original pieces of his own. In 1713 he ſucceeded to the office of ſecretary to the Royal Society, and in 1719 he was made aſtronomer-royal by king George I., inſtead of Mr. Flamſtead, who was lately dead. At Greenwich he exerted all his powers in completing the theory of the moon's motion, and in other obſervations on the heavens. For eighteen years he watched the celeſtial bodies with the cloſeſt attention, ſcarcely miſſing a meridian view of the moon during all that time, when the weather was favourable, and performing the whole buſineſs of the obſervatory without any aſſiſtant. In 1729 he was admitted a foreign member of the Academy of Sciences at Paris. He lived to the very advanced age of eighty-ſix, and died in his chair without a groan. He poſſeſſed all the qualifications neceſſary for the aſtronomer, the naturaliſt, the ſcholar, and the philoſopher: he was candid in his judgment; uniform and blameleſs in his manners; always communicative, and totally diſintereſted. His great qualifications were tempered with a vein of gaiety, which neither his abſtracted ſpeculations, the infirmities of old age, nor the palſy itſelf were able to impair. He was author of ſome other works beſides thoſe already noticed, as "Aſtronomical Tables, with precepts, for computing the Places of the Sun, Moon, Planets, and Comets." "A Synopſis of the Aſtronomy of Comets," annexed to Dr. Gregory's "Elements of Aſtronomy," and a great number of valuable papers in the Philoſophical Tranſactions. Biog. Brit.

HALLIA, in *Botany*, ſo named by Thunberg, apparently in honour of Birger Martin Hall, whoſe Theſis, publiſhed at Upſal, June 25, 1762, was the *Nectaria Florum* of Linnæus, re-printed in Amoen. Acad. v. 6. 263. We find no mention of this gentleman elſewhere. Thunb. Prod. 131. Willd. Sp. Pl. v. 3. 1168.—Claſs and order, *Diadelphia Decandria.* Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, its limb regular, in five deep equal ſegments. *Cor.* papilionaceous. Standard inverſely heart-ſhaped, reflexed. Wings oblong, ſtraight. Keel ſtraight, compreſſed, obtuſe. *Stam.* Filaments diadelphous, ſimple and nine-cleft, inflexed; anthers roundiſh. *Piſt.* Germen ſuperior, compreſſed; ſtyle awl-ſhaped, inflexed like the ſtamens, permanent; ſtigma ſimple. *Peric.* Legume oblong, compreſſed, of two valves and one cell. *Seed* ſolitary, kidney-ſhaped.

Eſſ. Ch. Calyx regular, in five deep ſegments. Legume of two valves and one cell. Seed ſolitary.

Thunberg has founded this genus on two or three Linnæan ſpecies of *Hedyſarum*, which certainly require to be ſeparated from thence, and to which he has added ſome new ones. Willdenow has properly ſubjoined to theſe *H. ſororium* of Linnæus. The whole, therefore, ſtand as follows:

1. H. *alata.* Thunb.—"Leaves oblong, ſmooth. Stipulas decurrent. Stem winged." Native of the Cape of Good Hope.

2. H. *flaccida.* Thunb.—"Leaves lanceolate, pointed, ſmooth. Stalks ſingle-flowered, the length of the leaves." From the ſame country.

3. H. *virgata.* Thunb.—"Leaves lanceolate, pointed, ſmooth. Stalks ſingle-flowered, ſhorter than the leaf."—Gathered alſo at the Cape by Thunberg, whoſe ſpecific definitions are all we know of theſe plants.

4. H. *cordata.* Thunb. (Hedyſarum cordatum; Thunb. Nov. Act. Upſ. v. 6. 41. t. 1. f. 1. Jacq. Hort. Schonbr. v. 3. 25. t. 296. Glycine monophylla; Linn. Mant. 101.)—Leaves heart-ſhaped, elongated, acute. Stalks ſingle-flowered, the length of the leaf. Stipulas lanceolate.—Native of the Cape of Good Hope. *Stems* ſeveral, upright or ſpreading, ſhrubby, branched, ſomewhat zigzag, ſlender, triangular, ſtriated, hairy. *Leaves* alternate, ſtalked, ſimple, an inch or inch and half long, dependent, heart-ſhaped at the baſe, elongated and tapering to a point, with a terminal briſtle, entire, with a ſtrong midrib and numerous fine veins, either ſmooth, or beſprinkled with long ſcattered hairs. *Stipulas* lanceolate, acute, widely ſpreading. *Flower-ſtalks* axillary, ſolitary, ſpreading, ſingle-flowered, about as long as the leaves, having a joint, with two or three minute *bracteas*, near the top. *Flowers* ſmall, pale violet, variegated with purple and blue.

5. H. *Aſarina.* Thunb. (Crotalaria Aſarina; Berg. Cap. 194.)—Leaves heart-ſhaped, rounded, obtuſe, hairy. Stalks ſingle-flowered, the length of the leaf. Stipulas ovate.—Gathered by Bergius at the Cape of Good Hope. The *ſtems* are procumbent, long, ſlender, branched, triangular, ſtriated, hairy. *Leaves* not an inch long, much ſhorter, broader, and rounder than in the laſt, as are alſo the *ſtipulas.* *Flowers* much like the laſt, on capillary, hairy ſtalks. *Petals* elegantly veiny. *Germen* lanceolate, with a long point, very hairy, ſtalked. *Legume* (according to Bergius) ovate, tapering at each end, hairy, of one cell, ſtanding on a ſtalk out of the permanent calyx. The deſcription of the preceding in the *Mantiſſa*, p. 101, is made from this ſpecies, though the other is the marked ſpecimen, and Linnæus in his copy of Bergius, has clearly diſtinguiſhed them by a manuſcript note, ſaying, "my *Glycine monophylla* differs," (from this plant of Bergius) "in having an upright triangular ſtem, and narrower leaves; otherwiſe they are alike."

6. H. *hirta.* Willd. n. 6. (Lens, elatines folio ſingulari, minor, piloſa, floribus luteis; Pluk. Amalth. 131. t. 154. f. 8. Lens maderaſpatana, elatines folio; Petiv. Gazoph. t. 30. f. 11.)—Leaves heart-ſhaped, rounded, nearly ſeſſile, fringed, without ſtipulas. Flower-ſtalks ſcarcely longer than the leaf-ſtalks.—Gathered by Kœnig at Tranquebar. Plukenet had it from Madras. It is ſtrange that Bergius ſhould quote his very diſſimilar figure for the laſt, but Willdenow has rightly diſtinguiſhed them. Linnæus, in his latter days, confounded the preſent with his own *Crotalaria biflora*, and Dahl took it for the very different *Hedyſarum nummularifolium.* Numerous hairy *ſtems*, a ſpan long, moſtly branched, ſpring from one root, and ſpread flat on the ground, covered with a multitude of crowded alternate *leaves* on ſhort thick ſtalks. Theſe *leaves* are without ſtipulas, between a quarter and half an inch long, heart-ſhaped, obtuſe, a little oblique, glaucous, dotted, fringed with coarſe tawny hairs, but otherwiſe nearly ſmooth. *Flowers* ſolitary, axillary, yellow, on hairy ſtalks, rather exceeding the footſtalks. *Legume* elliptical, rigid, ſomewhat tumid, poliſhed nearly or quite ſmooth, about half as big as the leaves.—Plukenet's t. 86. f. 4. is probably intended for this plant.

7. H. *imbricata.* Thunb. (Hedyſarum imbricatum; Linn. Suppl. 330. Thunb. Nov. Act. Upſ. v. 6. 42. t. 1. f. 2)—Leaves heart-ſhaped, pointed, ſeſſile, imbricated. Stipulas ovate, acute. Flowers ſeſſile, axillary.—Gathered by Thunberg at the Cape of Good Hope, in graſſy fields beyond Swellendam, along with *H. cordata*, n. 4. The *ſtems* are diffuſe and branched, a foot or more in length, angular, ſtriated, hairy. *Leaves* moſt numerous at the ends of the branches, where they are crowded or imbricated in two ranks. They are ſeſſile, heart-ſhaped, about half an inch broad, and rather longer, acute and tipped with a briſtle, finely reticulated with veins, and fringed. *Stipulas* ſpreading, pale, ovate, acute, ſtriated, fringed. *Flowers* concealed by the leaves, ſolitary, ſeſſile, with a very hairy calyx, purple veiny corolla, and ovate ſmall ſmooth legume.

8. H. *ſororia.* Willd. n. 8. (Hedyſarum ſororium; Linn. Mant. 270. Glycine monophyllos; Burm. Ind. 161. t. 50. f. 2. Lens maderaſpatana, nummulariæ folio maculato; Petiv. Gazoph. t. 33. f. 1.)—Leaves roundiſh, kidney-ſhaped, emarginate, nearly ſmooth. Flowers racemoſe.—Native of the Eaſt Indies. *Stem* herbaceous, long, trailing, triangular,

ſtriated, ſmooth. *Leaves* alternate, diſtant, ſpeckled with brown, about an inch wide, but not ſo long, emarginate at the baſe and ſummit, ſtanding on ſlender ſtalks nearly their own length, which ſometimes bear auricles; the veins are a little hairy at the back. *Stipulas* ſmall, cloſe-preſſed, broad at their baſe, taper-pointed, ribbed, ſmooth. *Flower-ſtalks* axillary, ſolitary, ſlender, hairy, racemoſe, about as long as the leaves, each bearing from four to eight oppoſite ſtalked *flowers*, with a broad concave ribbed deciduous *bractea* to each. The *calyx*, at leaſt when in fruit, ſeems broader, ſhorter, and leſs divided, than the character of this genus requires. *Corolla* ſmall. *Legume* ſemi-elliptical, compreſſed, ſmooth, veiny, the thinner edge wavy.—Linnæus juſtly remarks that the leaves are, ſtrictly ſpeaking, ternate, their ſtalk bearing, near the baſe, "two ſmall oval ſtalked ſtipulas." He ought rather to have called them leaflets, or auricles, for there are real membranous ſtipulas beſides, in their proper place; neither are theſe auricles by any means conſtant. Willdenow's deſcription is compiled from the *Mantiſſa* and *Syſt. Veg.* In the latter, the legume is ſaid to have two joints; a character equally foreign to the generic deſcription, and to truth. But it is curious to obſerve the cauſe of this error in the Linnæan ſpecimen, where two of the legumes are ſo placed as to give this appearance. Hence the value of original ſpecimens; and as we copy nothing without the inſpection of ſuch, except we avow it, we hope our labours may contribute to the aſſiſtance of thoſe who come after us, and to the accuracy of botanical ſcience.

HALLIAPOUR, in *Geography*, a town of Hindooſtan, in Oude; 22 miles S.W. of Fyzabad.

HALLIAR, a circar of Hindooſtan, in Guzerat, on the N. ſide of the gulf of Cutch, about 40 miles long, and 20 broad.

HALLIARDS, or HALYARDS, in a *Ship*, are the ropes or tacks uſually employed to hoiſt or lower any ſail upon its reſpective maſt or ſtay.

HALLIER. See BRAMBLE-*net*.

HALLIER, FRANCIS, in *Biography*, was born at Chartres in the year 1595; and having received a good education, he taught philoſophy at the univerſity of Paris. He afterwards engaged as private tutor to the abbé d'Alincourt, Ferdinand de Neufville, who was afterwards biſhop of Chartres. He accompanied the young man to Rome, where he acquired the eſteem of pope Urban VIII.: from Rome he went firſt to Naples, then to Greece, and afterwards to England. In 1637, he publiſhed a work, which fixed on him a very high reputation at Rome, and in his own country; it was entitled "De ſacris Electionibus et Ordinationibus ex antiquo et novo Eccleſiæ Ritu." For this the French clergy ſettled on him a penſion of eight hundred livres. Cardinal Richlieu was deſirous of engaging M. Hallier as his confeſſor, and cardinal Barberini wiſhed to attach him to his perſon, by the offer of a penſion, but a love of independence induced him to decline their propoſals. In 1656, he paid another viſit to Rome, in order to receive from the hands of pope Alexander VII. the bulls of inveſtiture to the biſhopric of Cavaillon, to which he had been nominated by the king. This new dignity he enjoyed but a ſhort time, having had his faculties impaired by a paralytic ſeizure, to which he fell a ſacrifice in 1659, when he was in the ſixty-fifth year of his age. M. Hallier was author of ſeveral works, beſides the one already mentioned, but as they related chiefly to his controverſies with the Jeſuits, their titles need not be tranſcribed.

HALLIER, in *Rural Economy*, a name provincially applied to a perſon who carts, or lends articles of different kinds for hire.

HALLIFAX, SAMUEL, in *Biography*, was born at Cheſterfield, in Derbyſhire, in the year 1730. After paſſing through the grammar ſchool, he went to Jeſus college, Cambridge, where he purſued his ſtudies with reputation, and took his degrees. He afterwards removed to Trinity hall, where he took his degree of doctor of laws. For many years he held the profeſſorſhip of Arabic at Cambridge, which he reſigned in 1770, upon his being appointed regius-profeſſor of civil law in the univerſity. In the exerciſe of this office he acquired much celebrity by a public courſe of lectures which he delivered, containing a compariſon between the Roman laws and thoſe of England. In 1775, the degree of doctor of divinity was conferred upon him by royal mandate, he was created chaplain to his majeſty, and appointed maſter of the faculties in Doctor's Commons. He now obtained conſiderable church preferment, and in the year 1781 was advanced to the biſhopric of Glouceſter, whence he was tranſlated to the ſee of St. Aſaph in 1787. He died in 1790, in the ſixtieth year of his age. He publiſhed ſome ſingle ſermons: "Three Sermons preached before the Univerſity of Cambridge," on the attempts to aboliſh ſubſcriptions in 1772: and "Twelve Sermons on the Prophecies concerning the Chriſtian Church, and in particular concerning the Church of Papal Rome," which are held in high eſteem: he was author likewiſe of an "Analyſis of Biſhop Butler's Analogy of Religion, natural and revealed." Gen. Biog.

HALLIGS, in *Geology*, are low alluvial iſlands, overflowed by the higheſt of the tides on the coaſt of Denmark, having an artificial raiſed mount in their higheſt parts, on which the houſes of their inhabitants are built; theſe halligs are particularly deſcribed in M. de Luc's "Geological Travels," vol i. pages 367 and 388.

HALLNAS, in *Geography*, a town of Sweden, in the province of Upland; 45 miles N. of Upſal.

HALLOWELL, a flouriſhing poſt-town of America, in Kennebeck county, and ſtate of Maine, at the head of the tide-waters, on the W. ſide of Kennebeck river. An academy has been eſtabliſhed in this place, and endowed with a conſiderable fund in lands: 195 miles N. by E. of Boſton. *Hallowell Hook* lies on the ſame ſide of the river, three miles below the town. The whole townſhip, interſected nearly in the centre by Kennebeck river, contains 1364 inhabitants.

HALLOWELL *Townſhip*, a townſhip in the county of Prince Edward, Upper Canada, at the ſouthern part of the county, open to lake Ontario.

HALLSIO, a town of Sweden, in the province of Jamtland; 43 miles N. W. of Sundſwall.

HALLSTATT, a town of Auſtria, on the lake Hallſtatter, near which is a ſalt-mine; 25 miles S. of Gemunden.

HALMOE, a ſmall iſland in the Baltic, belonging to Denmark, near the N.E. coaſt of the iſland of Arroe. N. lat. 54° 53'. E. long. 10° 30'.

HALMOTE, or HALIMOTE, from the Saxon *heale, hall*; and *gemot, meeting*; is the ſame with what we now call a *court-baron*; the word implying, a meeting of the tenants of the ſame hall or manor.

"Omnis cauſa terminetur, vel hundredo, vel comitatu, vel halimote, ſecum habentium, vel dominorum curia." LL. Hen. I. cap. 10. Halmote and halimote are often confounded with *folkmote*, though originally they were diſtinct courts. The halmote being properly the lord's court, or a court-baron held in the manor, in which differences between the tenants were determined.

The name is ſtill retained at Luſton, and other places in Herefordſhire.

Halmote is ſometimes alſo taken for a convention of citizens in their public hall, more properly called *folk-mote.*

HALMSTADT, in *Geography*, a ſea-port town of Sweden, in Alland, at the mouth of the Niſſa, in which are flouriſhing woollen manufactures, and a rich ſalmon fiſhery; 96 miles W. of Carlſcrona. N. lat. 56° 40′. E. long 12° 37′.

HALMYRAX, a name given by Pliny to the natrum of the ancients, when found in a dry form on the ſurface of the earth.

HALMYRHAGA, in the *Materia Medica of the Ancients*, was a name given by ſome authors to the natrum, when in a purer ſtate. They diſtinguiſhed, according to Pliny, two kinds of this ſalt; one they called by this name halmerhaga, which was the purer; the other, which was fouler, and mixed with earth, they called agrium. The firſt of theſe they had from Media, the other from Thrace.

HALMYRODES, of ἁλμυρος, *ſalt*; from ἁλ-, *ſea*; a word uſed by Hippocrates, as the name of a peculiar ſpecies of fever, in which, as Galen explains it, the external parts, when touched, communicate ſuch an itching ſenſation, as is perceived on touching ſalt ſubſtances. The ſame word is ſometimes uſed to expreſs a roughneſs of the ſkin, and is applied to many of the excretions, when ſalt and acrimonious.

HALNA, in *Geography*, a town of Sweden, in Weſt Gothland; 79 miles E.N.E. of Uddevalla.

HALO, or Corona, a luminous and ſometimes coloured circle appearing occaſionally around the heavenly bodies, but more eſpecially about the ſun and moon. This phenomenon is at times accompanied with others, ſuch as *parhelia*, or mock-ſuns, *paraſelenes*, or mock-moons, *anthelia*, or glories. All theſe appearances are occaſioned by the refraction, reflection, or inflection of light falling upon, or paſſing near the concrete vapour floating in the atmoſphere; but they have not yet received that ſatisfactory explanation which has been given to the rainbow, a phenomenon nearly related to them.

Halos are obſerved in an atmoſphere ſomewhat foggy or miſty, but not in a cloudy nor clear one: a thin hazineſs in the higher regions of the air in ſummer, and in the lower regions in winter, commonly occaſions ſome appearance of the halo, the characters of which are various, according to circumſtances. In ſummer, halos are conſidered by the farmers as portentous of wind or rain.

It is remarkable that the large halos ſurrounding the ſun and moon are commonly of given diameters, namely, about 23° or 24°, or double that magnitude, 47°. Sometimes two concentric halos of theſe dimenſions are ſeen at the ſame time. Philoſophers do not ſeem to have aſcertained the above facts by frequent and careful obſervation; but if they are found to be true, they muſt evidently lead to the theory of thoſe curious appearances. Halos, however, are often much ſmaller, not extending more than one or two degrees from the luminous body. The order of the colours in halos is differently deſcribed by different obſervers; this may be partly from the diverſity of the phenomena, and partly from the indiſtinctneſs of the colours. In thoſe which Newton obſerved in 1692, they were in the following order, reckoning from the inſide; in the innermoſt were blue, white, and red; in the middle were purple, blue, green, yellow, and pale red; in the innermoſt, pale blue and pale red. M. Huygens obſerved red next the ſun, and a pale blue outward. Sometimes they are red on the inſide, and white on the outſide. M. Weidler obſerved one that was yellow on the inſide, and white on the outſide. In France one was obſerved in 1683, the middle of which was white; after which followed a border of red, next to it was blue, then green, and the outermoſt circle was a bright red. In 1728 one was ſeen of a pale red outwardly, then followed yellow, and then green, terminated by white. Mr. Wood of Cambridge deſcribes three very brilliant halos which appeared round the moon, Nov. 30, 1785, the order of the colours beginning from the moon was white, of conſiderable breadth, yellow, orange, red; violet, green, yellowiſh, red; violet, green, yellowiſh, red. The red of a fourth was ſo faint as to be ſcarcely viſible. The radii of theſe rings might be about one, two, and three degrees, but they were not meaſured. The red and violet in each caſe ſeemed contiguous. Dec. 3d, a ſingle halo appeared round the moon; its diameter was about 2½ degrees, and the colours as in the firſt of thoſe mentioned above; the red of a ſecond was juſt ſeen, and its diameter, as far as could be determined by the naked eye, was double the diameter of the firſt. On the 20th Nov. 1802, ſir H. C. Englefield obſerved the ſun to be accompanied by uncommon halos and parhelia, at Richmond in Surrey. The weather was ſhowery, and the ſky of a turbid appearance, indicating rain; and the ſun, which was 14° high, ſhone with a faint and watery light. The circle, or halo, neareſt the ſun was of about 24° radius; its breadth was about 1°; it was of a pale yellowiſh light, but had no tendency to priſmatic colours. The exterior circle was 48° from the ſun, and about 1½° in breadth, being evidently broader than the inner circles. It was tinged throughout with the priſmatic colours, though only red, green, and blue were diſtinctly viſible. The red was neareſt the ſun; the blue very faint. The brightneſs of the circle was about that of the ſecondary rainbow. There were two parhelia accompanying the inner halo; the one faint, on the left-hand; the other, very bright, over the ſun; its light was more vivid than that of the ſun at the time, and whiter than the reſt of the circle in which it was, with ſomething of the priſmatic tints. It was about 2 broad, but ill defined, eſpecially on the ſide oppoſite to the ſun. From each ſide of the bright light proceeded a bright ray, which had a double curvature very diſtinct, being firſt convex towards the ſun, and then concave. The lower edge of theſe rays was tolerably well defined; the upper edge melted away into the ſky with a ſort of ſtreakineſs. They grew both narrower and fainter towards their termination, and they reached pretty near to the other circle. The whole form of the parhelion and its rays bore a ſtriking reſemblance to the body and extended wings of a long-winged bird, ſuch as an eagle.

Various have been the theories and opinions of optical writers concerning halos. Deſcartes concludes that the phenomena are occaſioned by the refraction of light in the round particles of ice floating in the atmoſphere at the time; the variations in the diameter of the halo, he conceives, are owing to the greater or leſs protuberance of the icy globules; he corroborates this hypotheſis by the obſervation that halos are not ſeen when it rains. Gaſſendi ſuppoſes a halo to be formed in the ſame manner as a rainbow; the rays of light being, in both caſes, twice refracted, and once reflected within each drop of rain, and that the difference between them is wholly owing to their different ſituation, with reſpect to the obſerver. This author does not, however, ſufficiently explain his ideas on this ſubject, nor illuſtrate them by a ſuitable diagram. Dechales alſo endeavours to ſhew that the generation of the halo is ſimilar to that of the rainbow. He ſays, if a ſphere of glaſs, filled with water, be placed in the beams of the ſun, there will not only be two circles of coloured light on the ſide next the ſun, conſtituting the two rainbows, but there will alſo be another on the part oppoſite to the ſun, the rays of which, meeting in a point, afterwards diverge and form a coloured circle, which may be exhibited on paper. The colours will appear, to an eye placed any where, on the ſurface of the cone; he found the angle which the diameter of the cone's baſe ſubtended at the vertex was 46°. The application of this to explain the effect of the ſun's light on ſmall globular particles of fogs is obvious; and he follows it up with ſome pertinent remarks upon the greater dilution of the colours in halos than in rainbows, and ſhews, that in favourable circumſtances, a halo of 46° diameter ſhould always be formed. Theſe obſervations, made prior to the optical diſcoveries of Newton, certainly do great credit to the author's ſagacity. Huygens alſo formed a theory to account for halos and parhelia; he aſſumes the exiſtence of hailſtones, opaque in the centre, and tranſparent in the circumference, by the help of which he explains the formation of halos; he further aſſumes cylindrical particles of ice in the air of a ſimilar conſtitution, by which he explains the parhelia. This theory, though mentioned in favourable terms by Newton, and afterwards by Dr. Smith, does not ſeem to have many advocates at preſent. Marriotte accounts for the formation of ſmall coronas by the tranſmiſſion of light through aqueous vapour, where it ſuffers two refractions without any intermediate reflection. The larger coronas of 45° diameter, he conceives, are effected by means of icy particles of vapour in the ſhape of equiangular priſms floating in the air, and refracting the rays of light into the priſmatic colours. This idea is ſupported by microſcopic obſervations on the hoar froſt, and on the particles of ſnow in which ſuch priſmatic figures are found. He obſerves, that the red rays are within, or neareſt the ſun, as being leaſt refracted, and the blue without. He calculates the angle of refraction to be ſuch as to agree with the phenomenon. This explanation is certainly ingenious, and entitled to conſideration. Newton does not ſeem to have given particular attention to halos; but he ſuppoſes the larger and more regular ones to be formed by two refractions without any reflection, in the manner of Dechales; and the ſmaller ones, he conceives, are formed on the ſame principle as the colours of thin plates. He corroborates this conjecture by an obſervation made in June, 1692. He ſaw, by reflection, in a veſſel of ſtagnant water, three halos, or rings of colours, about the ſun, which have been deſcribed above; the diameter of the ſecond was about 9½°, that of the firſt about 5° or 6°, and that of the third about 12°. He once obſerved coronas around the moon nearly ſimilar to theſe. In the 3d vol. of the Mancheſter Memoirs, Mr. Wood has given a theory of halos: he ſuppoſes, with Dr. Halley, that vapour conſiſts of hollow ſpherules of water, filled with an elaſtic fluid, and that the rays of light, in paſſing through theſe, are refracted and reflected, ſo as to produce halos in a manner ſimilar to that of the production of rainbows in the ordinary ſolid drops of rain. Laſtly, Dr. Young, in his Natural Philoſophy, 1807, revives the ingenious explanation of Marriotte, and ſupports it with pertinent obſervations. He ſays, "it is well known that the cryſtals of ice and ſnow tend always to form angles of 60°; now, a priſm of water or ice, of 60°, produces a deviation of about 23½° for rays forming equal angles with its ſurfaces, and the angle of deviation varies at firſt very ſlowly as the inclination changes, the variation amounting to leſs than 3°, while the inclination changes 30°. Now, if ſuch priſms were placed at all poſſible angles of inclination, differing equally from each other, one half of them would be ſo ſituated, as to be incapable of tranſmitting any light regularly by two ſucceſſive refractions, directed the ſame way; and of the remaining two-fourths, the one would refract all the light within theſe three degrees, and the other would diſperſe the light in a ſpace of between 20° and 30° beyond them. In the ſame manner we may imagine an immenſe number of priſmatic particles of ſnow to be diſpoſed in all poſſible directions, and a conſiderable proportion of them to be ſo ſituated, that the plane of their tranverſe ſection may paſs within certain limits of the ſun and the ſpectator. Then half of theſe only will appear illuminated, and the greater part of the light will be tranſmitted by ſuch as are ſituated at an angular diſtance of 23½°, or within 3° of it; the limit being ſtrongly marked internally, but the light being externally more gradually loſt. And this is preciſely the appearance of the moſt common halo. When there is a ſufficient quantity of the priſmatic particles, a conſiderable part of the light muſt fall, after one refraction, on a ſecond particle, ſo that the effect will be doubled; and in this caſe the angle of refraction will become ſufficient to preſent a faint appearance of colour, the red being internal, as the leaſt refrangible light, and the external part having a tinge of blue. Theſe concentric halos of 23½° and 47°, are, therefore, ſufficiently explicable, by particles of ſnow, ſituated promiſcuouſly in all poſſible directions. If the priſms be ſo ſhort as to form triangular plates, theſe plates, in falling through the air, will tend to aſſume a vertical direction, and a much greater number of them will be in this ſituation than in any other. The reflection from their flat ſurfaces will conſequently produce a horizontal circle of equal height with the ſun; and their refraction will exhibit a bright parhelion immediately over the ſun, with an appearance of wings or horns, diverging upwards from the parhelion."

Whatever may be the facility of explaining the phenomena of halos, parhelia, and paraſelenes by the aſſumption of triangular priſmatic particles of ice and thin plates of the ſame, it is upon the whole perhaps equally probable, that theſe phenomena are moſt, if not all, occaſioned by the refraction and reflection of light from the ordinary minute globules of water in the atmoſphere, before they become aggregated ſo as to form a cloud. Thus the flame of a candle ſeen through ſteam in cold weather, or through glaſs that has been breathed upon, or through a receiver during its exhauſtion, or after the re-admiſſion of air, exhibits the appearance of a halo. Alſo water thrown up againſt the ſun, and diſperſed in ſmall drops, ſhews the colours of the rainbow. It has been obſerved, that large halos do not appear concentric to the ſun or moon, but farther extended downwards than upwards; this, as Dr. Smith ſhews, is an optical deception, ariſing from the apparent concave of the ſky being leſs than a hemiſphere.

The *anthelia* or *glories* ſeen around the ſhadows of perſons' heads in certain ſituations, appear to have a ſimilar origin to the rainbows, or perhaps to the larger halos. The moſt accurate deſcription of theſe is given by Bouguer; they were obſerved by him and his companions on Pichinca, a high mountain in South America. When the ſun was juſt riſing behind them, and a cloud was about thirty paces before them, ſo as to appear white, each of them ſaw his own ſhadow projected upon it, and no other. All the parts of the ſhadow were diſtinguiſhable, but the head was adorned with a kind of glory, conſiſting of three or four ſmall concentric crowns of a very lively colour, each exhibiting all the varieties of the primary rainbow, and having the circle of red on the outſide. The intervals between theſe circles continued equal, though the diameters of them all were conſtantly changing. The laſt of them was very faint, and at a conſiderable diſtance was another great white circle which ſurrounded the whole. The diameter of the firſt circle was eſtimated at 5 ⅔, that of the ſecond at 11°, and that of the third at 17°; but the diameter of the white circle was about 67°. This phenomenon never appeared but in a cloud, conſiſting of frozen particles, and never in drops of rain, like the rainbow. When the ſun was not in the horizon, only part of the white circle was viſible, as Bouguer frequently obſerved afterwards. An appearance, ſomewhat ſimilar, was obſerved by Dr. M'Fait in Scotland; alſo by Dr. Haygarth in Wales in 1780. The fog or miſt in the laſt caſe too was probably frozen, as hoar froſt was obſerved the ſame evening.

Though the above accounts ſeem to ſhew that theſe glories are not produced but in fogs below the freezing temperature; yet it would be too haſty to adopt this concluſion till it ſhall be corroborated by the obſervations of other perſons, placed in ſimilar ſituations in more elevated temperatures.

For further accounts ſee ANTHELION, PARHELION, and the works above mentioned, Nicholſon's Journal, vol. vi. and Prieſtley's Hiſtory of diſcoveries relating to Viſion, &c.

HALO, in *Anatomy*, the name given by authors to that round red circle, or areola, about the nipple, from its ſimilitude to the circles formed round the ſun and moon at certain times, and called *halos*.

HALONNESUS, in *Ancient Geography*, a ſmall iſland in the Ægean ſea, which became the occaſion of a war between Philip, king of Macedonia, and the Athenians.

HALORAGIS, in *Botany*, from ἁλς, *the ſea*, and ῥαξ, *a grape ſtone*, becauſe its fruit reſembles ſuch, and the plant grows by the ſea ſide. Forſt. Gen. 31. t. 31. Linn. Suppl. 34. Schreb. 267. Willd. Sp. Pl. v. 2. 473. Jacq. Miſc. v. 2. 332. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 37. (Cercodia; Murr. Comm. Goett. for 1780. 3. Juſſ. 318. 451. Lamarck. Illuſtr. t. 319. Gærtn. t. 32.)—Claſs and order, *Octandria Tetragynia*. Nat. Ord. *Onagræ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, deeply four-cleft, crowning the germen, permanent. *Cor.* Petals four, oblong, obtuſe, concave, more or leſs ſpreading; their claws narrow, inſerted into the calyx. *Stam.* Filaments eight, capillary, erect, ſhorter than the corolla, inſerted into the calyx; anthers oblong, with four furrows, erect. *Piſt.* Germen inferior; ſtyles four, upright; ſtigmas ſimple, obtuſe. *Peric.* Drupa dry, roundiſh, crowned with the permanent calyx. *Seed.* Nut hard, of four cells, with a kernel in each.

Eſſ. Ch. Calyx deeply four-cleft, ſuperior. Petals four. Drupa dry. Nut of four cells.

1. H. *Cercodia.* (H. alata; Jacq. Ic. Rar. t. 69. Forſt. Prod. 30. Cercodia erecta; Murr. Comm. Goett. for 1780. 3. t. 1. Tetragonia ivæfolia; Linn. Suppl. 257.)—Leaves ovate, ſerrated. Flowers whorled.—Found in New Zealand by ſir Joſeph Banks, who introduced it to the Kew garden in 1772, where it is kept in the greenhouſe, flowering moſt part of the ſummer. The *ſtem* is ſhrubby, branched, erect, about two feet high, ſquare, with rough angles, reddiſh. *Leaves* oppoſite, ſtalked, ſpreading horizontally, about an inch long, ovate, acute, various in breadth, unequally and ſharply ſerrated, light green, roughiſh to the touch, but not hairy. *Stipulas* none. *Flowers* about ſix in a whorl, ſmall, green with a red tinge, pendulous, on ſhort rough reflexed ſtalks. *Fruit* ſmall, ovate, quadrangular. The ſpecific name of *erecta* ought to have been retained for this ſpecies, but we follow Aiton and Willdenow, who followed Medicus.

2. H. *proſtrata.* Forſt Prod. 30. Linn. Suppl. 229.—Leaves obovate, entire. Flowers axillary, ſolitary. Stem decumbent.—Gathered by Forſter in New Caledonia. His own ſpecimen of this, like many other plants, was given to Linnæus by Bæck. The *ſtem* is procumbent, with ſquare, ſmooth, leafy branches. *Leaves* crowded, oppoſite, on ſhort ſtalks, oblong or obovate, ſcarcely an inch in length, pointed, entire, ſomewhat revolute, ſmooth. *Flowers* ſolitary, on ſhort ſtalks, from the boſoms of the upper leaves. *Fruit* ſmall, globoſe, reddiſh.

3. H. *racemoſa.* Billard. Nov. Holl. v. 1. 100. t. 128.—Leaves lanceolate, ſerrated. Flowers in terminal and axillary cluſters.—Native of Lewin's land, on the ſouth coaſt of New Holland, where it was gathered by La Billardiere. *Stem* ſhrubby, ſquare, branched, ſmooth, a foot and half high. *Leaves* an inch and half or two inches long, ſlightly ſtalked, lanceolate, narrow, bluntiſh, with ſhallow ſerratures. *Cluſters* of ſeveral flowers, naked, an inch or more in length, terminal and axillary about the tops of the branches. *Flowers* ſmall, erect. *Fruit* pendulous, quadrangular, properly with four cells, but by abortion often having one only. The *petals* are ſometimes wanting.

4. H. *digyna.* Billard. Nov. Holl. v. 1. 101. t. 129.—Leaves ſcattered, linear, entire. Cluſters leafy, terminal.—From the ſame country as the laſt, with which it agrees in general habit, and from analogy with which the *flowers* are to be deemed racemoſe, as they grow about the extremities of each branch, in great numbers, and about half of them, in the lower part only, are accompanied by leaves. They are ſmall and pendulous, on ſhort ſtalks. The *leaves* are alternate, or ſcattered, the length of the laſt, but very narrow, rather fleſhy, blunt and entire. *Styles* but two. *Fruit* globoſe, without angles.

HALOSACHNE, formed of ἁλς, *ſea*, and ἄχνη, *froth*, in the *Materia Medica of the Ancients*, was a name given to a peculiar ſea-ſalt, made by the evaporation of ſmall quantities of ſea-water on rocks, by the ſun's heat. It no way differed from the common ſea-ſalt in its qualities or properties, except that it did not crackle ſo much in the fire; and this was merely owing to its being compoſed of finer particles, and in form of a ſort of powder, in which ſtate even common ſea-ſalt will no more crepitate in the fire than this. Hill's Hiſt. of Foſſ. p. 386.

Though this, however, was the common appearance of the haloſachne, it was not its univerſal one; for it was found ſometimes concreted on, or embodied in the alcyonia and other marine productions, and then appeared in a harder form.

HALOSANTHOS, of ἁλς, *ſea*, and ἄνθος, *flower*, *flower of ſalt*, was a ſubſtance though commonly ſuppoſed only an efflореſcence of common ſalt, yet really a bituminous matter mixed with ſome particles of ſalt.

It was a tough, viſcous, and fatty ſubſtance, found ſwimming on the waters of ſome ſprings and rivers, and was of a ſoft conſiſtence and of a yellow colour: and the ſame ſubſtance is ſtill found in the ſame places, and that not only yellow, but of various other colours, as blackiſh, green, or blue; theſe it takes up, according to the various earths it has waſhed againſt on the ſhores, or the ſubſtances mixed among it at its original concretion. The deſcription Dioſcorides gives of it is very expreſs; he ſays it was found ſwimming on the waters of the Nile, and ſome lakes, and was of a yellowiſh colour, very ſharp to the taſte, fattiſh, and of an unpleaſant ſmell. This, though that author did not diſtinguiſh to what claſs of foſſils it properly belonged, is enough, however, to teach us what it truly was; and it is ſomething wonderful, that thoſe who have accounted it a ſalt, ſhould not obſerve that the ſame author adds, that it was ſoluble in oil and not in water. Hill's Hiſt. Foſſ. p. 386.

HALS, Francis, in *Biography*, a portrait painter of great celebrity, born at Mechlin in 1584. He was a pupil of C. Van Mander, and ſtudying nature at the ſame time, he obtained great knowledge of the ſtructure of the human frame, as far as he required it in his practice. No man ever ſet the features of a face together with more truth than Frank Hals; or with a readier pencil; and he did it with great truth and ſpirit alſo of colour, as well as of execution. He avoided the laboured mode of finiſh, ſo much admired among his countrymen at the time, and gave his portraits much expreſſion and animation of countenance, particularly of a gay and humorous nature. He was famed for the ſtrong reſemblances his pictures conveyed of their originals.

Vandyke was ſo delighted with his works, that he thought him worthy of attention, and went to Haerlem, where he reſided, for no other purpoſe than to pay him a viſit. He introduced himſelf as a gentleman on his travels, who wiſhed in haſte to have his portrait painted. Hals was hurried from the tavern where he uſually paſſed his leiſure time, ſeized the firſt canvas he could find, and began his labour.

In a ſhort time he had proceeded ſo far, that he aſked Vandyke to look at what he had done, who expreſſed himſelf as very well pleaſed with it, at the ſame time ſaying that he thought ſuch work ſo eaſy, he was perſuaded he could do it himſelf. Taking the palette and pencils he deſired F. Hals to ſit down, and in a quarter of an hour ſhewed him the portrait. The moment he ſaw it he recognized his viſitor, and embraced him with tranſport.

Vandyke endeavoured to prevail upon Hals to accompany him to England, engaging to enrich him; but he was not able to ſucceed; Hals declaring that his happineſs conſiſted in the enjoyment of his friends and his bottle, and while he poſſeſſed theſe he was ſatisfied with his condition.

The talents of Hals would have raiſed him into ſtill more eſteem, if he had known how to give elegance or poliſh to his characters. But his idol was truth, and his repreſentation of it rather too ſevere. He died in 1666, at the age of 82.

Hals, Dirk, a painter of animals, merry-makings, converſations, feaſts, and ſubjects of drollery. He was brother of Frank Hals, to whom however as an artiſt he was far inferior in all the better qualities of art: ſtill his works gained him much reputation, and he practiſed with great ſucceſs till he was 67 years old, when he died in 1656.

Hals, in *Geography*, a town of Bavaria, with a county ſituated on the Iz; 2 miles N. of Paſſau.

HALSFANG. See Healfang and Pillory.

HALSINGLAND, in *Geography*. See Helsingland.

HALSTEAD is a large and populous town in the hundred of Hinkford and county of Eſſex, England, ſituated on the acclivity of a gravelly eminence near the river Colne, and deriving its name from two Saxon words, ſignifying *healthy place*. In Edward the Confeſſor's time it was held by earl Godwin and divers ſokemen and freemen; but it appears to have been divided, on the Conqueſt, among the Norman chiefs, Richard Fitz-Gilbert, earl of Brion; William de Warren, earl of Warren, and afterwards earl of Surrey; and Robert Malet, who had alſo the barony of Aye in Suffolk. The market here was probably eſtabliſhed in the Saxon times, as a hill at the upper end of the town, on which it was held for ſeveral centuries after the Conqueſt, has the name of Cheping Hill. Till the year 1251 it appears to have belonged to the crown; but about that time Henry III. granted it to Abel de St. Martin, who held two knight's fees in Halſtead and Belchamp, of Richard de Clare, earl of Glouceſter and Hertford, who inherited this manor from Richard Fitz-Gilbert. Hugh de Vere, fourth earl of Oxford, indicted Abel de St. Martin for ſetting up a market at Halſtead to his prejudice, as being too near to his own markets at Caſtle Hedingham, and Earl's Colne; but the difference was adjuſted on Abel's conſenting to pay half a mark yearly to the earl, and proving his right to a market at Halſtead, both by preſcription and the king's grant. About this period it appears to have been ſomewhere on the king's highway; but it was now removed to its ancient ſtation on Cheping Hill, where it continued till the reign of Elizabeth, when it was again removed, and fixed in its preſent ſituation, near the centre of the town. The church, dedicated to St. Andrew, is an old building, conſiſting of a nave, chancel, and ſide aiſles, with a tower and ſpire at the weſt end. The ſpire is of wood, and is the third that has been erected on the preſent tower, the two former having been deſtroyed by lightning. The ſecond ſpire was raiſed, in 1717, at the expence of Mr. Samuel Fiſke, an apothecary of this town. A chantry was founded in this church for a maſter and five prieſts, by Bartholomew, lord Bourchier, under a licence obtained from Edward III. in 1340, by Robert Bourchier, earl of Eſſex and lord chancellor of England, who was buried here, and whoſe monument is ſuppoſed to be in the ſouth aiſle, together with another ancient tomb of the Bourchiers, on which are the effigies of a knight croſs-legged, and his lady. The college for the chantry prieſts is yet ſtanding near the middle of the town. Among the charitable benefactions to this town, is a grammar-ſchool, founded in 1594 by dame Mary Ramſey, for 40 poor children; the direction of which ſhe veſted in the governors of Chriſt's Hoſpital, London. Halſtead is 46 miles diſtant from London, has a market on Friday, and two annual fairs. In the year 1801 the number of houſes was 784, of inhabitants 3380, of whom 1654 were returned as employed in trades and manufactures, principally that of baize and ſays, for which this town was formerly much noted. Morant's Hiſtory of Eſſex, two vols. folio.

HALT, in *War*, a pauſe or ſtop in the march of a military body.

Some derive the word from the Latin *halitus*, *breath*, it being a frequent occaſion of halting, to take breath; others from *alto*, becauſe in halts they raiſe their pikes, &c. on end.

Halt, in *Rural Economy*, a ſort of limping or lameneſs that affects different ſorts of animals, and which proceeds from many different cauſes. It ſhould always be carefully attended to on its firſt appearance.

Halt *Foot*, the name of a troubleſome diſeaſe in the feet of ſheep. It has been ſuppoſed to ariſe from different cauſes, but moſt commonly from a vermicular kind of inſect of conſiderable length. Its preſence is indicated by a ſort of limping or lameneſs in the animal, and its being prevented from feeding in a proper manner; alſo, by the ſheep becoming weak and languid, with conſiderable emaciation, in conſequence of the want of ſufficient food, and the exquiſite pain which it ſuffers. This is particularly the caſe when the cauſe of the diſeaſe is not expeditiouſly removed.

Upon the lameneſs being firſt perceived the foot ſhould be very carefully examined, eſpecially in the diviſion between the claws, where an opening is frequently met with, through which it is ſuppoſed the inſect has paſſed, in an upward direction, betwixt the bone and the integuments, or covering. With the intention of removing it, the claws ſhould be wrought gently backwards and forwards, until the inſect is brought out on the ſurface, which is ſuppoſed by ſome a much better practice than that of drawing it out, on account of the danger there is of breaking it in the operation, and the injury that may thereby be done to the foot of the animal. It is likewiſe conceived that very great benefit may be derived from the changing of the ſheep into ſuch paſtures as are dry and firm, both in the prevention and removal of the diſorder, as it is moſtly found to prevail in the damp, moiſt, autumnal, and early ſpring ſeaſons, and where the ſituations are low, moiſt, and marſhy. It however often occurs in other places.

HALTER, in *Rural Economy*, the name of an apparatus of the rope kind, formed for the purpoſe of putting upon the heads of horſes and other animals, in the view of leading or confining them. The head-part is ſometimes formed of rope, but at others of a ſort of narrow hempen web or girth, to which the rope-part is faſtened.

The term is alſo applied to a head-ſtall formed of leather, which is mounted ſometimes with one, and at others two ſtraps, having a ſecond throat-band where the horſe is liable to unhalter himſelf. In this caſe, a long ſtrap of leather is fixed to the head-ſtall in order to ſecure the horſe to the manger by, though ſometimes rope is employed for the purpoſe.

The improved ropes, formed from coarſe wool, are excellent for this uſe, as being both neat and durable, while they ſlide more readily in the rings of the mangers.

Halter *Caſt*, an accident ſometimes occurring to horſes in conſequence of the halters being left too long in tying them to the blocks. An excoriation of the paſtern is frequently produced by this means, which is very troubleſome in its removal. In the intention of preventing accidents of this nature, a ſpring-ſtaple has been contrived for the halter-ring to hang in, and deſcribed in the Tranſactions of the Society of Arts, and which is ſhewn in the annexed plate at *fig.* 1. : *a* is the ſpring paſſing through a mortice in the ſharp of the ſtaple cloſe to the part that is ſcrewed into the manger rail, which, preſſing againſt the lever *b*, keeps it ſhort. By this means the horſe, in pulling downwards, on becoming entangled, overcomes the power of the ſpring, and is thereby enabled to ſet himſelf at liberty.

It is neceſſary that all ſuch horſes, as have the habit of unhaltering themſelves, ſhould have throat-bands to their halters.

For the cure of this, anoint and waſh the place, morning and evening, with equal quantities of linſeed oil and brandy, or vinegar and brandy, well mixed : or, waſh the injured part with lead-water, or weak alum water. If it be much inflamed, apply a poultice, made of turnips boiled till they are tender, and after ſqueezing out the water, let them be chopped with two or three ounces of hog's lard : put this into a cloth and tie the foot in it, and let it remain all night. Accidents of this kind may be often prevented by faſtening a block of wood at the end of the halter.

Halter-*ſtrap* or *ſtring*, a cord or long ſtrap of leather, made faſt to the head-ſtall and to the manger, to tye the horſe.

HALTEREN, in *Geography*, a town of Germany, in the biſhopric of Munſter, ſituated on the Lippe; 20 miles S.W. of Munſter. N. lat. 51° 45′. E. long. 7° 17′.

HALTERISTÆ, in *Antiquity*, a ſort of players at diſcus, ſo denominated from a peculiar kind of diſcus, by the Greeks called ἁλτηρ, and by the Latins *halter*.

Budæus, and others, take the halter to have been a leaden weight or ball, which the vaulters bore in their hands, to ſecure and keep themſelves more ſteady in their leaping. Nor will theſe authors allow of any ſort of halter beſides this weight; nor other halteriſts but theſe vaulters. Others, as Cornarius, Conſtantine, and Portus, will have the halter to be a lump or maſs of lead or ſtone, with an hold or handle fixed to it, by which it might be carried; and that the halteriſtæ were thoſe who exerciſed themſelves in removing thoſe weights from place to place. Theſe authors add, that the weight or ball mentioned by Budæus, was not called ἁλτηρ, *halter*, but ἀλκτηρ, *alcter*, which ſignifies *helper*, *defender*.

Hier. Mercurialis, in his treatiſe De Arte Gymnaſtica, lib. ii. cap. 12. diſtinguiſhed two kinds of halteriſtæ; for though there was but one halter, there were two ways of applying it. The one was to throw or pitch it in a certain manner; the other only to hold it out at arm's end; and in this poſture to give themſelves divers motions, ſwinging the hands backwards and forwards, &c. according to the engraven figures thereof given us by Mercurialis.

The halter was of a cylindrical figure, ſmaller in the middle (where it was held) by one diameter, than at the two ends. It was about a foot long, and there was one for each hand. It was made either of iron, ſtone, or lead. Galen, de Tuend. Valetud. lib. i. lib. v. and lib. vi. ſpeaks of this exerciſe, and ſhews of what uſe it is in purging the body of peccant humours; making it equivalent both to purgation and phlebotomy.

HALTING, among *Farriers*, &c. an irregularity in the motion of a horſe, ariſing from a lameneſs or other injury in the ſhoulder, leg, or foot; which leads him to ſpare the part, or uſe it too timorouſly.

An acquaintance with this diſorder, in its ſeveral circumſtances, is a thing of great extent in the affairs of the manege; for which reaſon we ſhall add the principal points relating to it. If a horſe halts, it is either *before*, in which caſe his complaint lies either in the ſhoulder, the legs, or feet; or *behind*, where it muſt lie in the hip, ham, or the like.

1. The ſigns which indicate it in the ſhoulder, are his not lifting up his leg, but trailing it on the ground, or his caſting one leg more than the other, and with his knee, in a manner, unbent; and, that in turning ſhort he will viſibly favour the leg on the lame ſide. Again, if the ailment be found on the ſhoulder, it muſt either be in the top of the ſhoulder-blade, called the *withers*, which is known by his halting moſt when a perſon is on his back, his ſhrinking much, and offering to bite when griped and handled about the top of the ſhoulder-blade, or in the bottom of the ſhoulder-blade, joining to the marrow-bone, which is the fore-pitch of the breaſt, and is known by his treading his ſteps thick, and ſhrinking, ready to fall down, when preſſed in that part; or in the elbow, which joins the marrow-bone to the leg, which is known by wincing and taking up his foot when pinched there.

2. If the grievance be in the *legs*, it either lies in the knee or paſtern joint, which he diſcovers by refuſing to bow the one or the other, and going ſtiffly on it; or in the *ſhank*, which is diſcovered by ſome ſplint, ſcrew, wind-gall, or other viſible malady thereon.

3. If it be in the *foot*, it is either in the coronet, and owing to ſome ſtrain, or to be diſtinguiſhed by ſome tumour or breaking thereon, or its appearing hot and burning to the touch; or in the *heel*, owing to an over-reach, or the like, and viſible to the eye; as alſo by his treading altogether on his toe; or in the *quarters*, between the middle of the hoof and the heel, which is known by his halting more when on the edge of a bank than when on plain ground. This is ſometimes occaſioned by being pricked with a nail in the ſhoeing; and the faulty nail is diſtinguiſhed by pinching the head of each nail, and the hoof together, with a pair of pincers.

If a horſe halt *behind*, from a diſorder in the hip or huckle-bone, he will go ſide-long, and not follow ſo well with that leg as the other; nor will he turn on that ſide without favouring the leg: add, that he ſhews it more in walking on the ſide of a bank with the worſt leg higheſt.

If a horſe has any hidden infirmity, that will bring him to halt when he comes to travel well, it may be diſcovered by running him in hand on a ſmooth way, at the length of the halter, and obſerving how he ſets down his legs: if he favour none of them, he is to be farther proved, by riding him roundly till heated; then letting him ſtand ſtill an hour, and after that running him in the hand at halter's length as before.

HALTON, in *Geography*, a townſhip and chapelry in the pariſh of Runcorn, and hundred of Bucklow, in the county palatine of Cheſter, was formerly a place of note, and contained a large baronial fortreſs with its uſual appendages. The barony of Halton was given by Hugh Lupus, earl of Cheſter, to his couſin Nigil, who was alſo conſtituted the earl's marſhal. During the protectorate of Cromwell, "the honor, fee, manor, and caſtle of Halton," were diſpoſed of by ſale, but reverted to the crown at the reſtoration. They are now leaſed from the crown to the earl of Cholmondeley. The barons of Halton poſſeſſed very extenſive privileges by grants from the earls of Cheſter: being conſtables of Cheſter, and marſhals; having the ward of the ſtreets of Cheſter during fair time; the liberty of having a caſtle and priſon at Halton; which town was alſo a free borough, with privilege of a weekly market and two fairs; to hold a court for the cognizance of various offences, to have a maſter ſerjeant and eight under ſerjeants, within the fee of Halton; to have the advowries of all ſuch as ſhould put themſelves under their protection; to hold the town of Congleton as a free borough; with ſeveral other inferior privileges. A caſtle was built here ſoon after the Norman conqueſt; it was in ruins in Cromwell's time, but in a ſurvey then made a gate-houſe is deſcribed with five rooms over it; alſo one great hall with two ranges of buildings over it, containing nine rooms and a priſon. The honor of Halton is ſtated to have had juriſdiction over 37 townſhips in this county, and others in Lancaſhire. In this townſhip is Hallwood, the ſeat of ſir Richard Brooke, bart. whoſe father purchaſed it of Robert Newton, eſq. in 1799. This townſhip contained, in the year 1801, 137 houſes and 628 inhabitants. Lyſons's Magna Britannia, vol. ii. 4to. 1810.

HALTWHISTLE, a market town and pariſh in the weſt diviſion of Tynedale-ward, and near the S.W. corner of the county of Northumberland, England, is ſeated on the northern bank of the river Tyne. At a ſhort diſtance north of the town is part of Hadrian's wall, and to the weſt are traces of a Roman road, called the Maiden-way. Several Roman works are found in this part of the county: eaſt of the church is an encampment called Caſtle-banks: about three miles north of the town is Thelwall-caſtle; and another place is called Wall-town. Haltwhiſtle contained 104 houſes in the year 1801, and 453 inhabitants. It has a ſmall weekly market on Tueſdays, and two annual fairs.

HALVAN, or CHAULAN, a town of Africa, in Fez, celebrated for its baths; 10 miles S. of Fez.

HALY-ABBAS, in *Biography*, an Arabian phyſician and philoſopher, who flouriſhed in the latter part of the 10th century, and was held in ſuch high eſtimation on account of his learning, that he obtained the title of *Magus*. About the year 980 he wrote a book, which contains the fulleſt and beſt account, that has been tranſmitted to us, of the ancient Arabian phyſic, and which he intended as a complete ſyſtem of the art, and to ſupply the defects of preceding writers: for he affirmed, that no author had yet appeared, whoſe works were altogether complete; and he ſpecified ſeveral inſtances of failure in thoſe of Hippocrates, Galen, Oribaſius, and Paulus. This treatiſe of Haly-Abbas was entitled "Almaleci," or "The Royal Work," and was dedicated, in very hyperbolical language, according to the cuſtom of the eaſtern nations, to the caliph Adad-Odaula. It was tranſlated into Latin by Stephen of Antioch in 1 27, and was ſtill in great eſtimation in the fifteenth century, when it was printed under the following title; "Regalis Diſpoſitionis Theoricæ Libri decem, et Practicæ Libri decem," Venetiis, 1492, in folio; and afterwards at Lyons in 1515, in folio, and in 1523, 4to. See Freind Hiſt. of Phyſ. Eloy. Dict. Hiſt.

HALYMOTE, properly ſignifies a holy or eccleſiaſtical court. See HALMOTE.

There is a court held in London by this name, before the lord mayor and ſheriffs, for regulating the bakers. It was anciently held on the Sunday next before St. Thomas's day, and for this reaſon called the halymote, or holy court. The title thereof runs thus: "Curia ſancti motus tenta in Guilhalda civitatis Londin. coram major & vicecom. &c."

HALYWERCFOLK anciently ſignified ſuch perſons of the province of Durham as held lands on condition of defending the corpſe of St. Cuthbert; and who hereupon claimed the privilege, not to be forced to go out of the biſhopric either by king or biſhop.

HAM, a Saxon word properly ſignifying a *houſe* or *dwelling-place*.

HAM is alſo uſed to denote a ſtreet or village.

Hence it is that the names of many of our towns end with it; as Notting*ham*, Bucking*ham*, Walſing*ham*, &c.

HAM is alſo a part of the leg of an animal; being the inner or hind part of the knee, or the ply or angle in which the leg and thigh, when bent, incline to each other.

HAM, in *Rural Economy*, formerly a name frequently applied provincially to a ſtinted common, or cow paſture.

HAM, in *Commerce*, &c. is uſed for a leg or thigh of pork, dried, ſeaſoned, and prepared to make it keep, and to give it a briſk agreeable flavour.

Weſtphalia hams, ſo much in vogue, are prepared by ſalting them with ſalt-petre, preſſing them in a preſs eight or ten days, then ſteeping them in juniper water, and drying them by the ſmoke of juniper-wood.

A ham may be ſalted in imitation of thoſe of Weſtphalia, by ſprinkling a ham of young pork with ſalt for one day, in order to fetch out the blood: then wiping it dry, and rubbing it with a mixture of a pound of brown ſugar, a quarter of a pound of ſalt-petre, half a pint of bay ſalt, and three pints of common ſalt, well ſtirred together in an iron pan over the fire till they are moderately hot: let it lie three weeks in this ſalting, and be frequently turned, and then dry it in a chimney.

There are different methods purſued in curing hams in different places, but the practice that is the moſt ready and certain, has not yet been ſhewn by any well-conducted ſet of experiments upon the ſubject. In thoſe diſtricts which are the moſt celebrated for the making of good hams, the buſineſs is performed by firſt rubbing them very hard with ſome bay or other ſalt, but moſt commonly the former; then letting them remain ſome time upon a ſtone-bench, in order that the brine may drain away and diſcharge itſelf. But on the contrary, in other caſes, they are covered up quite cloſe. After the lapſe of a few days, however, (whatever method has been at firſt followed,) they are again rubbed as hard as before, with the ſame kind of ſalt, in mixture with about half an ounce of ſaltpetre to each ham. They are then continued about a week longer on the bench, or in the ſalting tub among the brine, when they are ſuppoſed ready to hang up to dry, which is often done on the ſides of large open chimneys, it being the practice with ſome to have them ſmoked by means of expoſure to the ſmoke of peat, coal, or ſome other ſort of fuel, while others cautiouſly avoid having them ſmoked at all.

Where they are not diſpoſed of before, they are uſually kept in theſe ſituations until the warm weather begins to ſet in, when they are packed up in caſks with ſtraw, or the ſeeds of oatmeal, and ſent to the market to be ſold.

The Survey of the County of Weſtmoreland ſtates the loſs in the weight of hams by drying to be ſo great as 20 per cent, but we can hardly ſuppoſe it to be quite ſo much, though it muſt evidently be very conſiderable, and ſhould not by any means be overlooked by the farmer or ſalter who cures any great number of pigs. The former ſhould indeed carefully weigh it before he enters upon the practice in any extenſive manner.

Ham, in *Scripture Biography*, the youngeſt ſon of Noah, who having indecently expoſed the nakedneſs of his father, was curſed by the patriarch in the line of Canaan and his poſterity. (See Canaan.) In conſequence of this irreverent act on the part of Ham, ſome have fancifully conjectured, that not only Ham and Canaan, but all their poſterity, became ſlaves, and the colour of their ſkin was ſuddenly rendered black; and accordingly they maintain, that all the blacks have deſcended from Ham and Canaan. Others have conſidered Ham as the introducer of wickedneſs after the flood, and they charge him with a variety of enormities and abominations. They ſuppoſe that he and his poſterity were principally concerned in the building of Babel, that they ſuggeſted the deſign, and formed the preſumptuous project. He is alſo repreſented as the firſt propagator of idolatry after the flood, and the inventor of magic and other ſimilar ſuperſtitions. Ham was the father of Cuſh, Mizraim, Phut, and Canaan: and it has been ſuppoſed that he peopled Africa, and that he dwelt in Egypt, the moſt fruitful part of this country. Africa is called the land of Ham in ſeveral paſſages of the Pſalms. Some have believed that Hammon, adored in Egypt and Lybia, was Ham, the ſon of Noah. But M. Baſnage is of opinion, that neither Ham nor Mizraim was ever in Egypt, but that their poſterity ſettled in this country, and called it by the name of their anceſtor. And as to Ham's being worſhipped as a god, and called Jupiter Ammon, he thinks that this is a miſtake occaſioned by ſimilitude of names, and that Jupiter Ammon was the ſun, to which divine honours have been paid at all times in Egypt.

Ham, in *Geography*, the name of two pariſhes of Eſſex, England, reſpectively called Eaſt and Weſt, from their relative ſituations to each other. Both are in the hundred of Becontree, and are ſeated in a flat marſhy tract of land, between the rivers Lee and Thames, to the S. E. of London. Eaſtham contained, in the year 1801, 159 houſes and 1065 inhabitants. About one mile from the church is Greenſtreet houſe, an ancient manſion, which progreſſively belonged to the Nevils, Holcrofts, Garrards, and Morleys. In the church is an old monument, with effigies of Edmund Neville, earl of Weſtmoreland, and his lady. The church contains ſome other monuments, and the ſouth wall of the chancel has ſome Saxon arches. This pariſh conſiſts of about 2000 acres of land; of which 900 are marſh, about 60 upland paſture, and the remainder arable; the greater part of the latter is uſually planted with potatoes, cabbages, and other vegetables. Weſt Ham pariſh contains 4500 acres of land, of which 1970 are arable, the remainder meadow and marſh. Here were formerly a weekly market and an annual fair, the charter for which was procured in 1253. In this pariſh was an abbey called Stratford Langthorne, founded in the year 1135, for monks of the Ciſtercian order. The abbey buildings were contiguous to the pariſh church, but nearly the whole have been deſtroyed and removed. The pariſh church, a large edifice, contains ſeveral monuments, ſome of which are fine and curious. In this pariſh are ſome water-works, which were eſtabliſhed in the year 1745, and are worked by a ſteam engine. Lyſons's Environs of London, vol. iv. p. 245, &c.

Ham, a town of France, in the department of the Somme, and chief place of a canton, in the diſtrict of Peronne, ſituated on the Somme. The place contains 1544, and the canton 9382 inhabitants, on a territory of 132½ kiliometres, in 21 communes. N. lat. 50° 11′. E. long. 3° 9′.

Ham *Bluff*, a cape at the W. extremity of the iſland of Santa Cruz, in the Weſt Indies. N. lat. 17° 51′. W. long. 63° 34′.

HAMADA, a town of Arabia, in the province of Yemen; 24 miles S.E. of Chamir.

HAMADAN. See Amadan.

HAMADRYADES, formed of ἁμα, *together*, and δρυας, *dryad*, of δρυς, *oak*, in *Antiquity*, certain fabulous deities revered among the ancient heathens, and believed to preſide over woods and foreſts, and to be encloſed under the bark of oaks.

The Hamadryades, ἁμαδρυαδες, were ſuppoſed to live, and die with the trees to which they were attached; as is obſerved by Servius on Virgil, Eclog. x. ver. 62, after Mneſimachus, the ſcholiaſt of Apollonius, &c. who mentions other traditions relating to this ſubject.

The poets, however, frequently confound the Hamadryades with the Naiads, Napææ, and rural nymphs in general: witneſs Catullus, Carm. lxviii. ver. 23. Ovid. Faſt. iv. 229. Met. i. ver. 695. xiv. ver. 628. Propertius, Eleg. xx. 32. Virg. Ecl. x. ver. 64. Georg. iv. ver. 382, 383.

Feſtus calls them *Querquetulanæ*, as being iſſued or ſprung from oaks.

An ancient poet, Pherenicus, in Athenæus, lib. iii. calls the vine, fig-tree, and other fruit trees, hamadryades, from the name of their mother the oak.

This common idea among the ancients, of nymphs or intellectual beings annexed to trees, will account for their worſhipping of trees; as we find they did, not only from their poets but their hiſtorians. Livy ſpeaks of an ambaſſador's addreſſing himſelf to an old oak, as to an intelligent perſon and a divinity. Lib. iii. § 25.

HAMADRYAS, in *Botany*, ſo named by Commerſon, from ἅμα, *accompanying*, and δρυος, *a grove*; becauſe it inhabits woods or ſhady places. The word, though at firſt ſight appearing to be compounded of another generic name, (ſee Dryas,) is not really ſo, and therefore not exceptionable. Juſſ. 232. Lamarck. Dict. v. 3. 67.—Claſs and order, *Dioecia Polyandria*. Nat. Ord. *Multiſiliquæ*, Linn. *Ranunculaceæ*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth of five or ſix ovate, pointed, concave, deciduous leaves. *Cor.* Petals ten or twelve, linear, acute, ſpreading, twice as long as the calyx, without any nectariferous pore at their baſe. *Stam.* Filaments numerous, ſhorter than the calyx, thread-ſhaped; anthers vertical, elliptical, obtuſe, thick-edged, of two marginal cells.

Female, *Cal.* and *Cor.* as in the male. *Piſt.* Germens ſuperior, numerous, collected into an ovate head; ſtyles none; ſtigmas ſimple, ſlightly reflexed. *Peric.* none. *Receptacle* roundiſh. *Seeds* numerous, ovate, compreſſed, hooked at the point.

Eſſ. Ch. Male, Calyx of five or ſix leaves. Petals twice as many, linear, deſtitute of a nectary. Stamens about fifty.

Female, Cal. and Cor. as in the male. Germens collected into a head. Stigma ſimple. Seeds naked.

1. H. *magellanica.* Lamarck. Gathered by Commerſon in the ſtraits of Magellan. Mr. Menzies found the ſame in February, 1787, half way up the mountains at Staten land. The *root* is perennial, conſiſting of long ſtraight fibres, as in other plants of this natural family. *Stem* none. *Leaves* few, radical, erect, deeply divided into three parts, which are more or leſs lobed and cut; ſmooth above; downy or cottony beneath. *Footſtalks* three or four inches long, being twice or thrice the length of the leaf, ſtout, downy, dilated and ſheathing at their baſe. *Flower-ſtalk* ſolitary, rather taller than the leaves, naked, ſimple, very cottony in the upper part. *Flowers* few, denſely ſpiked, pale green or yellowiſh, about half an inch in diameter, the males feweſt, on a more ſlender ſtalk; females about four or five in the ſpike, from a different plant. We have not ſeen the ripe fruit, but there is every appearance of its being as above deſcribed.

The flowers, except their being dioecious, and the general habit, though herbaceous, of this plant, bear much reſemblance to the *Knowltonia* of Saliſbury and Sims, Curt. Mag. t. 775, which is *Anamenia* of Ventenat, Jard. de la Malm. t. 22, *Adonis capenſis, veſicatoria* and *filia* of Linnæus, but the fruit of the latter genus is a berry or drupa, and the ſtigmas are accompanied by ſtyles.—The *Hamadryas* either varies in the number of ſegments, and degree of downineſs, of its leaves, perhaps according to its degree of elevation above the ſea, or Mr. Menzies' is another ſpecies, its leaves being much leſs cut than in Commerſon's ſpecimens, and very woolly. We are, however, hence inclined to aſſent to Mr. Saliſbury's idea, that the above *Knowltoniæ* are rather varieties than ſpecies, for they all differ from each other much in the ſame manner.

HAMADRYAS, in *Zoology*, the name given by Linnæus to an animal of the baboon tribe. See SIMIA.

HAMAH, or HAMA, in *Geography*, a town of Syria, ſituated in a narrow valley, on the banks of the Orontes, containing about 4000 inhabitants, and poſſeſſing ſome trade, from its ſituation on the road from Aleppo to Tripoli. This town is celebrated for its water-works; the wheels are the largeſt in that country, being 32 feet in diameter, and to the circumference are faſtened troughs, ſo diſpoſed as to fall in the river, and when they reach the vertex of the wheel, the water is diſcharged into a reſervoir, whence it is conveyed by conduits to the public and private baths. The gardens of Hamah are pleaſant and productive; and the ſoil in the adjacent country is well adapted to wheat and cotton; but agriculture, expoſed to the rapine of the Motſallam and the Arabs, is in a very languiſhing condition. The chiefs or ſcheiks of Hamah are very famous, as they are deſcended from Mahomet. Abulfeda, the great Arabian hiſtorian and geographer, was prince of Hamah about the year 1345, and he reigned three years, the ſovereign power being in his family. The Maronites built a chapel and a tomb in this place, whence ſoon aroſe a convent, very celebrated in that part of Syria; 62 miles S.S.W. of Aleppo. N. lat. 34 45'. E. long. 37° 10'.

HAMAM, a town of Africa, in the eaſtern province of Algiers, celebrated for its baths, anciently called "Aquæ Tibilitanæ;" 45 miles E. of Conſtantina.

HAMAMELIS, in *Botany*, ἁμαμηλις, an ancient Greek name from ἁμα, *accompanying*, and μηλεα, or μηλις, an *apple-tree*, becauſe the plant which bore it bloſſomed at the ſame ſeaſon, and is ſuppoſed by modern botaniſts to have been the *Meſpilus Amelanchier*, or ſomething near it. Linnæus choſe this now unoccupied name for a new American ſhrub, which Mitchell had called *Trilopus*, in his letters. The reaſon of its application in the preſent inſtance ſeems to be, that as the fruit is a whole year in ripening, it accompanies the flowers in autumn, which are deſtined to produce the next year's fruit.—Linn. Gen. 66. Schreb. 90. Willd. Sp. Pl. v. 1. 701. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. ed. 2. v. 1. 275. Juſſ. 238. Lamarck. Illuſtr. t. 88.—Claſs and order, *Tetrandria Digynia*. Nat. Ord. *Amentaceæ*, Linn. *Berberides*, Juſſ.

Gen. Ch. *Cal.* Perianth double, permanent, inferior; the outer of two roundiſh ſmaller leaves; inner of four erect, ovate-oblong, obtuſe, equal leaves. *Cor.* Petals four, linear, equal, very long, obtuſe, reflexed. Nectary of four truncated ſcales, attached to the petals. *Stam.* Filaments four, linear, alternate with the petals, ſhorter than the calyx; anthers vertical, elliptical, of two cells, each opening by a valve. *Piſt.* Germen ſuperior, ovate, villous; ſtyles two, the length of the ſtamens; ſtigmas capitate. *Peric.* Capſule coriaceous, ſupported by the baſe of the calyx, ovate, two-horned, with two cells, and two valves. *Seeds* ſolitary, oblong, poliſhed.

Eſſ. Ch. Calyx double; the outer of two, inner of four leaves, inferior. Petals four, with a nectariferous ſcale to each. Anthers with two lateral valves. Capſule of two cells. Seeds ſolitary.

Obſ. The paradoxical remarks on this plant in *Linn. Mant.* 333, aroſe from the author having confounded with it the *Fothergilla*, ſee that article, which circumſtance the younger Linnæus overlooked when he deſcribed the latter in his *Supplementum*, or he doubtleſs would have explained the matter. What is in the *Mantiſſa* termed the Carolina monoecious kind, is *Fothergilla*, the likeneſs of whoſe leaves to *Hamamelis* cauſed the miſtake. Willdenow and Reichard copy theſe remarks, and Schreber copies the laſt-named writer, as if his obſervation had been original. Dr. Garden was well aware of the differences between theſe genera, and intended to have called the *Fothergilla* by a name alluding to the other, *Anamelis*.

The only ſpecies is,

1. H. *virginiana.* Linn. Sp. Pl. 180. Mill. Illuſtr. t. 10. (Hamamelis; Du Hamel. Arb. 287. t. 288. Gron. Virg. 22.)—Native of Virginia and Carolina, where it is called, according to Clayton, Witch-Hazel, a name corrupted from Wych-Hazel, and applied, we preſume, on account of ſome reſemblance to the Elm, ſo denominated in England. The *leaves* however, and aſpect of the plant, more reſemble the Hazle-nut, or ſtill more the Alder. The *flowers* are in little axillary bunches, with downy ſtalks, bracteas, and calyx, their petals long, whitiſh and conſpicuous. They come out late in autumn, or early in ſpring, before the leaves, and the *capſules*, which are ſhaped ſomewhat like a mitre, ſcarcely half an inch long, are not perfected till the following ſummer. Linnæus's remark, that the flowers are polygamous, ſeems correct, and probably that circumſtance is owing to the caſual imperfection of one or other of their organs, from the precarious ſeaſon of their coming forth; yet hence Walter has made three different ſpecies in his *Flora Caroliniana*, 255, but Willdenow judiciouſly declined adopting theſe.

HAMAM-ET, in *Geography*, a ſea-port town of Africa, in the kingdom of Tunis, on the E. coaſt, in a bay or gulf of the Mediterranean, to which it gives name. The pillars, the blocks of marble, and other tokens of antiquity which are found in this place, were brought from the neighbouring ruins of Caſſir Aſcite, the "Civitas Siagitana" of the ancients. The name is derived from the Hamam, or wild pigeons, that copiouſly breed in the adjacent cliffs; 30 miles S. of Tunis. N. lat. 36° 13′. E. long. 10° 38′.

HAMAPATLI, a town of Hindooſtan, in the province of Madura; 17 miles W. of Madura.

HAMAPEL, a town of Hindooſtan, in the Carnatic; 14 miles E. of Tanjore.

HAMARA, a town of Greater Bucharia; 30 miles E. of Saganien.

HAMATH, in *Ancient Geography*, a celebrated city of Syria, ſuppoſed to be *Emeſa*, on the Orontes, and now called *Homs*. See Emesa.

HAMAXOBII, Hamaxobians, in *Ancient Geography*, a people who had no houſes, but lived in carriages.

The word is formed from αμαξα, a *carriage* or *chariot*, and βιος, life.

The Hamaxobii, called alſo *Hamaxobitæ*, were an ancient people of Sarmatia Europæa, inhabiting the ſouthern part of Muſcovy, who, inſtead of houſes, had a ſort of tents made of leather, and fixed on carriages, to be ready for ſhifting and travel.

HAMAZAN, in *Geography*, a town of Abyſſinia; 40 miles W. of Arkeeko.

HAMBATO, an aſſiento, or department, in the juriſdiction of Riobamba, in the province of Quito, ſituated in S. lat. 1° 41′ 40″, and 22′ W. of the city of Quito. In 1523 it was an Indian town, and in the following year marſhal Diego de Almagro laid the foundation of the preſent town. It ſtands on a very large plain, ſurrounded by mountains, particularly on the N. ſide, which is bounded by Chimborazo, from the foot of which it is at no great diſtance. On the S. ſide is a lake, called "Colta," about a league in length and three quarters of a league in breadth, where are a great number of wild geeſe and gallaretas; and its banks are covered with plantations. The principal ſquare and ſtreets are regular, ſtraight, and airy; the houſes, built of a light ſtone, are low, on account of the earthquakes. The Indians, who inhabited this place, were, before their converſion to Chriſtianity, known by the name of Puruayes, and are to this day diſtinguiſhed from all the other Indians in the whole province. It has two churches, ſeveral convents, a nunnery, and a hoſpital, in a ruined ſtate. On the W. ſide of the aſſiento is a river, cut into ſmall trenches, for watering the adjoining fields, which are thus rendered ſo fertile, that they produce corn through the whole year. The inhabitants amount to between 16 and 20 thouſand. The magiſtrates are regidores, who are always perſons of the firſt diſtinction. The air is colder here than at Quito, on account of its vicinity to the mountain of Chimborazo; the uncomfortable ſeaſon laſts from December to June, the N. and N.W. winds then principally prevailing; but it is free from the violent tempeſts that are common at Quito. Here are many conſiderable plantations and farms; and in the number and ſize of its manufactories, it ſurpaſſes every other part of this province. The Indians are much employed in weaving, particularly thoſe of the village of Guano, who are famous for their manufacture of worſted ſtockings, being amply ſupplied with wool, from the ſheep which abound in this juriſdiction. The ſoil is very fertile, producing plenty of grain and pulſe. The inhabitants, in their manners and cuſtoms, reſemble thoſe of Quito. This department includes ſix villages.

HAMBERGER, George Edward, in *Biography*, profeſſor of chemiſtry and of the practice of medicine in the univerſity of Jena, was born in that city on the 21ſt of December 1697, his father being profeſſor of mathematics in the ſame univerſity. From his earlieſt years he had evinced a diſpoſition to the ſtudy of anatomy, and was accuſtomed to ſteal from his parents, who deſtined him for the church, to attend the lectures of Slevoigt on that ſubject. After the death of his father, he relinquiſhed even the ſtudy of the mathematics, to which he had applied himſelf during ſeveral years, and gave up his attention excluſively to medical purſuits. In 1721 he took the degree of M.D., and in 1726 was appointed profeſſor; and he held the chair of the practice of medicine at the time of his death, which occurred on the 22d of June 1755.

Hamberger is entitled to the merit of having illuſtrated phyſiology by the doctrines of philoſophy, and of having rendered both more popular than they had ever before been in Germany; but in the diſpute with the celebrated Haller, in which the publication of his hypotheſis concerning reſpiration involved him, and which was carried on with conſiderable aſperity, he was altogether in error; he lived long enough, indeed, to be convinced of the weakneſs of his hypotheſis, which he avowed to his friends. It was contained in a diſſertation, "De Reſpirationis mechaniſmo et uſu genuino," publiſhed in 1727, and conſiſted of a ſuppoſition, that there was a quantity of air within the cavity of the pleura, as a counterbalance to the air taken in by reſpiration. He alſo aſſerted that the internal intercoſtal muſcles were employed to depreſs the ribs, and the external to elevate them. His other works are, "Elementa Phyſices, Methodo Mathematica in uſum Auditorum conſcripta," Jenæ 1727, 8vo. cum fig.—"Diſputatio de Venæſectione, quatenus Motum Sanguinis mutat," ibid. 1729.—"Diſſertation ſur la Mechanique des Secretions dans le Corps Humain," Bourdeaux, 1746. This diſſertation obtained a prize from the academy of that city. We omit ſeveral tracts publiſhed between 1744 and 1754, in continuation of the Hallerian controverſy, and have only to notice his "Phyſiologia Medica, ſeu de Actionibus Corporis Humani Sani Doctrina," Jenæ 1751, 4to. cum fig.—"Elementa Phyſiologiæ Medicæ, &c." 1757, an abridgment of the preceding for ſtudents; and "Methodus Medendi Morbos, cum præfatione de præſtantia Theoriæ Hambergeri, præ ceteris," ibid. 1763, publiſhed by profeſſor Baldinger. Eloy. Dict. Gen. Biog.

HAMBOIS, *Dr.* John, is ſaid to have poſſeſſed a conſiderable ſhare of learning in all the arts, and to have been no contemptible mathematician, but his biographers add, that muſic held the firſt place among all his ſtudies. It is related of him likewiſe, that he was remarkable for a fertile fancy, and a humour of a peculiar kind; and Pits, taking his ideas of muſical compoſition from a later period, tells us, that his knowledge in harmony, in the combination of concords, and preparation and reſolution of diſcords, was ſuch as no other perſon of his own age and nation poſſeſſed. To theſe talents, Hambois is allowed to have joined a great knowledge in the Latin tongue, in which he wrote a tract, entitled "Summum Artis Muſices;" and "Cantionum Artificialium diverſi generis," &c. Tanner was of opinion that this muſical treatiſe was the ſame as that in the Bodleian library, Digby 90, "De Quatuor Principalibus Muſicæ;" but that is proved to be the property of another. See Simon Turnstede.

Whether Hambois was a member of the univerſity of Oxford

ford or Cambridge does not appear, nor indeed is it preciſely known at what time he received his diploma.

In Hollinſhed's Chronicle, p. 1355, there is an enumeration of the moſt eminent men of learning in the reign of Edward IV. among whom the author includes John Hambois, "an excellent muſician," adding, that "for his notable cunning therein, he was made a Doctor of Muſic."

HAMBURGH, in *Geography*, a free imperial city of Germany, and one of the three cities of the Hanſeatic league (ſee Hanse-*towns*), and, next to Vienna and Berlin, the moſt conſiderable in Germany, is ſituated in the circle of Lower Saxony, and in that part of Holſtein which is called "Stormar," on the rivers Elbe, Alſter, and Bille, about 60 miles from the influx of the Elbe into the ocean. The Elbe is here, including the iſlands, near a mile broad; and, on the other ſide of the city, the Alſter forms a baſon, about 1000 feet long, which is chiefly uſed by parties of pleaſure, being furniſhed with a number of boats for their accommodation. Near this baſon is a large broad place called the "Jung farnſteig," or Ladies walk, planted with rows of trees, and branching out into three diſtinct pleaſant walks; and oppoſite to the Alſter are ſome of the beſt houſes in the city, which afford a charming proſpect. The Elbe, beſides forming two ſpacious harbours, runs through moſt parts of the city in canals, which being generally broad and deep, are very convenient for the merchants, whoſe houſes are ſituated near them. The tide alſo contributes to their additional convenience by ebbing and flowing in theſe canals, as well as in the river itſelf, twice a day; though it is ſometimes productive of inundations, which fill the lower buildings and cellars with water. The bridges that croſs theſe canals are not fewer in number than 84; but many of them, forming the continuations of ſtreets, and on the ſame level with them, are not viſible. The city is divided into the *old*, which is the largeſt, the moſt crowded, and the moſt convenient for buſineſs, and the *new*, by one of the beſt ſtreets in Hamburgh, called the "Neue-wall." There are ſome other ſtreets, which are ſpacious and of good appearance; but the ſtreets and lanes are for the moſt part narrow and dirty, and very much crowded with inhabitants, the extent of the city being by no means proportionate to its inhabitants. The houſes have no external elegance to recommend them, and within, whatever recommendations they may afford, the admiſſion of light is obſtructed by the awkward diſpoſition of their ſtair-caſes. This city was fortified by Charlemagne, A.D. 808. But the fortifications are conſtructed in the old Dutch taſte, with ſpacious ramparts, planted with trees, the circuit of which is about an eaſy two hours' walk, or, as ſome eſtimate them, about three miles. Theſe ramparts are lofty and ſo broad, that ſeveral carriages may go abreaſt; the moats are deep and wide. The number of baſtions round the town is 24, beſides ſome out-works; particularly thoſe called the "Sternchanze" and the "Neuewerk;" the latter is merely a line regularly fortified, and encloſing the ſtreets, houſes, and gardens, called by ſome the "Neuenwerk," or the "Suburb of St. George." The "*Hamburgh-Berg*" is a high land on the bank of the Elbe, between Hamburgh and Altona, and properly a ſuburb of the city. This ſuburb extends to Altona, and conſiſts of a range of houſes, with different docks, large warehouſes for the manufacture of tar and whale oil, a hemp-magazine, a church, and an hoſpital for idiots and lunatics. The city has four principal gates, two ſmaller, and two water gates, called the "Upper" and "Lower Baum." All ſhips that go to or come from the ſea, paſs through the latter of theſe gates. The city-gates are ſhut in winter from the hour of four to eight, and in ſummer from ſeven to ten, and when once ſhut, they are never opened on any account till morning. As ſoon as the gates open in the morning, a multitude of boats and ſmall barks appear, which are loaded with milk, fruit, and all kinds of proviſions; and thus the markets are plentifully ſupplied chiefly from Hanover and Holſtein; but proviſions of every kind are dear. Thoſe who will take the trouble to riſe early and go to the banks of the Elbe, about two miles from the town, will obtain every article brought from Hanover and Holſtein at leſs than half the price which it will fetch in the markets. To thoſe who amuſe themſelves with this walk, the harbour of the Elbe exhibits a rich and varying proſpect of veſſels of every ſize, ſailing up and down the river, and occupied in bringing proviſions into the city or carrying back the produce. The public buildings at Hamburgh are the following churches; *viz.* St. Peter's near the Alſter, St. Nicholas, St. Catharine's, St. Michael's, the Dome church, in which a fair is held for eight days preceding Chriſtmas, and Johannes church, the Engliſh chapel, near the Exchange, in which ſervice is performed every Sunday by an Engliſh clergyman. The palace of the imperial miniſter in the "Neue Wall" is a grand and beautiful building, and within it is a very neat Catholic chapel. In Admiralty ſtreet is a houſe for orphans, and an armoury. The city has alſo ſeveral hoſpitals and ſchools. In the Lombard, or town-pledge houſe, money is advanced on every kind of merchandize, without the intervention of a broker. The ſenate-houſe ſtands in the centre of the city, near the Exchange, and is joined by the Bank. Over the Exchange is the "Borſenſaal," or Auction-room, where goods of every kind are daily brought to be ſold from every quarter of the world. Hamburgh abounds alſo with hotels and taverns; and it has alſo a French and German theatre. The principal amuſements of Hamburgh are muſic and dancing, card playing and billiards; in winter, riding upon ſledges richly ornamented; and in ſummer, walking or riding to public gardens in the environs of the town. Hamburgh has been ſuppoſed to contain 100,000 inhabitants, or, according to the ſtatement of Hoeck, 95,000, the principal of whom are opulent merchants; and many are foreigners and Jews. The government is ariſtocratic, and conſiſts of a ſenate of 37 perſons. Lutheraniſm is the eſtabliſhed religion of the city, and the number of clergy, including thoſe of the dependent territories, amount to 53. And though no other public exerciſe of religion is tolerated here, Calviniſts and Papiſts may have an opportunity of attending worſhip at the chapels of the envoys of the emperor and other ſovereigns, who reſide in the city. Hamburgh has been uſually reckoned the third commercial city in Europe; and it is undoubtedly the firſt in Germany. Formerly the principal occupation of the inhabitants conſiſted in brewing and the cloth manufacture; but at preſent the principal manufacture is the ſugar-refinery, for which Hamburgh has long been famous. The cotton, ſtocking, gold thread, ribbon, and velvet manufactures of this place have been held in high eſtimation. The moſt conſiderable branches of its commerce have been linens, woollens, wine, ſugar, coffee, ſpiceries, metals, tobacco, timber, leather, corn, dried fiſh, furs, &c.; and of late it has been the great mart of the Britiſh iſles with the continent. Great quantities of all kinds of Britiſh goods have paſſed from hence to the different fairs, which are held three times every year at Frankfort on the Mayn, Frankfort on the Oder, Leipſic, and Brunſwick. The merchants of Hamburgh have been in the habit of deriving great benefit from the ſpecie bank, founded in 1619: this city has no paper-money except the bills of exchange that paſs between individuals; the ſilver, not wanted for daily uſe, is depoſited in the cellars of the bank, ſecured with iron bars. The plan of this bank is ſaid to be very ſimple, and, on that account, commended. Each burgher has a right by inheritance to his folio on its books, in which the ſum is put down, that is at the ſame time depoſited in bars of pure ſilver. The amount of the ſum depoſited is ſet down in the folio; if there are 10,000 marks in the name of one perſon upon one folio, and as much upon another, and one pays 8000 marks to the other, the folio of the perſon paying is altered to that of 2000 marks, and that of the perſon paid to that of 18,000; this is called "writing off," and the ſame ſum remains in the bank, although ſtanding in conſequence of transfers, in different names. All marks here are called "marks banco," and average the value of 20*d.* Engliſh. Nothing is paid in but bullion or pure ſilver and gold, and it never diſcounts. In conſequence of this arrangement there can be no forgeries; no transfer can be made by bill, *i. e.* the party paying muſt attend in perſon; if ill and confined, he is attended by a clerk from the bank, if abroad, he muſt ſend a power of attorney, and the perſon receiving ſuch power, muſt be previouſly identified, before he can touch a ſhilling.

There is another part of the bank, where money may be paid in, and received back again, on drafts, as in the caſe of common bankers. The bank of Hamburgh has been regarded as one of the ſafeſt in Europe. The principal gold-coins in uſe here are the ducats, the Louis, and the Frederic d'or: the Daniſh ducat paſſes for 3*s.* The Engliſh and Dutch for 10*s.*; the Louis and Frederic d'or for 18*s.* The principal ſilver money is the two-mark piece, 2*s.* 3*d.* Engliſh, and the dollar, commonly called a ſpecie, which is 3 marks, 12 ſtivers, or 5*d.* Of ſilver money Hamburgh coins very large quantities. In Hamburgh there are numerous libraries, which do honour to the literary taſte of its inhabitants. The chief dependencies of this city are the river Alſter, the bailliage of Ham, ſome iſles and low-lands on the Elbe; and, beſides ſome diſtricts acquired from Holſtein, the bailliage of Ritzebuttel, on the N. of the duchy of Bremen, including the port of Cuxhaven, and the iſle called Neuewerk, ſituated oppoſite to that port. Towards the latter end of the year 1806, Hamburg was taken by the French. N. lat. 53° 36′. E. long. 9° 56′.

Hamburgh has long been remarkably active in the cultivation of muſical dramas or operas, and it ſeems by Mattheſon's liſt of them, in his Muſical Patriot, that the operas performed there, during the latter end of the 17th century, and the beginning of the laſt, exceeded in number thoſe of every other city in the German empire.

The firſt muſical drama, to be found in the annals of the Hamburgh ſtage, is "Orontes," ſet by the chapel-maſter, Theil, 1678; but this, and moſt of the operas performed here till the beginning of the preſent century, were in the German language.

The compoſitions of Keiſer, Mattheſon, Handel, and Telemann, who all began their career in this city, are the moſt renowned. See the biographical articles for theſe compoſers, in their ſeveral places.

A liſt of the numerous operas that were performed at Hamburgh after 1678, is recorded in Marpurg's Hiſtorical and Critical Eſſays on Muſical Subjects.

The principal compoſers of theſe early attempts at operas, during the latter part of the 17th century, were Strunck, Franck, Förtſch, Conradi, and Couſſer, who afterwards came to England, where he obtained the place of compoſer and maſter of the ſtate band of muſic in Ireland. In 1694, Keiſer, Brenner, and Krieger began to compoſe for the Hamburgh theatre, and in 1696 the operas of the celebrated Abate Steffani, which he had ſet in Italian for the court of Hanover, began to be tranſlated and performed in the German language at Hamburgh, except the airs, which were uſually ſung in Italian. This cuſtom prevailed in ſeveral parts of Germany ſo late as the year 1733, when Graun ſet his opera of "Pharao," the "Gianguir" of Apoſtolo Zeno, for the theatre at Brunſwic, of which only the recitatives were tranſlated into German, while the airs were ſet and ſung in their original language. See Graun.

In the beginning of the laſt century, according to Riccoboni, (General Hiſt. of the Stage,) the performers in the German operas at Hamburgh "were all tradeſmen or handicrafts; when your ſhoe-maker was often the firſt performer on the ſtage; and you might have bought fruit and ſweetmeats of the ſame girls whom the night before you ſaw in the character of Armida or Semiramis." This may, perhaps, have been literally true in the infancy of the muſical drama in that city; and even later, ſome of the under-characters may have been filled in the manner mentioned by Riccoboni; but afterwards, it is known that Mattheſon was many years a performer in thoſe operas; and the celebrated compoſer Haſſe, before he went to Italy, was a tenor ſinger on the Hamburg ſtage, in the operas of Keiſer. Life of Graun.

The celebrated Telemann, who ſucceeded Keiſer as muſic director in 1739, and died in 1767, in the 86th year of his age, was ſucceeded by the admirable Carl. Phil. Emanuel Bach, the greateſt muſician of his time, who died at above 80, in 1788.

Hamburg, a ſmall poſt-town of America, in New Jerſey, 18 miles from Goſhen in New York.—Alſo, a handſome poſt-town, in Berke's county, Pennſylvania, on the E. ſide of Schuylkill, containing about 50 or 60 houſes, and a church for united Germans, Lutherans and Calviniſts; 70 miles N.N.W. from Philadelphia. N. lat. 40° 34′. W. long. 76°.

HAMBURGHER's Bay, a bay on the W. coaſt of Spitzbergen. N. lat. 79° 23′. E. long. 9° 15′.

HAMDEN, a town in Hancock county, and ſtate of Maine, on the W. ſide of Penobſcot river, which is navigable to this town for veſſels of any ſize. This town has conſiderable trade; about 40 miles N.E. from Wincaſſet.—Alſo, a townſhip in New Haven county, Connecticut, about 8 miles N. of New Haven; containing 1482 inhabitants.

HAME-Trees, in *Rural Economy*, a term provincially employed to ſignify the hames of team horſes.

HAMED, El, in *Geography*, a town of Egypt; 4 miles S. of Roſetta.

HAMEESE, a town of Algiers, 8 miles W.N.W. of Teffiſh; whence proceeds a river of the ſame name.

HAMEL du Monceau, Henry Lewis du, in *Biography*, an eminent French writer on rural economy and vegetable phyſiology, was born at Paris in 1700. Being a member of the *Academie des Sciences*, he publiſhed in the memoirs of that body, in 1728, his firſt economical eſſay, on a kind of Paraſitical Fungus, which infeſts the roots of the Cultivated Saffron, and is ſo fatal to them, as to be known amongſt cultivators in France by the name of *Mort du Saffran*. This is the *Sclerotium crocorum* of Perſoon, *Fung.* 119; *Tuber paraſiticum* of Bulliard, *t.* 456. In the ſame year he publiſhed in that work his firſt treatiſe on a much more important ſubject, the propagation of trees by grafting, where he hazarded ſome phyſiological opinions, and entered on a courſe of experiment and obſervation, ſubſequently purſued to an extent which has been of great ſervice to ſcience, and has juſtly rendered his name famous. He continued, from time to time, to communicate to the academy various papers relative to theſe matters. In 1750 he began to publiſh, in 12mo, his *Traité de la Culture des Terres*, which was continued in following years till 1761, when the ſixth volume came out. Our Engliſh writer Tull was his firſt guide, but he ſubſequently profited widely by the experience of himſelf and of various other people, aided by his phyſiological ſagacity, of which, it deſerves to be noted, he made a far more cautious uſe and application than is general with farming philoſophers. In ſhort, he left this moſt important practical ſcience in a ſtate far different indeed from that in which he found it, and deſerves to be reckoned the father of intelligent agriculture in France. His *Elémens d'Agriculture*, in two vols. 12mo publiſhed in 1764, may be conſidered as a ſequel to the preceding work. Theſe two volumes have been tranſlated into German, Spaniſh, and Engliſh. Du Hamel wrote alſo on the cultivation and preparation of Madder, in 4to. in 1757.

A more ſplendid and extenſive work of our author was publiſhed in 1755, making two vols. 4to. entitled *Traité des Arbres et Arbuſtes qui ſe cultivent en France en pleine terre.* Having been made inſpector of the Marine, the ſtudies which had been his amuſement, became, as he ſays, his duty; and while he undertook to inveſtigate all that concerned the cultivation and preſervation of timber, for that immediate object, he, in this work, extended his views to the treatment and botanical diſcrimination of all trees and ſhrubs capable of bearing the climate of France. Hence a number of American ſpecies became firſt known to his countrymen, and even to other nations, by his means. Haller reckons that this work treats of a thouſand ſpecies and varieties. They are arranged alphabetically, according to their Latin generic names, and he took for the baſis of the work the nomenclature of Tournefort. To this he was, in a manner, obliged by national prejudice in the time he wrote, but he has ventured to borrow ſome improvements from Linnæus, and he expreſſes himſelf with ſenſe and candour on this ſubject, as well as on that of botanical ſyſtems. To each genus is prefixed a copper-plate of its parts of fructification, with diſſections, after the manner of Tournefort; then follow the generic characters in French. The ſpecies are enumerated by the appellations of Caſpar Bauhin, or ſome other author, in Latin and French, and general remarks on their culture, properties, and uſes are ſubjoined. One or more ſpecies is repreſented by wooden cuts, in the adjoining pages. Moſt of theſe were furniſhed by the very identical blocks of the fine Venetian editions of Matthiolus, which Du Hamel was ſo fortunate as to procure almoſt complete, and the deficiencies are ſupplied by new cuts, of a far inferior ſtyle indeed, but very often of conſiderable merit. The economical remarks on the more important genera, as *Morus*, *Olea*, *Pinus*, and *Quercus*, are extenſive and valuable. It is to be regretted that the author did not regularly adopt the Linnæan nomenclature, as to ſpecies, which had appeared two years before in the *Species Plantarum*, a work he occaſionally cites; but he was not enough of a practical botaniſt to feel its tranſcendent utility. He would not, like Haller, have rejected it from prejudice or envy, for his character was far above ſuch feelings, from which his own modeſty ſecured him, and he was always in amicable correſpondence with the illuſtrious Swede, to whom he ſent his publications as they came out. We have now before us a copy, with his own hand-writing addreſſed to Linnæus, of his moſt eminent and important work, the *Phyſique des Arbres*, which came out in 1758, in two vols. 4to., with numerous copper-plates. On this his merit as a phyſiologiſt ſecurely reſts. In it he has collected and reviſed all that had been done before him, eſpecially by Malpighi, Grew, Hales, and Bonnet, as well as his own preceding experiments and remarks. We paſs over his preliminary obſervations on ſyſtem and nomenclature, in which the difficulties of the ſubject are more apparent than its advancement. They are however the performance of an intelligent and candid man, and he gives due credit to ſuch as deſerve it, whether his own countrymen or not. The great merit of this work conſiſts in its details reſpecting the ſtructure and anatomy of plants, and the phyſiology of their different organs. If Duhamel, like everybody elſe till very lately, miſtook the woody fibres for the ſap-veſſels, he has formed very juſt conceptions of vegetable ſecretions, the production of the wood, the uſe of the leaves, &c. See CIRCULATION *of Sap*, and CORTEX.

In 1760 he publiſhed another valuable practical volume in 4to. with plates, entitled *Des Semis et Plantations des Arbres, et de leur Culture.* This had an eſpecial view to the great national object of improving the foreſts of the kingdom, highly important in a country where ſo much wood is continually uſed for fuel, and ſo little, in proportion to ſome other countries, naturally produced. The author laudably takes advantage of the panic, with which his countrymen are every now and then ſeized, of a ſcarcity of fuel, to excite their attention to the means he would recommend for the prevention of ſo dreadful an evil, and his book is a mine of practical information for the woodman, the planter, and the gardener, of the firſt authority and value.

The ſame ſubject is followed up in two vols. 4to. publiſhed in 1764, under the title of *De l'exploitation des bois, ou moyen de tirer parti des taillis demi futayes et hautes futayes.*

In 1767 appeared another 4to. volume, *Du tranſport, de la conſervation, et de la force du bois*, full of practical information relative to the properties, qualities, and uſes of different woods, intermixed with phyſiological remarks, as in the preceding performances of this excellent writer, who publiſhed alſo, in 1764, upon the art of refining ſugar, in folio, and, in 1765, on the preſervation of grain, in 12mo.

His moſt ſplendid work was printed at Paris in 1768, in two vols. 4to. with fine coloured plates. Its title is *Traité des arbres fruitiers.* In this the varieties of fruit-trees are elegantly diſtinguiſhed, by figures and deſcriptions, and their treatment illuſtrated with the uſual ſcience of the author.

Du Hamel was aſſociated to the chief learned ſocieties of Europe, lived in high reſpect and eſteem, and died at Paris in 1782, when he was dean of the Academy of Sciences. Beſides the above works, he wrote on the management of rope-yards, and fiſheries, and on naval architecture.—Works of Du Hamel. Haller. Bibl. Bot. Aikin's Gen. Biog.

HAMELBURG, in *Geography*, a town of Germany, in the biſhopric of Fulda; 24 miles S. of Fulda.

HAMELING, or HAM-*ſtringing*, the act of cutting the great tendon, vulgarly called the *ham-ſtring*.

Hameling or *hambling* of dogs, amounts to the ſame with *expeditation* or lawing.

HAMELLIA, in *Botany*, ſo named by Jacquin, in honour of the great vegetable phyſiologiſt Henry Lewis Du Hamel du Monceau; ſee that article. Jacquin by miſtake calls him John Baptiſt, and he ſpells the name of the genus with one *l*, in which he is followed by Juſſieu and others. In ſpite of theſe authorities, we preſume to think Linnæus the moſt correct, a double *l* being neceſſary to preſerve the ſhortneſs of the preceding vowel, as is juſtified by Latin analogy.—Linn. Gen. 93. Jacq. Amer. 71. Schreb. 123. Willd. Sp. Pl. v. 1. 980. Mart. Mill. Dict. v. 2.

Ait. Hort. Kew. ed. 2. v. 1. 375. Juſſ. 207. Lamarck Dict. v. 3. 68. Illuſtr. t. 155. Claſs and order, *Pentandria Monogynia.* Nat. Ord. *Rubiaceæ*, Juſſ.—Linnæus reckons it doubtful, not having a comprehenſive idea of this order.

Gen. Ch. *Cal.* Perianth ſuperior, ſmall, in five deep, upright, acute, permanent ſegments or teeth. *Cor.* of one petal; tube cylindrical, with five angles, often ſwelling upwards; limb in five deep, equal, ſmall, acute ſegments. *Stam.* Filaments five, awl-ſhaped, inſerted into the tube; anthers vertical, long, linear, included in the tube. *Piſt.* Germen inferior, ovate, with a conical apex; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma linear, obtuſe. *Peric.* Berry oval, of five cells, crowned with the calyx. *Seeds* numerous, roundiſh, compreſſed, very ſmall.

Eſſ. Ch. Corolla tubular, five-cleft. Berry inferior, with five cells and many ſeeds.

1. H. *patens.* Jacq. Amer. 72. t. 50. Linn. Sp. Pl. 246. Swartz. Obſ. 77. Sm. Exot. Bot. v. 1. 45. t. 24. (H. coccinea; Sw. Prod. 46. Periclymenum aliud arboreſcens, ramulis inflexis, flore corallino; Plum. Ic. 212. t. 218. f. 2.) —Cluſters terminal, downy. Leaves three together, ſoft and downy, eſpecially beneath.—Gathered by Jacquin, as well as by Swartz more recently, on the buſhy ſides of mountains in Hiſpaniola. The late lady Amelia Hume received a fine plant from Jamaica, which flowered abundantly in her ſtove in October 1796, making a very ſplendid appearance. It ſeems, however, to have been firſt introduced into this country by Houſton's bringing a plant to Miller, who mentions it in his dictionary, by the name of *Periclymenum verticillatum*, ed. 8. n. 3. Yet it found no place in the firſt edition of Hort. Kew. being probably loſt ſoon after its introduction. The *ſtem* is ſhrubby, about four feet high, with round ſpreading leafy branches, downy when young. *Leaves* three together, ſpreading, three inches long, on red downy ſtalks, elliptical, tapering at each end, entire, ſoft and pliable, veiny; ſlightly downy above, more ſo, and paler, beneath. Sometimes they are ſaid to ſtand four or five in a whorl. *Stipulas* tapering, between the foot-ſtalks. *Cluſters* terminal, compound, their ſtalks red, downy, three together, forked, each bearing many ſeſſile flowers, in two rows with a ſolitary flower between. The *calyx* is purpliſh red, downy, as well as the germen to which it is united. *Corolla* an inch long, ſcarlet, paler, or yellow, at the baſe. *Berry* black, the ſize of a pea.

Jacquin's *H. erecta* is deemed a mere variety.

2. H. *axillaris.* Swartz. Ind. Occ. v. 1. 443—Nearly herbaceous. Cluſters from the forks of the ſtem. Flowers turned to one ſide. Leaves oppoſite, ſmooth.—Native of Jamaica and Hiſpaniola, in buſhy rocky places by the brinks of rivers, according to Dr. Swartz, from whom and Dr. Wright we have ſpecimens. The *ſtem* is two or three feet high, branching, ſmooth; the lower part only being ſhrubby, the reſt herbaceous. *Leaves* oppoſite only, not whorled, about two inches long, elliptical, pointed at each end, dark green, ſmooth. *Cluſters* from the forks of the upper part of the ſtem, ſurmounted by branches and leaves, nearly or quite ſmooth. *Flowers* numerous, ſmall, pale yellow. *Berry* oval, crowned with the elongated, ſlightly recurved, calyx-teeth.

3. H. *chryſantha.* Swartz. Ind. Occ. v. 1. 444. Lamarck t. 155. f. 1. (Campanula minor fruteſcens, foliis ovatis oppoſitis ſtipulis acutis interpoſitis, capſulis quinquelocularibus; Browne Jam. 166. t. 14. f. 1.)—Cluſters terminal. Partial flower-ſtalks long and ſlender. Leaves oppoſite, obovato-lanceolate, pointed, very ſmooth.—Communicated by Dr. Swartz, who gathered it in mountain thickets on the weſt ſide of Jamaica. We cannot but think the ſynonyms of Plumier and Jacquin, quoted by him and copied by Willdenow under this ſpecies, are widely miſapplied, and that Browne's is the only true one. *H. chryſantha* is a *ſhrub* from four to ſix feet high, ſmooth in all its parts, and eſſentially diſtinguiſhed by the elongated ſlender ſtalks which ſupport each flower. The *corolla* is almoſt of a cylindrical figure, ſcarcely inflated, and near an inch long; its colour a ſhining yellowiſh orange. *Berry* bright ſcarlet. The *leaves* are uſually broadeſt beyond their middle.

4. H. *lutea.* Von Rohr. MSS. (H. chryſantha; Jacq. Coll. v. 3. 204. Ic. Rar. t. 335.)—Cluſters terminal, divaricated, recurved. Flowers nearly ſeſſile. Tube inflated. Leaves oppoſite, elliptic-lanceolate, pointed, ſmooth.—Gathered by Von Rohr in Cayenne, and by Mærter, who, though never mentioned by Jacquin, ſent this and abundance of fine plants from the Caraccas. It flowered in the Vienna ſtove all ſummer long, ripening its black berries in October. The *ſtem* is ſhrubby, very ſmooth. *Leaves* two inches or more in length, broad in the middle, tapering much at each end, quite ſmooth, except a little occaſional down where their veins branch from the midrib. *Footſtalks* red and rather long. *Cluſters* ſmooth, or ſlightly downy. *Flowers* numerous, ſpreading every way, nearly ſeſſile, yellow, their *corolla* rather above half an inch long, the tube dilated ſuddenly juſt above the baſe, ſo as to be almoſt bell-ſhaped. This dilatation ſeems to contract ſomewhat in drying. No ſpecies can be more diſtinct than this is from the laſt.

5. H. *ventricoſa.* Swartz. Ind. Occ. v. 1. 446. (Nerio affinis arbor, verſicolora materie, lauri folio lucido, flore pentapetaloide ſulphureo amplo; Sloane Jam. v. 2. 63. t. 183. f. 2? Periclymenum arboreſcens, ramulis inflexis, flore luteo; Plum. Ic. 212. t. 208. f. 1? Campanula arboreſcens, &c.; Browne Jam. 166. n. 1.)—Cluſters terminal or axillary, ſpreading. Flowers on ſhort ſtalks. Tube inflated. Leaves three together, elliptical, pointed, ſmooth.—Native of dry ſhrubby hills in Jamaica. A large *ſhrub* or ſmall *tree*, according to Swartz. Sloane ſays it is "a very large and ſtately *tree*, affording very broad boards to make tables or cabinets, the wood being of the ſoftneſs or grain of elm," marked with wavy light brown or grey lines; and that it is called "Spaniſh elm, or Prince wood, being imported to Europe in great quantities for the uſe of cabinet-makers." We preſume it is the grey ſattin-wood, but nothing is more ill explained than theſe exotic articles of commerce. Sloane's plant may very poſſibly be diſtinct from Swartz's, for his figure by no means anſwers well to our ſpecimens, though too bad to afford any ſolid marks of difference. Swartz's ſpecimen is ſo like Plumier's figure, that we have preſumed to remove his ſynonym hither, as it can moſt aſſuredly have nothing to do with *H. chryſantha.* The *branches* of Dr. Swartz's plant are ſmooth. *Leaves* three together, broadly elliptical, tapering at each end, with more or leſs of an elongated point; they are from two or three to four or five inches long, and one or almoſt two broad, ſmooth, ribbed, and veiny, moſtly red-edged. *Footſtalks* half an inch to an inch long. *Stipulas* ovate, pointed, incurved. Swartz deſcribes them "in pairs" and "awl-ſhaped;" we find them ſolitary in his ſpecimen. The *cluſters* are moſtly terminal, though occaſionally ſurmounted by branches, many-flowered, three-branched, ſpreading nearly or quite ſmooth. *Flowers* nearly ſeſſile, or on ſhort partial ſtalks, leaning to one ſide, and ſomewhat drooping. *Calyx-teeth* ſhort, and broad at the baſe. *Corolla* yellow, an inch and quarter long, its tube contracted juſt above the bottom, then ſuddenly dilated, or nearly bell-ſhaped, as in the laſt, but, like that, ſhrunk in when dry. *Berry* ſcarlet.

6. H. *grandiflora*. Saliſb. Parad. t. 55. L'Herit. Sert. Angl. 4. t. 7?—Cluſters terminal or axillary. Flowers few, on longiſh ſtalks. Tube inflated. Leaves three together, lanceolate, acute, nearly ſmooth.—Native of the Weſt Indies. We received it in Auguſt, 1791, from the earl of Tankerville's ſtove at Walton upon-Thames. In ſeparating this from the laſt, we rather wiſh to direct the attention of botaniſts to the ſubject, than abſolutely to decide; but it appears to us that the ſpecies of this beautiful genus are ſtill open to correction, and yet we are not furniſhed with ſufficient materials to elucidate the whole, they being very rare in gardens, and even in herbariums. The *leaves* of the preſent ſpecies are either three or four in a whorl, on longiſh ſtalks, elliptic-lanceolate, three inches long, hardly an inch wide, acute, ſlightly downy towards the edge, with far leſs conſpicuous lateral veins than in *H. ventricoſa*. In our ſpecimen the inſertion of the leaves ſeems to be, by ſome accident of its growth, for we have ſeen no other ſo, diſturbed into a ſpiral direction. The *ſtipulas* are in pairs betwixt every leaf-ſtalk, and awl-ſhaped, as repreſented in the *Paradiſus Londinenſis*, not broad and ſolitary as in L'Heritier, or in our ſpecimens of the foregoing ſpecies. The *flowers* alſo are much fewer in the cluſter, more inflated, and ſupported by much longer and ſlenderer partial ſtalks than in the laſt, which circumſtances, and eſpecially the double ſtipulas, have induced us to ſeparate the two, with a mark of doubt as to L'Heritier's ſynonym, chiefly on account of his delineation of the ſtipulas. The *corolla* is of a fine golden yellow, with a ſpreading border; the tube even, not angular.

7. H? *ſeſſiliflora*. Willd. n. 5. (H. glabra; Lamarck. Dict. v. 3. 69. Amaioua guianenſis; Aubl. Guian. v. 2. ſuppl. 13. t. 375.)—Flowers terminal, capitate. Leaves three together, elliptic-lanceolate, pointed, ſmooth.—Gathered by Aublet in the wild foreſts of Guiana, bearing fruit in May. Of the *flowers* he ſaw nothing, and the capitate infloreſcence is certainly very much againſt its belonging to this genus, though the habit is tolerably like. The *trunk* of the ſhrub is four feet or more in height, and five or ſix inches thick, with a reddiſh bark and white wood. *Branches* ſeveral, ſtraight, triangular, knotty, ſix or ſeven feet long. *Leaves* three together, ſometimes eight inches long, and three or three and half broad, taper-pointed, ſtalked, firm, ſmooth. *Stipulas* annular, fringed. *Fruit* oval, angular, yellow, eaten by the armadillos. The *ſtipulation* of this ſhrub ſeems to indicate a different tribe of the *Rubiaceæ* from *Hamellia*. S.

HAMELN, in *Geography*, a town of Weſtphalia, and capital of the principality of Calenberg, to which it gives name, ſituated on the Weſer, which here forms an iſland, and is furniſhed with a ſluice for the convenience of ſhipping. It derives its name from the river Hamel, which here joins the Weſer. The town contains 600 houſes of merchants and tradeſmen, with 50 eccleſiaſtical and other ſplendid buildings, among which are two churches. The magiſtrates poſſeſs civil and criminal juriſdiction. In November 1806 it ſurrendered to the French; 18 miles S.W. of Hanover. N. lat. 52° 5'. E. long. 9° 18'.

HAMEN, El, a town of the Arabian Irak; 140 miles W.S.W. of Baſſora.

HAMES, the name of the iron or wooden harneſs by which draught horſes are attached to the carts or other ſorts of farming carriages.

HAMETNAGUR, in *Geography*, a town of Hindooſtan, in Oude; 34 miles N.W. of Kairabad.

HAMFARE, in our *Old Writers*, a breach of the peace in a houſe.

HA-MI, Chemi, or *Chamel*, in *Geography*, a country of Aſia, ſituated to the N.E. of China, at the extremity of that deſert which the Chineſe call "Cha-mo," and the Tartars "Cobi." (See Cobi.) It is only 90 leagues diſtant from the moſt weſterly point of the province of Chen-ſi, and by the maps of the Jeſuits, 70 leagues from the Chineſe wall; whereas Goez ſays, that he travelled the ſpace in nine days, which can ſcarcely equal that length, as 30 miles a day ſeems too much for a caravan, eſpecially when we conſider that 20 days are occupied in travelling from Chaliſh to Purhan, not far from Turfan, a ſpace which in our maps does not occupy above half the extent between Ha-mi and the Chineſe wall. This country in the early ages was inhabited by a wandering people, named "Iong." About the year 950 B.C. they ſent deputies to pay homage to the emperor of China, and preſented ſome ſabres by way of tribute. Theſe people, not having received timely aſſiſtance, fell under the dominion of the "Hiong-nou," who appear to have been the ſame as the Huns, and who at that time were a formidable nation. The Chineſe ſeveral times loſt and recovered the country. After ſeveral changes and revolutions, the Mahometans, who had made a rapid progreſs in all the countries that are ſituated between Perſia, Cobi, and the Caſpian ſea, advanced as far as Ha-mi, which they conquered. Afterwards it had princes of its own, but dependent on the Tartars, who ſucceſſively ruled theſe immenſe regions. The Yuen, or Mogul Tartars, again united the country of Ha-mi to the province of Chen-ſi; and this union ſubſiſted till the year 1360, when the emperor formed it into a kingdom, ſtipulating that its princes ſhould do homage and pay tribute. Several viciſſitudes afterwards occurred; however, the prince who occupied the throne in 1696, acknowledged himſelf a vaſſal of the empire, and ſent as tribute to Pekin, camels, horſes, and ſabres. Kang-hi having received his homage with the uſual ceremonies, publiſhed a diploma, which eſtabliſhed the rank to be held by the king of Ha-mi among the tributary princes, the time when homage ſhould be rendered, the preſents neceſſary for his tribute, the number of auxiliaries which he was bound to furniſh in time of war, and the manner of his appointing a ſucceſſor.

This country, though ſurrounded with deſerts, is reckoned one of the moſt delightful in the world. The ſoil produces abundance of grain, fruits, leguminous plants, and paſture of every kind. The rice which grows here is particularly eſteemed in China; and its pomegranates, oranges, peaches, raiſins, and prunes have a moſt exquiſite taſte; and even the jujubes are ſo juicy, and have a flavour ſo delicious, that the Chineſe call them "perfumed jujubes." The melons are much valued, and are carried to Pe-king, for the emperor's table; and they have this ſingular property, that they may be kept freſh during great part of the winter. But the moſt eſteemed productions of this country are its dried raiſins, which are of two kinds. The firſt reſemble thoſe known in Europe by the name of Corinthian, the ſecond are ſmaller and more delicate than thoſe of Provence. Theſe raiſins are preſcribed in various diſorders. An infuſion of the firſt is ſaid to facilitate an eruption of the ſmall-pox about the fourth day, and to promote a gentle perſpiration in ſome kinds of pleuriſies, or malignant fevers. Althoug Ha-mi lies farther towards the north than ſeveral provinces of France (*viz.* N. lat. 42° 53' 20"), we are nevertheleſs aſſured, that its climate is more favourable to the culture of vines, and that the grapes have a ſuperior quality. It never rains at Ha-mi; dew and fogs are ſcarcely ever ſeen here; the country is only watered by the ſnow which falls in winter, and this ſnow is collected at the bottoms of the mountains, and carefully preſerved. The kingdom of Ha-mi contains a great number of villages and hamlets, but it has properly only one city, which is its capital, of the ſame name. It is ſurrounded by lofty walls, half a league in circumference; and it has two gates, one fronting the eaſt and the other the weſt. Theſe gates are exceedingly beautiful, and make a fine appearance at a diſtance. The ſtreets are ſtraight and well laid out; but the houſes, which contain only a ground-floor, and which are almoſt all conſtructed of earth, make very little ſhow; however, as this city enjoys a ſerene ſky, and is ſituated in a beautiful plain, watered by a river, and ſurrounded by mountains, which ſhelter it from the north winds, it is a moſt delightful reſidence. On whatever ſide it is approached, it has gardens, which contain every thing which a fertile and cultivated country can produce in the mildeſt climates. All the ſurrounding fields are enchanting, but they do not extend far, as they terminate in dry plains, where a number of beautiful horſes is fed, and alſo a ſpecies of excellent ſheep, with large flat tails, ſome of which weigh three pounds. Ha-mi abounds in foſſils and valuable minerals. The Chineſe have, for a long time, procured diamonds and a great quantity of gold from it; at preſent it ſupplies them with agate, which they highly value. As to the inhabitants of this ſmall ſtate, they are brave, capable of enduring fatigue, very dexterous in all bodily exerciſes, and are excellent ſoldiers, but they are fickle, and ſoon irritated; and when in a paſſion, they are extremely ferocious and ſanguinary. Du Halde places Ha-mi in N. lat. 42° 53′. W. long. from Pe-king 22° 23′. Du Halde. Groſier.

HAMILCAR, Barcas, in *Biography*, father to the celebrated Hannibal, a Carthaginian general, was in Sicily during the firſt Punic war, and after a peace had been made with the Romans, he quelled a rebellion of ſlaves, who had taken many African towns, and had laid ſiege to Carthage itſelf. This internal war was concluded by the almoſt total deſtruction of the enemy; and the towns which had eſpouſed their cauſe, or which had ſubmitted to their power, were obliged to ſurrender to the arms of Hamilcar. He now meditated ſomething more important for his country, and extended the dominion of the republic beyond its former limits in Africa, and brought the whole country to a tranquil condition. After this he paſſed into Spain with his ſon Hannibal, whom he cauſed to ſwear at the altar eternal and irreconcileable enmity againſt the Romans, a paſſion by which he himſelf had ever been animated. In Spain he carried on a war for nine years, with great ſucceſs, ſubduing many nations, and enriching his army and country with abundance of plunder. In this expedition he laid the foundation of the city of Barcelona. Univer. Hiſt.

HAMILTON, Anthony, *Count of*, deſcended from a younger branch of the dukes of Hamilton, was born in Ireland about 1646. His mother was ſiſter to the duke of Ormond, viceroy of that iſland. The troubles in which the country was involved drove his family to France while he was an infant, and he was educated in the religion and language of the country. During the reign of Charles II. he made ſeveral viſits to England, but his religion prevented him from obtaining any public employment here. James II. however, gave the count Hamilton a regiment of infantry in Ireland, and raiſed him to the important poſt of governor of Limerick, but when James abdicated the throne, the count thought it prudent to accompany him back to France, where he ended his days. He died at the age of ſeventy-four, and his works were printed collectively in ſix volumes 12mo. in the year 1749. They conſiſt of "Poems," "Fairy Tales," and of the "Memoirs of count Grammond." This laſt, according to Voltaire, is of all books that in which the moſt ſlender ground work is ſet off with the gayeſt, moſt lively, and agreeable ſtyle. "The hero," ſays his biographer, "is little more than a genteel ſharper; and the adventures which befal him are the common ones of ſuch a character; but they are related with irreſiſtible pleaſantry, and all the grace of faſhionable converſation." The work is filled with portraits and anecdotes of the moſt celebrated perſons in the court of Charles II., which has rendered it peculiarly intereſting to Engliſh readers. Moreri.

Hamilton, Gavin, a painter of hiſtory, deſcended from a branch of a noble family in Scotland, who reſided the greater part of his life at Rome. He had not, perhaps, the genius of an inventor; but the advantages of a liberal education, of a claſſic taſte in the choice of his ſubjects, and the ſtyle at which he always aimed, made him, at leaſt, equal to his moſt celebrated contemporaries. Some of the ſubjects which he painted from the Iliad bear ample teſtimony to this. Achilles graſping the dead body of Patroclus, and rejecting the conſolation of the Grecian chiefs, and Hector tied to his chariot, have ſomething of Homeric ſimplicity and pathos. His expreſſions, however, are not always juſt. In his Achilles diſmiſſing Briſeis, the geſticulation of an actor ſupplants the expreſſion of the man.

Of his women, the Briſeis in the ſame ſubject is the moſt attractive. Neither his Andromache mourning over Hector, nor the Helen of the ſame; or the ſcene with Paris, reach our ideas of the dignity and anguiſh of the former, or the forms and graces of the latter. Indeed, what idea can be ſuppoſed to reach that beauty, which, in the confeſſion of age itſelf, deſerved the ten years' ſtruggle of two nations? and yet, in the ſubject of Paris, thoſe graces, and that form, are to be ſubordinate to the ſuperior ones of Venus. He would rank with the firſt names in art, who from ſuch a combination ſhould eſcape without having provoked the indignation, contempt, or pity of diſappointed expectation.

Though he was familiar with the antique, the forms of Hamilton have neither its correctneſs nor characteriſtic purity: ſomething of the modern eclectic principle prevails in his works, and his compoſition is not ſeldom as much beholden to common-place, ornamental conceits, and habits, as to propriety. Though ſolicitous about colour, he was no colouriſt; he ſhould have diſdained what the grandeur of his ſubjects rejected, and contented himſelf with negative hues, and grave and ſimple tones.

A conſiderable part of the latter period of this artiſt's life was dedicated to the diſcovery of antique monuments. He made excavations and opened buried chambers in various places of the Roman ſtate, Centumcellæ, Velletri, Oſtia, and above all at Tivoli, among the ruins of Adrian's Villa; and it muſt be acknowledged that the ſucceſs which attended moſt of his reſearches, made ample amends to the art in general, for the loſs which painting may have ſuffered by the intermiſſion of his practice and example. In the collection of the Muſeo Clementino, next to the treaſures of the Belvidere, the contributions of Hamilton in ſtatues, buſts, and baſſo relievo, were by far the moſt important to the progreſs of arts and claſſic learning; and the beſt collections ſcattered over Ruſſia, Germany, and this country owe many of their principal ornaments to his diſcoveries. Nor was he leſs attentive to modern art; he publiſhed his "Schola Italica Picturæ," to trace the progreſs of its ſtyles from Leonardo da Vinci to the ſucceſſors of the Caracci.

It yet remains to be ſaid of Hamilton, that however eminent his talents, or other qualities were, they were excelled

celled by the liberality, benevolence, and humanity of his character. He died in 1794. Fuſeli's Pilkington.

Hamilton, William, a painter of hiſtorical and fancy ſubjects: he was of Scotch extraction, but probably born in London, and went, when ſcarcely a youth, with Zucchi, the arabeſque ornamental painter, to Rome. At his return he ſoon acquired general employment by the verſatility of his talents, the amenity of his method, his knowledge of colours, his aſſiduity and expertneſs. Though he was employed in all the public works which the ſpeculations of commerce had contrived to form a new ſource of opulence from the talents of living artiſts, as in the Shakeſpeare, the poets and biblical galleries, and that of national hiſtory; and in each of them obtained the praiſe of his employers, and the applauſe of the public; yet his choice of ſtyle is too vague in drawing, execution, and expreſſion, to obtain the meed of exalted praiſe from the true connoiſſeur. To pleaſe the eye appears to have been more his object than to inform the mind; and ornament, rather than truth, captivated his imagination. In works of mere ornament he excelled, and gave to it propriety, richneſs, and a claſſic air. His coloured drawings imitate the fulneſs of his oil paintings with more freſhneſs, and without much labour are finiſhed with taſte. Hamilton was a member of the Royal Academy; was poſſeſſed of affability and gentle manners; and died univerſally lamented, in 1801, at the age of fifty.

Hamilton's *Bawn*, in *Geography*, a ſmall fair town in the barony of Fews, county of Armagh, and province of Ulſter, Ireland, about two miles ſouth from Rich-hill, and 61 N. by W. from Dublin. It is a well built town, on the ſpot recorded under this name in the poetical works of dean Swift.

Hamilton, the chief town of the middle ward of Lanarkſhire, in Scotland, pleaſantly ſituated on the banks of the rivers Clyde and Evan near their confluence. The ſituation of Hamilton is extremely pleaſant, and the ſurrounding country level, fertile, and richly cultivated. It is of no great conſequence as a place of trade, the only manufactures cultivated here being thoſe of weaving and figuring muſlins, and thoſe employed in theſe branches almoſt univerſally work for the manufacturers of Glaſgow, from which it is about eleven miles diſtant. The ducal reſidence, or, as it is generally called, the palace, is a large building, by no means remarkable for its architecture, but commodious and ſplendidly furniſhed. It contains a fine gallery of paintings, many of which are originals of eminent maſters. A Daniel in the Den of Lions, by Reubens, is greatly admired by connoiſſeurs. The pleaſure grounds are very extenſive and during the life of the late duke, who was very much attached to equeſtrian and other athletic amuſements, there were horſe-races annually, but ſince his death this practice is diſcontinued. Near Hamilton is the village and bridge of Bothwell, famous in Scottiſh hiſtory for the defeat of the Covenanters, in the reign of Charles II. Near the village of Bothwwell, upon the banks of the Clyde, is Bothwell caſtle, one of the ſeats and the chief reſidence of lord Douglas, of Douglas. Situated on a winding part of this noble river, with precipitous banks, richly covered with wood and ſhrubby, the pleaſure grounds of Bothwell are delightful. The ancient caſtle, from which the huſband of the unfortunate Mary Stewart derived his title, is in ruins.

Hamilton, a poſt-town of America, in Eſſex county, Maſſachuſetts; 26 miles N.E. from Boſton, containing 749 inhabitants.—Alſo, three townſhips in Pennſylvania; one in each of the counties of York, Franklin, and Northampton.—Alſo, a poſt-town in Chenango county, New York, containing 2673 inhabitants.—Alſo, a town in Albany county, New York, ſo called in honour of Alexander Hamilton, eſq. a great patron of American manufacture; 10 miles W. of Albany: famous for its glaſs manufactory. The air is highly ſalubrious.—Alſo, a county in the ſtate of Ohio, bounded N. on Warren and Buller counties, S. on the Ohio; E. on Clermont and Warren; and W. on the State line or Indiana. Its towns are Cincinnati and Columbia. It is ſaid to contain 14,692 inhabitants.—Alſo, a port in the Bermuda iſlands.—Alſo, a cape on the N. coaſt of Newfoundland iſland.—Alſo, a ſettlement in Vermont, on the Canada line.

Hamilton *Ban*, a townſhip of Adam's county, Pennſylvania. In a mountain, on the W. part of the town, are found gold, ſilver, copper, and iron.

Hamilton *Diſtrict*, deriving its name from A. Hamilton, eſq. is ſituated in the ſtate of Teneſſee, on the waters of the Holſton and Clinch, bounded S. by Teneſſee river, and ſeparated from Mero diſtrict on the W. by an uninhabited country. It contains the counties of Knox, Jefferſon, Blount, Seveer, Grainger, and Coche, and has 37,836 inhabitants, of whom 2996 are ſlaves.

Hamilton *Fort*, a blockaded fort which ſtands on the E. ſide of the Great Miami, in the ſtate of Ohio, 25 miles S. of fort St. Clair, and 25 N. of Cincinnati. It is capable of containing 200 men. The ſoil near it is rich.

Hamilton *Townſhip*, a townſhip in the county of Northumberland, Upper Canada, lying W. of Haldimand, with lake Ontario in front, and Rice lake in the rear.

HAMIN, a town of Arabia Felix, in the province of Oman.

HAMING, a town of Sweden, in Sudermanland; 10 miles S. of Stockholm.

HAMLET, a diminutive of *ham*, ſignifies a little village, or rather a part of a village.

Spelman, upon theſe words, ſhewing the difference between *villa integra* and *villa dimidia & hamleta*, ſays, "Hamleta vero, quæ medietatem friborgianon obtinuit hoc eſt ubi quinque capitales plegii non deprehenſi ſint." The ſtatute of Exon. 14 Edw. I. mentions this word thus, "Les nommes de toutes les villes et hamlets que ſont en ſon wapentake." In the ancient MS. hamlet is expounded the ſeat of a freeholder.

HAMM, in *Geography*, a town of Germany, the capital of the county of Mark; large, well built, ſurrounded with ditches and palliſades. In this town the Calviniſts have an academy with three profeſſors, a Latin ſchool, and a pariſh church. The Lutherans have a church, and the Roman Catholics a convent. It is a place of good trade, and was formerly Hanſeatic. Its linen bleacheries are extenſive; 17 miles S. of Munſter. N. lat. 51° 40′. E. long. 7° 53′.

HAMMA, ἅμμα, of ἅπτω, *I tie*, a word uſed, by ſome chirurgical writers, for a knot that faſtens a bandage.

HAMMACÆ, or Hammock *Racks*, are the battins nailed to the ſide of the beams, to which the ſailors hang their hammocks.

HAMMAH, El, or Elhammah *of Gabs*, in *Geography*, a town of Africa, in Tunis, lies four leagues to the weſtward of Gabs, being one of the frontier towns of the Tuniſeens, where they have a ſmall caſtle and garriſon. The old town, at a little diſtance, was anciently called "Aquæ Tacapitanæ," on account of its baths. Theſe baths are ſheltered from the weather by low thatched hovels, and their baſons, about 12 feet ſquare and four deep, have, a little below the ſurface of the water, ſome benches of ſtone for the bathers to ſit upon. One of theſe baths is called the "Bath of the Lepers," below which the water ſtagnates and forms a pool, called the

“ Lake of the Lepers.” A ſmall rivulet is formed by the water which flows from theſe baths, which, after having been conducted in a number of ſmall ſtreams through the adjacent gardens, becomes united, and directs its courſe towards the “ Lake of Marks,” and loſes itſelf in the ſand. Shaw's Travels, p. 128.

HAMMAM Leef, a town of Africa, in Tunis, having a celebrated hot bath, much reſorted to by the inhabitants of the capital, and near it is a mountain rich in lead-ore ; 14 miles S. of Tunis.

Hammam *Mereega*. See Mereega.

Hammam *Meſkonteen*, a town of Africa, in Algiers ; 36 miles E. of Conſtantina.

HAMMAMLU, a town of Aſiatic Turkey, in Natolia ; 36 miles W. of Alphiom-Karahiſar.

HAMME, a town of France, in the department of the Scheldt, and chief place of a canton, in the diſtrict of Termonde. The place contains 7238, and the canton 14,251 inhabitants, on a territory of 50 kiliometres, in four communes.

HAMMEL's Town, a town of America, in Dauphiné county, Pennſylvania, five miles from Suſquehannah river, and 85 from Philadelphia, containing a German church, and about 35 dwelling-houſes.

HAMMER, an inſtrument of iron, with a handle of wood; uſed, in moſt mechanic arts, to beat, ſtretch, drive, &c. Bodies capable of being ſtretched or extended under the hammer, are ſaid to be *malleable*.

The Latins call it *malleus*, anciently *martulus* or *marculus* ; by which name Pliny calls it when he ſays that Cyntra, ſon of Agrippa, invented the hammer and pincers. Hiſt. Nat. lib. vii. cap. 56. Vide Hardouin. Not. ad loc.

The hammers of our great forges are moved or worked by a water-mill.

Hammer, in the *Manege*. See Shoeing-*hammer*.

Hammer *of a Clock*. See Clock.

Hammer, in *Anatomy*. See Malleus and Ear.

Hammer-*headed ſhark*. See Shark.

Hammer, *Yellow*, in *Ornithology*. See Emberiza *Citrinella*.

Hammer-*hardened*, in *Smithery*, is ſaid of iron which is ſhort or brittle, owing to its having been hammered when in a warm or due red heat, which is ſuppoſed to cloſe its pores. Hammer-hardened iron, by being heated to a white heat, and ſuffered to cool gradually, again recovers its toughneſs. See Hardening.

Hammer-*men*, or *Drivers*, in *Mining*, are thoſe colliers who fall or wedge down the coals in a coal-pit, after the holers have undermined them, the proceſſes of which are deſcribed in Mr. Farey's Report on Derbyſhire, vol. i.

Hammer-*mills*, or *Forges*, in the *Iron Manufacture*, are works in which very large tilt and forge hammers, worked by water-wheels or by ſteam engines, are uſed for working the iron, and drawing it out into bars. Smaller hammers of the ſame kind are uſed now for forging the articles of various manufactures ; in the ſcythe factories, theſe are called ſkelpers, and are very common in the neighbourhood of Sheffield. The hammer-mill uſed by Mr. George Walby, trowel-maker of Goſwell-ſtreet, is on a very curious conſtruction ; a view and deſcription of which may be ſeen in the Tranſactions of the Society of Arts, vol. xxii. page 335.

Hammer-*pick*, in *Mining*, is a ſtrong pick with a hammer at one end, almoſt like that uſed by paviors, which is uſed in coal-pits, by the remblers, or colliers, who break the coals into ſizable lumps, after they are fallen by the hammer-men, ready for the hurriers, or thoſe who drag them to the ſhaft bottom. The whole proceſs of working coals is deſcribed in Mr. Farey's Report on Derbyſhire, vol. i.

Hammer, in *Geography*, a town of Norway, in the dioceſe of Aggerhuus ; 14 miles N. of Chriſtiania.

Hammer, *Little*, a town of Norway, in the dioceſe of Aggerhuus ; 76 miles N. of Chriſtiania. N. lat. 61° 9′. E. long. 10° 25′.

Hammer *Iſland*, a ſmall iſland of Sweden, in the Baltic, near the coaſt of Blechingen ; four miles E. of Carlſcrona.

HAMMERDALE, a town of Sweden, in the province of Jutland ; 32 miles N.E. of Froſon.

HAMMERING, the act of beating or extending and faſhioning a body under the hammer.

When it is performed on iron heated for the purpoſe, the ſmiths uſually call it *forging*.

Hammering, in *Coining*. A piece of money, or a medal, is ſaid to be *hammered* when ſtruck, and the impreſſion given with a hammer and not with a mill.

For the method of beating with the hammer, ſee Coining.

HAMMERS *of Pythagoras*. See Pythagoras, and Harmonics.

HAMMERSCHMIDT, Andreas, in *Biography*, an eminent Lutheran eccleſiaſtical compoſer, born at Brixa, in Bohemia. Walter has given a long liſt of his publications, which are chiefly choral, and ſaid to have improved church muſic ſo much, that on his tomb-ſtone he is called “ the glory of Germany.” He died 1675, aged ſixty-four.

HAMMERSMITH, in *Geography*, a chapelry, or hamlet, in the pariſh of Fulham, hundred of Oſſulton, and county of Middleſex, contained, in the year 1801, 920 houſes, and 5600 inhabitants. During the interregnum it was propoſed to make this hamlet parochial, but the plan was not effected ; and although the proportion has progreſſively augmented, yet the whole is dependent on a diſtant pariſh. The land of this hamlet is eſtimated at 1540 acres, nearly 300 of which are occupied by market-gardeners : the remainder is covered with houſes, incloſed in ſmall paddocks, and laid out in private gardens. The river Thames bounds the ſouthern ſide of this hamlet, and on the banks of that noble ſtream are many ſeats, villas, and rows of houſes. Among theſe is Brandenburgh houſe, which has been occupied by many diſtinguiſhed perſons. It is ſaid to have been built by ſir Nicholas Criſpe, about the beginning of king Charles the Firſt's reign. It was afterwards ſold to prince Rupert, as a reſidence for Margaret Hughes, an admired actreſs, who reſided here 10 years. George Doddington, afterwards lord Melcombe Regis, purchaſed it in 1748, and made conſiderable additions for the reception of ſtatues, antique pictures, &c. In the year 1792 the margrave of Brandenburgh-Anſpach bought it, and his lady, the margravine, rendered the houſe a ſcene of luxury and gaiety by the eſtabliſhment of a private theatre. The houſe is ſplendidly embelliſhed. Near the chapel, in the centre of Hammerſmith, is an ancient manſion called Butterwick-houſe, ſuppoſed to have been the reſidence of Edmund Sheffield, earl of Mulgrave, who died here in 1646. Near the houſe is a large cedar of Libanus, the girt of which, at three feet from the ground, is nearly eleven feet. The chapel was built in the time of king Charles I., and is ſaid to have coſt 2000*l*. although ſir Nicholas Criſpe gave the bricks. This gentleman is deſcribed as the inventor of the preſent mode of making bricks. (See Lloyd's Memoirs, page 628). At Hammerſmith are ſeveral other houſes, which have been occupied by diſtinguiſhed characters ; but it would exceed our limits to notice or deſcribe them. For further particulars the reader is referred to Lyſons's "Environs of London," vol. iv.

HAMMITES, in *Natural Hiſtory*, a name uſed by Pliny (Nat. Hiſt. l. 37. c. 10.) for a kind of ſtone compoſed of globules, reſembling pretty cloſely the ova of fiſhes, hence called alſo roe-ſtone, piſolithus, oalite, marmor, &c. by different writers. Dr. Woodward (Method of Foſ. p. 18.) ſeems to conſider the hammites as really produced from the roes of fiſhes, but thoſe who have more attentively conſidered the vaſt accumulation of theſe, in the Bath free-ſtone range, in all its courſe from Portland Iſland to Ketton, in Rutland, and thence into Yorkſhire, reject this opinion, and conſider theſe globules as a peculiar ſpecies of nodules.

HAMMOC, or HAMAC, a kind of hanging bed, ſuſpended between two trees, poſts, hooks, or the like; much uſed throughout the Weſt Indies, as alſo on board of ſhips.

The Indians hang their hammocs to trees, and thus ſecure themſelves from wild beaſts and inſects, which render lying on the ground there very dangerous.

The people of the Caribbee iſlands are wonderfully ſuperſtitious with regard to their hammocs, and do not make them without many ceremonies.

According to F. Plumier, who has often made uſe of the hammoc in the Indies, it conſiſts of a large ſtrong coverlet or ſheet of coarſe cotton, about ſix feet ſquare: on two oppoſite ſides are loops of the ſame ſtuff, through which a ſtring is run, and thereof other loops are formed, all which are tied together with a cord; and thus is the whole faſtened to two neighbouring trees in the field, or two hooks in houſes.

This kind of couch ſerves, at the ſame time, for bed, quilts, ſheets, pillow, &c.

The hammoc uſed on board of ſhips is made of a piece of canvas ſix feet long and three feet wide, gathered or drawn together at the two ends; there are uſually from fourteen to twenty inches in breadth allowed between decks for every hammoc in a ſhip of war; but this ſpace muſt in ſome meaſure depend on the number of the crew, &c. In time of battle the hammocs and bedding are firmly corded and fixed in the nettings on the quarter-deck, or wherever the men are too much expoſed to the view or fire of the enemy.

M. Le Cat has contrived a hammoc of Turkey leather, which may be eaſily raiſed or let down with a ſick perſon in it, by ropes and pullies. See Phil. Tranſ. N° 468. § 3.

HAMMON, in the *Heathen Mythology*. See AMMON.

HAMMON, or CHUMON, in *Ancient Geography*, a city of Aſher, (Joſh. xix. 28.) the ſame with the city of this name, ſaid to belong to Naphtali, 1 Chron. vi. 76.

HAMMOND, HENRY, in *Biography*, was born at Chertſey, in Surrey, in the year 1605. He was educated at Eton ſchool, where he made a rapid progreſs in the learned languages, and was transferred, when he was only thirteen years of age, to Magdalen college, Oxford. Here in due courſe he took his degrees, and was made fellow in his college, where he had been appointed to the office of reader of the lectures in natural philoſophy. During his reſidence at the univerſity, he generally ſpent thirteen hours a day in his ſtudies, among which was a particular regard to theology, and the holy ſcriptures: to theſe he applied himſelf to diſcover their ſenſe, without following the judgment of others. In 1633 he was, from the remarkable fine ſtyle of his preaching, preſented with the rectory of Penſhurſt in Kent, the duties of which he performed with exemplary diligence. In 1642 he was made archdeacon of Chicheſter, and nominated one of the aſſembly of divines at Weſtminſter, but never took his ſeat among them. He took a decided part in favour of the king's party, but was permitted to live in peace till the year 1643, when a reward being offered for his apprehenſion, he thought it right to abſcond, and eſcape to Oxford, where he lived wholly retired, taking no other amuſement than what the giving encouragement and inſtruction to ingenious young men afforded him, and the ſatisfaction which he received from the converſation of the learned. In 1644 he publiſhed his "Practical Catechiſm," which, though oppoſed by the Calviniſts, paſſed through many editions during the author's life. After this Dr. Hammond was preſented by the king to a canonry of Chriſt church, and elected public orator to the univerſity of Oxford; he was alſo appointed one of his majeſty's chaplains in ordinary. Without following the doctor in the minutiæ of his hiſtory, we may obſerve that he attended the king during his ſeveral impriſonments till Chriſtmas 1647, when the monarch was deprived of his ſlender houſhold. Dr. Hammond, being now without employment, returned to Oxford, where he was choſen ſub-dean of Chriſt-church, in which office he continued managing the affairs of the college with much diligence and ability, till the month of March 1648, when he was ejected by the parliamentary viſitors. He was not permitted to leave the place, but was, with Dr. Sheldon, kept priſoner in that city for ſeveral weeks. In this confinement his mind was alive to the purſuits of literature, and he began to prepare for the preſs his learned and valuable "Paraphraſe on the New Teſtament." Previouſly to the trial of his ſovereign, he was reſolved to make one effort in his favour, by writing to the perſons in power in behalf of the king. What he wrote was afterwards publiſhed under the title of "To the Right Honourable the Lord Fairfax and his council of War, the Humble Addreſs of Henry Hammond." The application produced no effect, and the execution of Charles ſoon followed, which excited in him the moſt poignant grief. In 1649 he removed into Worceſterſhire, to the ſeat of ſir John Packington, under whoſe hoſpitable roof he ſpent the remainder of his days. In 1653, he publiſhed his "Paraphraſe and Annotations on the New Teſtament," in folio. He had been led to this great undertaking from the careful and attentive ſtudy of the New Teſtament, with reference to the cuſtoms of the Jews and of the firſt heretics in the Chriſtian church, and alſo of the heathens, eſpecially in the Grecian games, and above all, the importance of the Helleniſtical dialect, into which he had made the exacteſt ſearch; and having, ſome years before, collated ſeveral copies of the New Teſtament, obſerved the variation of our Engliſh from the original, and made an entire tranſlation of the whole for his private uſe: he caſt his work into the form in which it appears. Dr. Hammond did not confine himſelf to the elucidation of the ſcriptures of the New Teſtament, but furniſhed a commentary on the whole Old Teſtament, which was publiſhed in 1659. He died of the ſtone, in the year 1660, in the fifty-fifth year of his age. Had he lived a ſhort time longer, there is reaſon to believe he would have been nominated to the biſhopric of Worceſter by Charles II., as well on account of his great learning and zeal in his profeſſion, as for his attachment to the cauſe of the late king. Dr. Hammond was author of many other works beſides thoſe already mentioned. His natural abilities were very conſiderable, and his learning deep and extenſive, the reſult of indefatigable ſtudy and application. As a preacher he was truly eloquent; Charles I. uſed to ſay of him that he was the moſt natural orator he ever heard. In private life, he was of a ſocial, benevolent, and friendly diſpoſition, and particularly kind and liberal to the poor and diſtreſſed. Biſhop Burnet ſays his death was an unſpeakable loſs to the church : for as he was a man of great learning, and of the moſt eminent merit ; ſo he was a very moderate man in his temper, though with a high principle, and would probably have fallen into healing counſels. Biog. Brit.

Hammond, James, a popular elegiac poet, born in 1710, was educated at Weſtminſter ſchool, and early in life obtained the friendſhip of ſeveral perſons of diſtinction, among whom were the lords Cheſterfield and Lyttleton. He was appointed to the place of equerry to Frederic prince of Wales, and ſerved as member of parliament for Truro in Cornwall. An unfortunate paſſion for a young lady, who was cold to his addreſſes, is ſaid to have diſordered his mind, and probably to have contributed to his death, which took place when he was only thirty years of age. His "Love Elegies," by which he is known as an author, were publiſhed after his death by the earl of Cheſterfield. They have gone through many editions, but it detracts from their merit that they conſiſt, almoſt entirely, of tranſlations or imitations of paſſages in Tibullus. Two of the elegies to his friend Mr. Grenville, and to his miſtreſs, prove that he was able to write pathetically on real topics, and much praiſe is due to him for the ſweetneſs and elegance with which ſome of the fineſt ſentiments of Tibullus are rendered. Lives of the Poets by Johnſon.

Hammond, *Cape*, in *Geography*, the S. extremity of Kayes iſland, in the N. Pacific ocean. N. lat. 59° 48'. E. long. 215°.

Hammond's *Iſland*, a ſmall iſland near the S. coaſt of New Georgia, ſo named by lieutenant Shortland in 1788. S. lat. 8° 46'. E. long. 157° 5'.

HAMMOSTEUS, the oſteocolla of the ſhops.

HAMNSHAR, in *Geography*, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 63° 54'. E. long. 23° 39'.—Alſo, a ſmall iſland on the W. ſide of the gulf of Bothnia. N. lat. 63° 25'. E. long. 20°.

HAMOA, an iſland of the Pacific ocean, in the vicinity of the Friendly iſlands, or forming part of the group. It is repreſented as larger than Tongataboo, though under its dominion, and about two days ſail N.W. from Vavaoo. This, indeed, is deſcribed as the largeſt of all the iſlands in that part of the ocean, as affording harbour and good water ; and as producing, in abundance, every article of refreſhment found at other places that were actually viſited. The people of this iſland ſeem to be in high eſtimation at Tongataboo, for our navigators were told, that ſome of the ſongs and dances with which they were entertained, had been copied from thoſe people, and they ſaw ſome houſes ſaid to be built after their faſhion. Cook's Third Voyage, vol. i. p. 372.

HAMOAZE, a creek or bay in the Engliſh channel, the weſtern branch or main ſtream of the river Tamar, which falls into Plymouth ſound, and forms a harbour for the Britiſh navy, capable of containing 100 veſſels; which uſually lie at anchor in three tiers, in thirteen or fifteen fathoms water.

HAMOTE, a long iſland at the entrance of Queen Charlotte's ſound, in New Zealand, betweeen which and Motuara, another iſland, there is a paſſage into the harbour, called by Cook "Ship Cove."

HAMPDEN, John, in *Biography*, celebrated in the political hiſtory of this country, was born at London in 1594, and was at an early age entered as a gentleman commoner at Magdalen college, Oxford. After remaining there three years, he applied himſelf diligently to the ſtudy of the law, and had made much progreſs in the ſcience, when the death of his father put him in poſſeſſion of a large eſtate, and rendered it unneceſſary for him to continue the purſuit. For ſome time he indulged himſelf in the unreſtrained courſe of life uſual among country gentlemen, till the ſerious aſpect of the times brought him to reflection. He was a relation to Oliver Cromwell, and attached himſelf to the party in oppoſition to the court. About the year 1626, he was brought into parliament, but though an uniform oppoſer of arbitrary meaſures, he took no very decided part in the houſe. In 1637, he was one of thoſe who had engaged a ſhip to tranſport themſelves to America, rather than ſubmit to the tyrannical proceedings of the ſtar-chamber. Fortunately for the country, they were prevented from ſailing ; and in a ſhort time, the ſubject of this article began to diſtinguiſh himſelf by a noble reſiſtance to the illegal demand of ſhip-money. It was after the declaration of the judges in favour of the king's right to levy ſhip-money, that Hampden refuſed the payment. A proſecution was inſtituted againſt him : for twelve days the caſe was argued before the judges, eight of whom decided againſt him, but the right, the law, and the people were with him, and from thenceforth he received, as he merited it, the noble appellation of the "patriot Hampden." From this moment he was a leading man in the conteſt between an arbitrary king and the people ; he who, but a ſhort time before, was ſcarcely known, became now the object of every man's ſolicitude. Perſons of all claſſes began to enquire who and what he was, that durſt, at his own expence and peril, ſupport the liberty and property of the kingdom, and reſcue his country from being made a prey to the court. His power and intereſt were greater than thoſe which any other man poſſeſſed. He was a member of the Long parliament, and various important duties were aſſigned him in and out of the houſe. When a ſcheme was agitated for admitting ſome of the popular party into adminiſtration, the poſt of preceptor to the young prince was deſigned for Hampden, which ſhews how highly his character was eſtimated for talents and purity. The project failed, the breach was widened ; and now the illuſtrious Hampden was ſelected as one of five members, whom Charles I., in 1640, imprudently cauſed to be accuſed of high-treaſon, and attempted in perſon to ſeize in the houſe. When matters were carried ſo far that an appeal muſt be made to the ſword, Hampden accepted the command of a regiment of foot in the parliamentary army, under the earl of Eſſex : his military career was very ſhort, but long enough to enable him to make a glorious diſplay of the ſame courage in the field, which he had ſhewn in civil debate. He received a ſhot in an early engagement, which, in a few days, put an end to his valuable life. This event took place on the 24th of June, 1643, and ſo highly did the king reſpect him, that it is ſaid, he ſent his own phyſicians and ſurgeons to viſit him, and to render him all the aid of their profeſſional talents. His death was probably the ſubject of rejoicing to the royal party, but of the deepeſt grief and affliction to his own. He could not be deſtitute of ambition, but it was of that kind which enabled him to benefit his country : it never rendered him incapable of ſwerving from the line of ſtrict integrity. Biog. Brit. Hume's Hiſt.

Hampden, in *Geography*, a poſt-town of America, in Hancock county, and ſtate of Maine ; 734 miles N.E. of Waſhington.

HAMPSHIRE, or, as called in legal proceedings, the county of Southampton, and county of Hants, a diſtrict of

England, bordering on the Engliſh Channel, and having Dorſetſhire, and part of Wiltſhire on its weſtern limits, while the latter county, and part of Berkſhire, ſkirt it on the ſouth, and Surry attaches to the eaſtern border. The area of land, thus ſurrounded, is calculated to extend about 42 miles in length, by 38 in breadth; and to contain 1,112,000 acres, of which 600,000 are ſuppoſed to be appropriated to paſturage, 300,000 to arable, and the remainder in foreſt, common, and waſte. In this arrangement, the Iſle of Wight, a part of Hampſhire, is not included. For civil purpoſes the whole is divided into 39 hundreds and liberties, which are again ſubdivided into 293 pariſhes: it has one city, (Wincheſter,) twenty market towns, and about 1000 villages and hamlets. According to the population report of 1801, it contained, (including the Iſle of Wight,) 39,257 houſes, and 219,656 inhabitants: of the latter 105,667 are males, and 111,989 are females. Hampſhire, with the Iſles of Wight, Jerſey, Guernſey, Sark, and Alderney, are in the dioceſe of Wincheſter. The county returns twenty members to the Britiſh parliament: *viz.* two for the ſhire, two for Wincheſter, and two for each of the following boroughs: Southampton, Portſmouth, Petersfield, Stockbridge, Chriſtchurch, Lymington, Whitchurch, and Andover: ſix members are alſo returned for the boroughs of Newport, Yarmouth, and Newton, in the Iſle of Wight. A particular account of this iſland will be given in the letter I.

Ancient Hiſtory.—The aboriginal inhabitants of this diſtrict are ſaid to have migrated from the continent at a very remote period; and to have acquired the name of Segontiaci. Theſe were diſpoſſeſſed by the Belgæ, a German tribe, who are deſcribed by hiſtorians as having come into this iſland between two and three centuries before the arrival of Julius Cæſar. The Belgæ, (ſee vol. iv. of this work), appear to have been a powerful people, and to have obtained poſſeſſion of a large tract of country before the Roman conqueſt. Subdued, however, by theſe military invaders, their country was named Britannia Prima, afterwards Flavia Cæſarienſis, and was occupied by the following military towns or ſtations: Venta-Belgarum, Wincheſter; Clauſentum, Bitter, near Southampton; Portus Magnus, Porcheſter; and Vindonum, Silcheſter; other encampments, and traces of Roman roads, are to be ſeen in different parts of the county. Under the Anglo-Saxon dynaſty, this diſtrict was part of Weſſex, and Wincheſter became the capital. The name of the county was now changed into Hantunſcyre, and in Wincheſter Egbert was crowned king of all England.

Topography and Deſcription.—The ſurface of Hampſhire preſents a continued variation of gently riſing hills and fruitful vallies, adorned with numerous ſeats and villages, and interſperſed with extenſive woodlands. Its ſouthern parts were the firſt inhabited, and there the population is ſtill the greateſt; the mildneſs of the ſeaſons, and the convenience of the ports, operating as ſtrong inducements to continued reſidence. The chief part of the county is encloſed; though large tracts of open heath, and uncultivated land, remain in the vicinity of Chriſtchurch, and on the borders of Dorſetſhire. The aggregate extent of the waſte lands, excluſive of the foreſts, is ſuppoſed to include nearly 100,000 acres. The ſoils are extremely numerous, but the far greateſt proportion is tending to chalk; and a ridge of chalk-hills, or downs, may be traced acroſs the country in the parallel of Wincheſter. On the north ſide, bordering on Berkſhire, the ſoil is deep, and very productive: here great quantities of corn are annually grown, and the elm and the oak flouriſh greatly; though the latter, in many inſtances, has been originally tranſplanted. On the acclivities of the hills towards Baſingſtoke, the land is in general very deep and ſtrong, with chalk beneath: round Whitchurch it is ſhallower, and leſs chalky, but produces good crops of corn and ſaintfoin. A beautiful vale divided into well-watered meadows, and producing from two to three loads of hay per acre, extends from Overton towards Stockbridge, and thence to Redbridge. The land round Andover is high and down-like; yet the ſoil, though thin, is very favourable to the growth of barley: towards Romſey it is yet more fertile; and the land is well cultivated, and interſperſed with woods, and fine hedge-row timber. South and ſouth-weſt of Romſey, the country is principally occupied by the New Foreſt; though very large open tracts ſtill remain, as already ſtated, on the borders of Dorſetſhire, and in the vicinity of Chriſtchurch: the ſoil of the New Foreſt is chiefly loam and gravel. Valuable ſalt-marſhes are found about Redbridge. The pariſhes eaſtward of Alton, and bordering on Surrey, are chiefly appropriated to the growth of hops, the plantations of which have been conſiderably augmented, through the reputation of the Farnham hops; yet, though equally good, and the produce of contiguous grounds, ſuch is the faſcination of a name, that the price they bear at market is generally from forty to fifty ſhillings per hundred weight below thoſe with the Farnham mark. About 800 acres are ſuppoſed to be occupied by the hop-grounds: the produce, though varying conſiderably, may be averaged at about five cwt. per acre. The land towards Petersfield is more open, with great quantity of down; approaching Portſmouth, it is more incloſed, and interſperſed with timber and underwood. The hills round Fareham and Warnford are chalky, and partly covered with beech wood: here are alſo extenſive downs; and the banks of the river Itchin are enriched with ſome valuable water meadows.

Hampſhire has obtained high reputation as a breeding country, and particularly for ſheep and hogs. The original Hampſhire ſheep is horned and white-faced; the flocks are generally large, and the downs are moſtly covered with them: the whole number of ſheep annually fed in the county is eſtimated at 350,000. For its breed of hogs, Hampſhire is proverbially famous; and this breed is of the largeſt kind, ſuch being encouraged by the farmers as moſt productive. Thoſe in the vicinity of the foreſts are principally fed on acorns and beech-maſt, which give them a ſuperiority over moſt others in the kingdom: their weight is from ſixteen to forty ſcore each.

A very conſiderable proportion of Hampſhire is occupied by the foreſt of Alice Holt and Woolmer, the foreſt of Bere, and the New Foreſt. The former is ſeparated into two portions by intervening private property: its area comprehends about 15,498 acres, of which 8694 belong to the crown. On a ſurvey made of the timber of this foreſt in the year 1608, 1301 oak trees were returned as fit for the uſe of the navy; and 23,934 loads as defective: this quantity has ſince greatly decreaſed; and in 1783, the ſound and defective wood together amounted to only 15,142 loads; and thoſe were of trees moſtly of one age, that is, from 100 to 120 years, without any having been planted to ſucceed them. This foreſt is ſituated on the borders of Surrey and Suſſex. The foreſt of Bere extends northward from the Portſdown hills, and, according to the perambulation made in the year 1688, and now conſidered as the boundary, it includes about 16,000 acres, of which one-third is encloſed. This foreſt is divided into two walks, reſpectively named Eaſt and Weſt. From a ſurvey of the timber in this foreſt made in the year 1783, it appears that the quantity then growing was only a twenty-eighth part of what was ſtanding in the year 1608; and by the many incroachments made in modern times, its boundaries were continually decreaſing.

The New Foreſt is particularly celebrated in hiſtory, from the vaſt enlargement of it by William the Conqueror, and from its being the ſcene of the accidental death of his ſucceſſor William Rufus. Its preſent appellation has an evident reference to the alteration made in its extent by the Conqueror: but a more ancient name of this diſtrict was Itene, or Y. Thene: it was alſo called Natanleod, from the Britiſh chieftain, who was here conquered by Cerdic, the founder of the Weſt-Saxon monarchy.

For further particulars reſpecting the important tract, ſee New Forest.

The principal rivers in Hampſhire are the Itchin, the Avon, the Boldre Water, the Exe, the Anton, and the Teſe or Teſt; ſeveral ſmaller ſtreams riſe in the north-weſt parts, but ſoon leave the county. The Itchin has its ſource near the middle of the county, and being ſoon increaſed by the Alne, flows weſtward to King's Worthy; where, turning to the ſouth, it paſſes Wincheſter, Twyford, and Biſhopſtoke, and falls into the Southampton water, about half a mile eaſtward from the town. The Avon enters the county from Wiltſhire, and meanders in ſeveral channels near the New Foreſt; whence, paſſing Fordingbridge and Ringwood, it flows towards Chriſtchurch, and having received the waters of the Stour, unites with the ſea in Chriſtchurch bay. The Boldre Water is formed by various ſprings that riſe in the New Foreſt, and unite above Brokenhurſt; whence, in a ſingle ſtream, they paſs Boldre and Lymington to the ſea. The Exe has alſo its ſource in the ſame diſtrict, and opens in a broad eſtuary to the ſea below Exbury. The Anton riſes in the north-weſt angle of the county, and, flowing through part of Andover, runs into the Teſe, below Whirwell. The Teſe has its origin near Whitchurch, and, after its junction with the Anton, paſſes Stockbridge and Romſey, and, opening below Redbridge, it forms the head of the Southampton Water, which is properly an arm of the ſea, extending from above Southampton to Calſhot caſtle. Driver's Agricultural Survey of Hampſhire. Warner's Topographical Remarks on Hampſhire, &c. 2 vols. 8vo. Vancouver's Agricultural Survey of Hants, 8vo. 1810.

Hampshire, an extenſive, populous, and wealthy county of America, in Maſſachuſetts, which was made a ſhire in 1662. It is in many parts mountainous and hilly, and extends acroſs the ſtate from N. to S.; bounded N. by the ſtates of New Hampſhire and Vermont, S. by the ſtate of Connecticut, E. by Worceſter county, and W. by Berkſhire. It contains 62 townſhips and 72,432 inhabitants. Its principal towns lie on both ſides of Connecticut river, which interſects it from N. to S. Theſe are Springfield, Weſt Springfield, Northamption, Hudley, Hatfield, Durfield, and Northfield. This is one of the moſt fertile, as well as populous, counties in the ſtate. A copper mine has been diſcovered in Leveret, and black lead in ſeveral other places.—Alſo, a county in Virginia, bounded N. and N.W. by the Potowmack river, which divides it from the ſtate of Maryland, about 60 miles long and 50 broad; containing 7310 free inhabitants, and 587 ſlaves. Iron ore and coals have been diſcovered on the banks of the Potowmack. Its chief town is Romney.

HAMSOKEN, the liberty or privilege of a man's own houſe; alſo a franchiſe granted to lords of manors, whereby they hold pleas, and take cognizance of the breach and violation of that immunity: and it likewiſe ſignifies "quietantiam miſericordiæ intrationis in alienum domum vi & injuſte." Fleta, cap. 47. In Scotland, violations of this kind are equally puniſhable with raviſhing a woman, And our old records expreſs burglary under the word *hamſocne*.

HAMPSTEAD, or Hamestede, as the name was formerly written, in *Geography*, a pariſh in the hundred of Oſſulton, and county of Middleſex, England, is juſtly regarded as the moſt pleaſant ſituation for villas in the vicinity of London. Hence it abounds with reſpectable houſes belonging to the higher claſſes of merchants and tradeſmen, who have other dwellings, counting-houſes, &c. in the metropolis. The buildings of Hampſtead are irregularly diſperſed over the ſummit, and the ſouthern and weſtern ſides of a hill, which riſes to a conſiderable elevation, and is very ſteep in many places. At the top of the hill is a piece of waſte land, called Hampſtead-common, from various ſtations on which extenſive, diverſified, and intereſting views are obtained, of a fertile, pictureſque tract of country to the north and north-weſt, and of an expanſive flat to the ſouth, ſouth-eaſt and ſouth-weſt, terminated by the Surrey hills and Epping foreſt. In the midſt of this flat are the immenſe connected cities of London and Weſtminſter, with the borough of Southwark, and numerous villages and hamlets, all really, or apparently connected with the Britiſh metropolis. To a foreigner, and even to a native of London, this ſcene muſt prove ſingularly intereſting and attractive; and each will contemplate with ſome aſtoniſhment, the vaſt congregation of houſes, churches, and public buildings, that are indiſtinctly ſpread before him. Nor is the fore-ground devoid of intereſt and pictureſque features: for the red ſandy ſoil, broken clumps of ground, furze, heath, and old trees, all conſpire to render the home ſcene "highly pleaſing and beautiful." The whole hill is alſo adorned with many plantations of old and young trees; among which there are numerous elms of large ſize. The inequality of ground, and abruptneſs of ſome declivities, may be alſo enumerated among the natural beauties of the place. From theſe attractions, and its nearneſs to the central part of London, being leſs than five miles from Somerſet-houſe, Hampſtead is nearly covered with buildings, and the value of land has been greatly advanced within the laſt century. This pariſh comprehends 2169 acres, of which about 200 may be conſidered waſte. Though Hampſtead has few attractions to the antiquary, yet it ſeems that a Roman villa, or ſome Roman reſidence, was eſtabliſhed here during the Anglo-Roman dynaſty; for, in the year 1774, ſeveral ſepulchral urns, vaſes, earthen lamps, &c. were dug up in a place called the Wells Walk. (See Gent. Mag. for 1776. p. 169.) The manor was given in 986, by king Ethelred, to the church of Weſtminſter. In the Doomſday-book it is deſcribed to contain four hides. Since the diſſolution of monaſteries, it has been poſſeſſed by ſeveral different families. Near the S.W. end of the village is the church, which was newly built, and conſecrated in Oct. 8, 1747. Before the year 1477, this place was only a chapelry to Hendon, but it was then made a donative, or perpetual curacy. In the year 986 Hampſtead contained only five cottages. Mr. Lyſons ſtates that the population increaſed during the 17th and 18th centuries, at the rate of ſeven to one. In 1801 the pariſh contained 738 houſes and 4343 inhabitants. Near the eaſtern extremity of the village is a ſpring of mineral water, which was formerly much frequented. Mr. Goodwin, a medical practitioner here, has publiſhed a ſmall volume (1804) deſcriptive of the properties of the mineral waters of Hampſtead. For many other particulars relating to Hampſtead, ſee Lyſons's Environs of London, v. ii.

Hampstead, a town of America, in Rockingham county, New Hampſhire, about 34 miles W. of Portſmouth; incorporated in 1729, and in 1800 containing 790 inhabitants.

HAMPTON, a pariſh in the hundred of Spelthorne, and county of Middleſex, in England, is ſeated on the northern bank of the river Thames, at the diſtance of 12 miles S.W.

of London. This place is diſtinguiſhed by a magnificent palace, called Hampton-court, which, though not originally built, was greatly enlarged by cardinal Wolſey, who gave it to the king in the year 1526. After this period, the monarch again extended the buildings, and added much to their embelliſhment. The preſent edifice conſiſts of various dwellings and offices, with a chapel and a hall; all of which ſurround three quadrangular courts, and occupy an area of ground meaſuring about 700 feet from eaſt to weſt, by 400 feet from north to ſouth. Many alterations and additions were made to the palace by king William, from deſigns by ſir Chriſtopher Wren. The royal family have not reſided at, or occupied this palace for many years. Its numerous apartments are now occupied by various perſons, who are chiefly preſented with theſe reſidences by the lord chamberlain, and by other miniſters of the crown. The prince of Orange, with his family and ſuite, have a ſuit of apartments here. Several of the public rooms are decorated with paintings, ſome of which are the works of eminent maſters. Among theſe are the ſeven celebrated cartoons by Raphael. They repreſent ſo many paſſages from ſcripture hiſtory, and are eſteemed among the moſt admirable productions of that diſtinguiſhed maſter. A ſeries of highly finiſhed plates from theſe are now in the progreſs of engraving by Mr. Holloway. To particularize the numerous other works of arts, and briefly notice the chapel, the noble hall, the gardens, graperies, &c. would render this article longer than conſiſtent with the nature of the publication. The reader is, therefore, referred, for ſuch information, to Lyſons's Environs of London, vol. v. and the lateſt guide to Hampton-court. This palace was occupied by king Henry VIII. during the latter part of his reign; when it was rendered a ſcene of great pomp and ſplendour, and it is ſaid that 280 ſilk beds were reſerved for viſitors. Edward VI. was born here, and queen Jane Seymour died at this place in the ſame month, *viz.* Oct. 1537. In 1540 the monarch introduced Catharine Howard to this palace, where, in 1543, the ſame ſanguinary tyrant was married to Catharine Parr. Philip and Mary kept the Chriſtmas of 1558 at Hampton-court, at which feſtival the palace was illuminated with 1000 lamps; various feats, ſports, and revels were held; and in a juſting match on the 29th of Dec. 200 ſpears were broken. Queen Elizabeth reſided here occaſionally, and king James I. aſſembled the Preſbyterians and members of the eſtabliſhed church here 1603-4, to hold a conference reſpecting a new tranſlation of the bible, and alterations in the liturgy. King Charles I. held ſeveral interviews with ambaſſadors here, and in 1647 was impriſoned within theſe walls. After his decapitation, Cromwell made it his principal reſidence; and ſubſequently it was progreſſively occupied by kings Charles II. James II., William, George I., and George II. In 1540 an act of parliament was paſſed for creating the manor of Hampton-court an honor; which comprehends 16 manors, beſides a tract of land called the Chaſe. The latter was made in 1538, for the purpoſe of preſerving game immediately contiguous to the palace, whereby his majeſty might enjoy the ſports of the chaſe, without the fatigue of travelling far from home. In this pariſh is Buſhy-park, the reſidence of the duke of Clarence: and Hampton-houſe, the elegant villa of the late Mr. Garrick. The church contains ſeveral monuments. In 1548 here were 230 houſlying people in this pariſh; and in 1801 the houſes are ſpecified at 141, and the population at 1722.

Hampton, a townſhip of America, in Windham county, Connecticut, 8 miles N.E. of Windham; containing 1379 inhabitants.

Hampton, *Eaſt*, a townſhip in Hampſhire county, Maſſachuſetts, S. of Northampton; incorporated in 1785, and containing 586 inhabitants.—Alſo, a half-ſhire town of Suffolk county, on the E. end of Long iſland, New York; containing 1549 inhabitants, and an academy, which in 1791 had 92 ſtudents.

Hampton, the *Winicowett* of the Indians, a townſhip on the ſea-coaſt of New Hampſhire, on the eaſtern ſide of Rockingham county, incorporated in 1638, and in 1800 containing 875 inhabitants; 8 miles S.E. of Exeter. In 1791 a canal was cut through the marſhes in this town, which opens an inland navigation for loaded boats, from Hampton through Saliſbury, into Merrimack river, for about eight miles.

Hampton *Falls*, a ſmall town taken from that laſt mentioned, lying on the road which paſſes from Exeter to Newbury port, ſix miles S.E. of the former and eight N. of the latter; incorporated in 1712, and in 1800 containing 519 inhabitants.

Hampton, a townſhip in the northern part of Waſhington county, New York, containing 700 inhabitants.—Alſo, the capital of Elizabeth county, in Virginia; a port of entry and poſt-town, ſituated at the head of a bay, running up N. from the mouth of James river, called "Hampton road," 5 miles N.W. of Point Comfort. It contains about 30 houſes, an epiſcopal church, a court-houſe and gaol. It was anciently called "Kecoughton" by the Indians; 18 miles N. of Norfolk. It exports grain, lumber, ſtaves, &c.

HAMRA, a ſmall iſland in the Red ſea; near the coaſt of Arabia. N. lat. 25° 30′.

HAMRACHI, a town of Perſia, in Segeſtan; 180 miles S.E. of Zareng.

HAMRAH, *Ras-el-Hamra*, *Cape*, on the coaſt of Algiers, anciently called "Promontorium Hippi." N. lat. 37°. E. long. 7° 58′.

HAMRANGE, a town of Sweden, in Geſtricia, ſituated in a bay of the gulf of Bothnia; 14 miles N. of Gefle. N. lat. 60° 55′. E. long. 16° 52′.

HAMSTEAD, a town of America, in Rockland county, New York, W. of Hudſon river; containing 1981 inhabitants.

Hamstead, or *Hemſtead*, *North* and *South*, are ſituated in Queen's county, Long iſland, New York; 23 miles E. of New York city.

HAMSTED Point, a cape on the N. coaſt of the Iſle of Wight. N. lat. 50° 43′. W. long. 1° 16′.

HAMSTER, Siberian, in *Zoology*. See Mus *Acredula*.

Hamster, *German*. See Mus *Cricetus*.

HAMULARIA, a new genus of inteſtinal worms eſtabliſhed by Treutler, in a diſſertation lately printed at Leipſic. The body is linear and cylindric, the head obtuſe, and beneath an armament of two crochets. Only a ſingle ſpecies of this genus has been hitherto diſcovered, and that is ſpecifically named *lymphatica*. It was found upon the external part of the tracheal artery of a man who died of a conſumption, where it appeared in cluſters interwoven with each other. This animal, the length of which is about an inch, very much reſembles ſome kinds of the aſcarides, but as the latter reſide in the inteſtines, the habits of the hamulariæ ſeem to indicate a peculiar difference, and probably an organization materially diſtinct.

HAMUS, or Hamulus, a hook.

Surgeons alſo make uſe of an inſtrument thus called, to extract the child in difficult labours.

HAMWARDS, in *Rural Economy*, a term provincially applied, in ſome places, to ſtraw or ruſh-collars for horſes or other animals.

HAMZAH, in *Biography*, the principal founder of the Druſes in Syria, commenced his public career at Cairo, under the reign of Hakem-Bamrillah, about the commencemens of the eleventh century of the Chriſtian era. He became a diſciple of Mahomet Ebn Iſhmael, ſurnamed Durzi, who is ſuppoſed to have inſpired *Hakem* (ſee his article) with the impious conceit of his being God incarnate. After the maſſacre of the new prophet, Hamzah was encouraged to aſſume his office, and to propagate the doctrine of Hakem's divinity through his dominions. He gained a multitude of ſupporters and followers among the Druſes in the mountains of Syria, whoſe deſcendants ſtill maintain his peculiar tenets, and particularly the fundamental one, that the great creator of the univerſe became incarnate in Hakem, in order to inculcate on mankind the principles of true religion, and to exhibit in his perſon an object of adoration ſuited to their limited and imperfect conceptions. Hamzah aſſumed the character of high prieſt and prophet of the religion of the Druſes, which was a compound of Mahometaniſm and Catholic Chriſtianity. The followers of this ſyſtem, if ſo it can be denominated, are ſo ignorant, that nothing preciſe concerning their belief can be learned from them or their prieſts. The work, which is held in the higheſt eſtimation among them, was compoſed by Hamzah, and is entitled "The Book of Teſtimonies to the Myſteries of the Unity." It was intended as a rival to, or ſubſtitute for the Koran, and is thought by ſome to be ſuperior to it in point of purity and elegance of ſtyle. A copy of the work was, towards the concluſion of the 17th century, lodged in the royal library at Paris, where it was tranſlated from the Arabic into the French language. Moreri.

HAN, in *Geography*, a city of China, of the ſecond rank, in the province of Se-tchuen. N. lat. 31°.

Han, a ſmall iſland near the coaſt of Scotland. N. lat. 58° 37′. W. long. 4° 35′.

HANAMINE, a ſmall iſland near the weſtern coaſt of Ireland, and county of Galway; 2 miles N.W. of Rinuell point.

HANAB Althaleb, in the *Materia Medica*, a name uſed, by the ancient Arabian writers, to expreſs the *lycoperſicum*, or *pomum amoris*.

HANAPER, or Hamper, an office in chancery, under the direction of a maſter, his deputy and clerks, anſwering, in ſome meaſure, to the fiſcus among the Romans.

Hanaper, *Clerk of the.* See Clerk *of the Hamper*, &c.

HANAU, in *Geography*, a town of Germany, capital of Hanau Munzenburg, on the Kinzig, where it joins the Maine. It is divided into Old and New Town; the former received its charter in 1303, and the latter was built in 1597 by the Walloons, who fled from the perſecutions of Philip II. king of Spain. This town contains ſeveral churches, with manufactures of woollen, ſilk, cotton, porcelain, &c. and alſo roll-tobacco: but the chief articles of its trade are timber, caſt-iron, meal and corn; 8 miles E. of Francfort on the Maine. N. lat. 50° 9′. E. long. 8° 59′.

Hanau *Munzenburg*, a county and principality of Germany, ſituated for the moſt part on the Maine, between the electorate of Mentz, biſhopric of Fulda, and principality of Heſſe Hamburg; about 45 miles long, and 15 wide. It is deemed one of the moſt fertile and rich countries in Germany, producing grain, legumes, exquiſite wine, and delicious fruits. It contains magnificent foreſts, mines of ſalt, copper, ſilver, and cobalt. It was erected into a county in 1439, and fell by compact to the landgrave of Heſſe Caſſel in 1736.

HANBAL, Ahmed Ebn, in *Biography*, one of the chiefs of the four ſects recognized as orthodox among the Mahometans, was born at Bagdat about the year 164 of the Hegira. He was eſteemed as a doctor profoundly ſkilled in the law, the traditions, and the devotional obſervances obligatory on the diſciples of the prophet. He viſited all the principal cities in the Eaſt, where he propagated his opinions, and acquired univerſal reſpect by his virtues. But notwithſtanding his high character, he was impriſoned, and ordered to be cruelly ſcourged, for refuſing to ſubſcribe to the opinion that the Alcoran was created. The contrary opinions, maintained by the orthodox, expoſed them, at this period, to cruel perſecutions from the princes of the houſe of Abbas. Hanbal was kept in priſon till the ſucceſſion of a new prince, when he was ſet at liberty, and richly compenſated for all his ſufferings. Hanbal, on account of his perſecutions, eſtabliſhed a ſect, named after himſelf Hanbalites, who attracted much notice about a century after the death of the founder. At this period, the head of the ſect maintained that God would hereafter place Mahomet upon the throne of his glory near himſelf. The other Mahometan ſects, while they condemned this doctrine as heretical and impious, maintain that the prophet would be exalted to the high honour of mediator and interceſſor for all true believers at the day of judgment. Theſe diſcordant opinions led to the moſt ſavage perſecutions, which were continued a long time, ſo that Bagdat was a complete ſcene of blood and confuſion. Hanbal died in the year 241, or 855 of the Chriſtian era. Univer. Hiſt.

HANCES, in a *Ship*, are falls or deſcents of the fiferails, which are placed as baniſters in the poop, &c. and down to the gang-way.

Hances, or *Hanſes*, in *Architecture*, are the ends of elliptical arches, which are arcs of ſmaller circles than the ſcheme or middle part of the arch.

HANCOCK, in *Geography*, a large maritime county of America, in the ſtate of Maine, bounded N. by Lower Canada, S. by the ocean, E. by Waſhington county, and W. by Lincoln and Kennebeck counties; 190 miles long from N. to S. and nearly 60 broad, interſected by Penobſcot river. It contains ſeveral townſhips and plantations; and the number of inhabitants is 16,316. It is well watered; and on the ſea-coaſt are many harbours and inlets, hidden by a multitude of fertile iſlands; the largeſt of which are ſituated in Penobſcot bay. The towns along the ſea-coaſt, and on the banks of the rivers Penobſcot and Union, are the moſt productive and populous. The ſhire-town is Caſtine.—Alſo, a county in the upper diſtrict of Georgia; containing 14,456 inhabitants, of whom 4835 are ſlaves. Alſo, a ſmall poſt-town of Maryland, in Waſhington county, on the N. bank of Potowmack river; about 25 miles S.E. of Bedford in Pennſylvania.—Alſo, a long, narrow, and mountainous townſhip in the New York line, in Berkſhire county, Maſſachuſetts; incorporated in 1776, and containing 1187 inhabitants.—Alſo, a townſhip in Hillſborough county, New Hampſhire, ſituated between two branches of Contoocoock river; 14 miles E. of Keene; incorporated in 1779, and containing 1120 inhabitants.—Alſo, a town, now called *Clinton*, in Kennebeck county, Maine, encloſed by the Kennebeck and Sebeſticook rivers.—Alſo, a townſhip in Addiſon county, Vermont, having 149 inhabitants.—Alſo, a river of Waſhington iſland, on the N.W. coaſt of North America, called "Maſbeet" by the Indians, diſcovered by

Capt. Crowell in 1791. It diſcharges itſelf into the ſea at the north end of the largeſt iſland, and at its mouth is nearly 2½ nautical miles wide. The land is low and apparently fertile; and the river abounds with ſalmon. The mouth of the river is in N. lat. 54° 7′. W. long. 131° 54′. Morſe.

HANCOCK's *Harbour*, called by the Indians "Clioquot," is ſituated about 20 leagues E.S.E. of Nootka, in N. lat. 48° 30′. W. long. 125° 26′. Its entrance is about five miles in length, and it has good anchorage. Several iſlands and ſeveral ſand-banks are diſperſed about it: it has alſo a number of fine coves. The land round the harbour is generally rocky and mountainous, covered, however, with pine, fir, ſpruce, cedar, hemlock, cypreſs, and other large trees. The climate is much milder than on the eaſtern ſide of the continent in the ſame latitude; the froſt, in winter, not preventing vegetation. An eaſterly wind is conſidered here as a prognoſtic of a ſtorm, and weſt winds bring fair weather. The foreſts abound with deer, raccoons, wolves, bears, ſquirrels, martins, land otters, beaver, and wild cats. The amphibious animals in this place are the common ſeal and ſea-otter. The inhabitants are ſaid to be cannibals. This and other places of the ſame name have their appellation in honour of the late governor Hancock of Maſſachuſetts.

HAND, MANUS, a part or member of the body of man, making the extremity of the arm.

The mechaniſm of the hand is very curious; excellently contrived to fit it for the various uſes and occaſions we have for it, and the great number of arts and manufactures it is to be employed in. It conſiſts of a compages of nerves, and little bones joined into each other, which give it a great degree of ſtrength, and at the ſame time an unuſual flexibility, to enable it to handle adjacent bodies, lay hold of them, and graſp them, in order either to draw them toward us or thruſt them off. Anaxagoras is repreſented, by ancient authors, as maintaining, that man owes all his wiſdom, knowledge, and ſuperiority over other animals, to the uſe of his hands. Galen repreſents the matter otherwiſe: man, according to him, is not the wiſeſt creature, becauſe he has hands; but he had hands given him becauſe he was the wiſeſt creature; for it was not our hands that taught us arts, but our reaſon. The hands are the organs of reaſon, &c. De Uſu. Part. lib. i. cap. 3. For an anatomical deſcription of the hand, ſee EXTREMITIES.

The hand makes the ſubject of the art of palmiſtry, which is employed in conſidering the ſeveral lines and eminences of the palm of the hand, their ſignifications, &c. Among the Egyptians, the hand was uſed as a ſymbol of ſtrength; among the Romans, it was held a ſymbol of fidelity: and, accordingly, was conſecrated to that goddeſs by Numa, with great ſolemnity.

HAND, in *Falconry*, is uſed for the foot of the hawk. To have a clean, ſtrong, ſlender, glutinous hand, well clawed, are ſome of the good qualities of a hawk, or falcon.

HAND, *Branding*, or *Burning in the*, in *Law*. See BRANDING.

HAND, *Diſabling of*. See MAYHEM.

HAND, *Holding up of*. See ARRAIGN.

HAND, *Loſs of*, a puniſhment inflicted for particular crimes. See CONTEMPT, COURT *of the Lord Steward of the King's Houſehold*, OWLING, &c.

HAND, in the *Manege*, is a term variouſly uſed. Sometimes it ſtands for the fore-feet of a horſe.

Hand is alſo uſed for a diviſion of the horſe into two parts, with reſpect to the rider's hand. The *fore-hand* includes the head, neck, and fore-quarters; the *hind-hand* is all the reſt of the horſe.

Spear-hand, or *ſword-hand*, is uſed for a horſeman's right hand.

Bridle-hand is the horſeman's left hand.

A regular cavalier holds his bridle-hand two or three inches above the pommel of the ſaddle.

A horſeman is ſaid to have *no hand*, when he only makes uſe of the bridle unſeaſonably; not knowing how to give the aids, or helps, of the hand with diſcretion.

To keep a horſe *upon the hand*, ſignifies to feel him in the ſtay upon the hand, and to be always prepared to avoid any ſurpriſe from him. When the horſe obeys and anſwers the effects of the hand, he is ſaid to *reſt well upon the hand*.

A horſeman ought to have a *light hand, i. e.* he ought only to feel the horſe upon his hand, ſo as to reſiſt him whenever he attempts to ſlip from it; and as ſoon as he has made his reſiſtance, he ought to lower the bridle, inſtead of cleaving to it.

If a horſe, by a too great eagerneſs to go forward, preſſes too much *upon the hand*, it ought to be ſlackened at certain times, and at other times to be kept hard, in order to diſappoint him from continually preſſing upon the bit. This facility, or liberty, of the horſeman, of ſlackening or ſtiffening the hand, makes what they call a *good hand*. A horſe is ſaid to *force the hand*, when he does not fear the bridle, but runs away in ſpite of the rider.

To *work the horſe upon the hand*, is to manage him by the effects of the bridle, without any other helps, except the calves of the legs.

To be *heavy upon the hand*, is underſtood of a horſe, which on account of the ſoftneſs of his neck, the weakneſs of his back, the largeneſs of his head, and the weight of his fore-quarters, or his wearineſs, throws himſelf upon the bridle, without making any reſiſtance, or effort, to force the horſeman's hand.

To make a horſe right upon the hand, and free in the *ſtay* or *reſt*, he muſt be taught to know the hand by degrees, and by gentle methods; the horſeman muſt turn him, or change *hands*: ſtop him, and manage with dexterity the *appui*, or preſſure of his mouth, ſo as to make him ſuffer chearfully and freely the effect of the bit-mouth, without reſiſting or reſting heavy upon the hand. The ſhort, or hand-gallop, teaches horſes to be right upon the hand.

HAND, in *Rural Economy*, the name of a meaſure which is employed in aſcertaining the height of horſes, and ſome other ſorts of animals. It is the meaſure of the hand when clenched or ſhut up. A good ſized horſe is from fifteen to ſixteen hands in height; but there are many horſes that are much higher.

HAND is alſo found, in many other terms, or phraſes of art, belonging to the manege, as,

HAND, *to ſlack, or yield the*, is to ſlacken the bridle.

HAND, *to hold up, or ſuſtain the*, is to pull the bridle in.

HAND, *to guide a horſe by the*, is to turn or change hands upon one tread.

HAND, *appui, or ſtay of the*. See APPUI.

HAND, *beat upon the*. See BEAT and CHECK.

HAND, *to preſs upon the*. See PRESS.

HAND, *to change the*. See CHANGE.

HAND, *effects of the*. See EFFECTS.

HAND, *haſten the*. See HASTE.

HAND, *to feel a horſe upon the*. See FEEL.

HAND, *full, or full reſt upon the hand*. See APPUI and MOUTH.

Hand, *to have mares covered in the.* See Horse and Mare.

Hand, *to make a horſe part from the*, or ſuffer him *to ſlip from the hand*, is to put on at full ſpeed.

Hand, *to make a horſe part right from the*, he ſhould not put himſelf upon his back or reins, but bring down his hips.

Hands, *all.* A horſe is ſaid to turn upon *all hands*, that is not reſty for one hand. This is called in French *entire.*

Hand, *harmonical*, in *Muſic*, uſed by old writers on the elements of the art, for the ancient diagram, or ſcale of muſic, marking the ſolmiſation on the joints of the fingers on the left hand. See *Muſic* Plates.

It has been ſuppoſed that this was Guido's method of teaching the boys of his convent to ſing. But no proof can be found, in the writings of Guido, that the harmonic hand was of his conſtruction; writers however mention it by the name of the Guidonian hand, ſoon after his time. And, when his ſyſtem was digeſted, and the hexachords were arranged, to teach the names of the notes by the joints of the fingers of the left hand ſeems to have been a common expedient; in which, however, the ſyllabic names of the notes do not follow in an order ſufficiently regular or remarkable to be of much uſe in forming the hexachords, or diſcriminating the mutations. Such an expedient would have been more clear and uſeful in teaching the tetrachords, by appropriating a finger to each of the five, in the great ſyſtem, or diſdiapaſon of the Greeks. And by imagining the five fingers of each hand to repreſent the five lines and ſpaces of the baſe and treble clefs, children may likewiſe be taught to name the notes in the ſcale much ſooner than ſolmiſation by the harmonic hand. Henry Faber has arranged the notes in the harmonic, or Guidonian hand, in a better manner than any other author within our knowledge, by placing a clef at the top of the three middle fingers, as beacons or land-marks; and making each finger the repreſentative of a tetrachord. D'Avella exhibits a great number of harmonic hands, in which the notes of the ſcale are differently diſpoſed; one of the hands, we know not why, he calls Boethian, another he gives to Plato, and a third to Ariſtotle. See Hexachords, Solmisation, and d'Avella.

Hand *of juſtice*, is a ſceptre, or batoon, a cubit long, having an ivory hand at the extremity thereof; uſed as an attribute of certain kings, wherewith they are painted in their royal robes; as on the coronation day.

Authors uſually call it *virga.* Louis X. of France firſt took the hand of juſtice for his device.

Hands, *impoſition of*, or *laying on of hands*, ſignifies the conferring of holy orders; a ceremony wherein the hands are laid on the head of another, as a ſign of a miſſion, or of a power given him to exerciſe the functions of the miniſtry belonging to the order.

The apoſtles began to appoint miſſionaries by the impoſition of hands. See Imposition.

Hands, *waſhing one's*, of a thing ſignifies the witneſſing that a perſon has no part or concern in an affair; and that he will not be anſwerable for it: this Pilate did in reſpect of our Saviour's death. In this ſenſe, a man is ſaid to have *clean hands;* becauſe the hands are the chief inſtruments of action; and particularly a judge does this, to denote that he has not been corrupted by bribes or preſents.

Hand *beating*, in *Agriculture*, a term uſed in ſome places provincially to ſignify the operation of paring the ſward, for the purpoſe of burning, with a beating axe, which is made in the form of a large adze.

Hand-*gallop*, a kind of ſhort gallop, which is very eaſy to the horſe and rider.

Hand-*glaſſes*, in *Gardening*, are all ſuch glaſſes as are moved by the hand, and uſed for placing over, protecting, and forwarding various ſorts of plants, during the winter ſeaſon, ſuch as young cauliflowers, lettuces, &c. and in raiſing ſeedling plants of both theſe ſorts in the ſpring, as well as ſeveral others, in hot-beds, or in warm borders; alſo ſmall ſallading. They are particularly neceſſary in the culture of general crops of ſummer cucumbers, for placing upon the hot-bed ridges made in April and May; and alſo occaſionally for melon-ridges, made in the ſame ſeaſon, to produce crops of autumnal fruit. In the flower-garden, pleaſure-ground, nurſery, green-houſe, &c. they alſo prove very uſeful in propagating, raiſing, and protecting many kinds of curious plants in their young growth, and while they are ſtriking root.

Theſe glaſſes may be employed likewiſe in raiſing many of the tenderer or more curious annual flowers, ſuch as African and French marigolds, chryſanthemums, balſams, ten-week ſtocks, and others of ſimilar kinds, where better contrivances are not at hand for the purpoſe. See Annual Plants.

They are ſtill further uſeful in ſtriking many ſorts of ſmall cuttings, pipings, and ſlips of tender or curious plants, ſuch as myrtles, flowering plants, and many other ſimilar kinds.

It may be noticed, that hand-glaſſes are of different kinds and forms. The leaded glaſſes conſiſt of many ſmall panes of glaſs worked into lead-work in different ways.

They are moſtly made ſquare, but ſometimes round or octagonal; in all of which, each is formed in an open frame-work of ſtrong window-lead, and ſometimes of caſt-iron in the ſame form, but more commonly lead; the lower part being upright, from ſix to eight or ten inches in depth, and the other hipped off, or ſloped on each ſide, narrowing upward, ſo as to terminate in a point, as it were, at top, having in that part a fixed erect ring handle of the ſame material; the glaſs being laid in lead-work, and the joints well bruſhed over with proper cement, to render the whole wind and water tight, as well as to prevent the injury of the atmoſphere: and they are of different dimenſions, from twelve or eighteen inches to two feet wide, or more, to ſuit different purpoſes; though for general uſe in kitchen gardens, about eighteen inches width is the moſt common, and nearly the ſame in depth in the whole; but ſome for particular uſes are of ſmaller ſizes, as from ſix or eight to ten or twelve inches in width.

Where laid in frames of caſt-iron, in putty, they are neat, ſtrong, and durable; but heavy, and much more expenſive than leaded glaſſes in general.

There are other ſorts, as what are called *bell* hand-glaſſes, which are blown at the glaſs-houſes in different places, and are equally eligible, or ſuperior to the leaded glaſſes in many caſes, eſpecially in kitchen-gardens, particularly for the preſervation of plants in winter, ſuch as early crops of cauliflowers, deſigned to ſtand the winter, lettuces, &c. as well as for hot-bed ridges of cucumbers and melons, in the ſummer and autumn crops; and theſe are in dimenſions nearly in proportion to thoſe of the larger ſizes of leaded glaſſes, or rather wider below; made in the bell form, having a rough knob at top, ſerving as a handle; they ſhould be made not too high, but flat, and in the dome-form above, which is more advantageous in promoting a ſtrong growth, and not ſo liable to draw up the plants, while they receive the benefit of the ſun more effectually in them.

But the leaded glaſſes are ſuperior in this reſpect, that when any of the glaſs-work is broken it can be readily mended, or replaced by the glazier: but the bell-glaſſes, when much broken, are nearly uſeleſs; though, when they are broken into pieces, they may be joined with a cement of ſtrong white-lead, and placed under cover till it is thoroughly dry; and then, with care in handling, they may laſt a long time. As new bell-glaſſes are more liable to crack by froſt, or by too haſtily moving them, than older ones ſeaſoned to the weather, in uſing them the firſt winter in crops of early cauliflowers, &c. great care ſhould be taken in handling them, in lifting them off and on, or in raiſing one ſide occaſionally for the admiſſion of air: the ſeaſoned old ſound glaſſes are in this reſpect more valuable than the new ones.

All the leaded glaſſes ſhould have wooden frames at the bottom part to reſt upon, otherwiſe they are ſoon deſtroyed by their conſtant contact with the earth, while they are in uſe.

In gardening, it is eſſential to have plenty of theſe different deſcriptions of hand-glaſſes, in order that the various kinds of the more tender culinary crops may be properly protected and brought forward during the more cold and ſevere periods of the winter ſeaſon.

HAND-*hind*, a term ſignifying the hind quarters of a horſe.

HAND-*hoe*, in *Agriculture*, the name of a tool of the hoe kind, which is uſually wrought by the hand. See HOE.

HAND-*hoeing*, that method of hoeing which is executed by means of hand labour. See HOEING.

HAND-*mattock*, the name of a tool of the pick-axe kind, which has been lately much recommended for the purpoſe of clearing the ground in ſowing or ſetting acorns among the young trees in plantations.

The deſcription of it is this: the handle is eighteen inches long and the head about fifteen, having one end of it reſembling an adze four inches and a half in breadth in the face; and the other, a pick about ten inches in length tapering, and ſharpened at the point. The axe part is capable of cutting at right angles with the handle in uſing it.

HAND-*reaping*, a term ſignifying the ordinary method of reaping by the hand, in contradiſtinction to that which is practiſed by the ſcythe.

HAND-*reaping Machine*, the name of a tool that has been occaſionally tried in the buſineſs of reaping grains, but without much ſucceſs. See REAPING *Machine*.

HAND-*threſhing Machine*, the name of a machine which is uſed in threſhing out grain, and which is wrought by the hand. See THRESHING-*Machine*.

HAND-*weeding*, the method of weeding and cleaning land by means of the hand. See WEEDING.

HAND, *Left*. To marry with the left hand, is to eſpouſe a woman of inferior degree, whoſe children, in virtue of ſuch marriage, are not to ſucceed to the father, nor ſhare with the other children, but are to be contented with what fortune the huſband ſhall appoint them the next day after marriage.

This method of taking left-handed wives obtains at this time in Germany.

HAND is alſo uſed for the index of a clock, watch, or the like, ſerving to point the hour, &c.

HAND, *Long*, *Longimanus*, a kind of title, or ſurname, aſſumed by certain princes. Artaxerxes, the ſon of Xerxes, and his ſucceſſor in the Perſian empire, was thus denominated; as having hands ſo long, that he could touch his knees with them when he ſtood upright.

HAND, *Short*. See TACHYGRAPHY.

HAND, *Bloody*. See BLOODY *Hand*.

HAND is alſo figuratively uſed in painting, ſculpture, &c. for the manner, or ſtyle, of this or that maſter.

HANDS are borne in coat-armour, *dexter* and *ſiniſter*; that is, right and left; expanded or open; and after other manners.

Azure, a dexter hand couped to the wriſt, and extended in pale argent, is borne by the name of Brome. Argent, three ſiniſter hands, couped to the wriſt, gules, by the name of Maynard.

Knights baronets are to bear in a canton, or in an eſcutcheon as they pleaſe, the arms of Ulſter; *viz.* in a field argent, a ſiniſter hand couped to the wriſt, gules. See BARONETS.

HAND, or *Handing*, in the *Sea Language*. When a thing is to be delivered away, or paſſed from one to another, or to be brought to any one, then the word is, *hand* it this way, or that way. Alſo, when more men are wanted to do any labour, as hoiſing, &c. they call for more *hands*, not more men.

Handing the ſails is the ſame operation as *furling* them.

HAND, *in and out*, in our *Old Writers*, the name of an unlawful game, now diſuſed and prohibited by the ſtatute 17 Edw. IV. cap. 2.

HAND-*barrow*, in the *Military Art*, is commonly made of hard light wood. It is of great uſe in fortification, for carrying earth from one place to another, and in a ſiege, for carrying bombs, or cannon-ball, along the trenches, and for ſeveral other uſes.

HAND-*borow*, a pledge, or ſurety, of the lower rank. "Eſt quaſi vas, aut fidejuſſor manuenſis, hoc eſt, minor, ſeu inferior; nam head-borow, vas eſt capitalis, vel ſuperior." Spelman. See HEADBOROUGH.

HAND-*breadth*, is ſometimes uſed for a meaſure of three inches.

HAND-*cuffs*, an inſtrument formed of two circular pieces of iron, each fixed by a hinge on the ends of a ſhort iron bar, which being locked over the wriſts of a malefactor, prevents his uſing his hands.

HAND *Grenades*. See GRANADO.

HAND-*over-hand*, in *Sea Language*, is an order to the men, who pull upon any rope, to paſs their hands alternately one before, or above the other, if they are hoiſing, in order to haſten the ſervice. A ſailor is ſaid to go aloft, *hand-over-hand*, when he aſcends into the tops by a ſingle rope, as a ſhroud or back-ſtay, without the help of the ratlings, by the dexterity of throwing one hand above the other, and lifting his weight along with it.

HAND-*ſale*, in *Law*. See SALE.

HAND-*ſcrew*. See JACK.

HAND-*ſpike*, or *hand-ſpec*, a lever, or piece of aſh, elm, or other ſtrong wood, five or ſix feet long, cut thin like a wedge at one end, that it may get the eaſier betwixt things which are to be ſeparated, or under any thing that is to be raiſed; it is better than a crow of iron, becauſe its length allows a better poiſe.

Hand-ſpikes are uſed in ſhips, to traverſe the ordnance, to heave with in a windlaſs, to weigh up the anchor, &c. The gunners hand-ſpike is ſhorter and flatter than the other, and armed with two claws, for the purpoſe of managing the artillery in battle, &c.

HAND, or *Handful*, is a meaſure of four inches, by the ſtandard; according to the ſtatute 33 Hen. VIII. cap. 5. The hand, among *Jockeys*, is four fingers breadth, and is the meaſure of the fiſt clenched; by this the height of horſes is meaſured.

A horſe for war ſhould be 16 or 18 hands high.

A *handful* of corn or bran is alſo underſtood to be as much grain or bran as two hands will hold, when joined together; a quantity frequently ordered to be given horſes.

HANDA, or Henda, in *Geography*, a ſmall inhabited iſland of Scotland, on the coaſt of Sutherland, divided from the main land by a narrow ſound. It riſes gradually from the ſea by a gentle aſcent from the ſouth, and on the north is a tremendous rock, about 80 fathoms in height. It is a mile ſquare, and much frequented by ſea-fowls of various kinds.

HANDEL, George Frederick, in *Biography*, the greateſt muſical compoſer of his time, and, in ſome particulars, of any time or country in Europe, was born at Halle, in the duchy of Magdeburgh, and circle of Lower Saxony, 24th February, 1684; his father was an eminent ſurgeon and phyſician of the ſame place, and upwards of ſixty years of age when this ſon, the iſſue of a ſecond marriage, was born; and in his early childhood, he diſcovered ſuch a paſſion for muſic as could not be ſubdued by the commands of his father, who intended him for the profeſſion of the law.

He had made a conſiderable progreſs in this art, by ſtealth, before he was allowed a maſter; but at ſeven years old, his father finding it impoſſible to fix his attention to any thing but muſic, for which he ſeemed to have been endowed by nature with very uncommon propenſities and faculties, he placed him under Zachau, organiſt of the cathedral church of Halle; a man of conſiderable abilities in his profeſſion, and proud of his pupil. By the time he was nine years old, our young muſician was not only able to officiate on the organ for his maſter, but began to ſtudy compoſition; and at this early period of his life he is ſaid to have compoſed a Service, or, as it is called in Germany, a *ſpiritual Cantata*, every week, for voices and inſtruments, during three years ſucceſſively. The late Mr. Weideman was in poſſeſſion of a ſet of ſonatas, in three parts, which Handel compoſed when he was only ten years old.

He ſeems to have continued to ſtudy under his firſt maſter Zachau, in his native city, till the year 1698; when, being arrived at the age of fourteen, he was carried to Berlin, where operas were in a very flouriſhing ſtate, at the court of the elector of Brandenburg, afterwards king of Pruſſia, who had then in his ſervice not only many ſingers of eminence from Italy, but Bononcini and Attilio, to compoſe. Handel is ſaid to have diſtinguiſhed himſelf in this city as a wonderful performer, for his early years, and to have given birth to ſuch expectations of his future greatneſs, that his electoral highneſs offered to take him into his ſervice, and ſend him to Italy, for the completion of his muſical ſtudies; but his father declining this honour, from a ſpirit of independence, it was determined that he ſhould return to Halle, where he muſt have continued a conſiderable time; though we are told that his father's death happening ſoon after his return from Berlin, Handel, not being able to ſupport the expence of a journey to Italy, whither he was ambitious of going, removed to Hamburgh, in order, by his muſical talents, to procure a ſubſiſtence: this city, next to Berlin, being then the moſt renowned for its operas. We loſe ſight, however, in all the accounts of his life hitherto publiſhed, both of our young muſician and his improvements from the time of his quitting Berlin, till his arrival at Hamburgh, a period of five years; for, according to his rival Mattheſon, he did not viſit that city till the year 1703, at the age of nineteen.

Yet the celebrated Telemann, one of the greateſt German muſicians of his time, in a well-written account of his own life and works, drawn up by himſelf at the requeſt of Mattheſon, in the year 1740, furniſhes two or three incidents concerning Handel, which intervened between the time of his quitting Berlin and arrival at Hamburgh, that will help to throw a little light on this dark period of his hiſtory.

Telemann, born at Magdeburg 1681, like Handel, diſcovered an early paſſion for muſic, and, while he was at ſchool, had, like him, made a great progreſs in the art, contrary to the inclination of his friends; but, though he played on almoſt every kind of inſtrument, and had attempted to compoſe an opera at twelve years old, yet, in obedience to his mother's poſitive commands, on whom, as his father was dead, he was ſolely dependent, at about the age of twenty he ſolemnly renounced his muſical purſuits, though with the greateſt reluctance, and ſet out for Leipſic, in order to ſtudy the law in that univerſity. In the way thither, however, he ſtopped at Halle, where, ſays Telemann, "from my acquaintance with Handel, who was already famous, I again ſucked in ſo much of the poiſon of muſic as nearly overſet all my reſolutions."

Handel was now but ſixteen years of age; and as Telemann, in his account of himſelf and his ſtudies, ſoon mentions our juvenile muſician again, we ſhall proceed a little further in his narrative.

"However," continues Telemann, "after quitting Handel, I perſevered in the plan preſcribed by my mother, and went to Leipſic to purſue my ſtudies; but, unfortuately, was lodged in a houſe where I perpetually heard muſic of all kinds, which, though much worſe than my own, again led me into temptation. And a fellow-ſtudent finding among my papers a pſalm which I had ſet to muſic, and which, in ſacrificing all my other illicit attempts at compoſition, had chanced to eſcape oblivion, he begged it of me, and had it performed at St. Thomas's church, where it was ſo much approved, that the burgomaſter deſired I would compoſe ſomething of this kind every fortnight; for this I was amply rewarded, and had hopes, likewiſe, given me, of future advantages of much greater importance. At this time I happened to be reminded of the ſolemn promiſe I had made my mother, for whom I had a great reverence, of utterly abandoning all thoughts of muſic, by receiving from her a draught for my ſubſiſtence; which, however, I returned; and, after mentioning the profitable and promiſing ſtate of my affairs, earneſtly intreated her to relax a little in the rigour of her injunctions concerning the ſtudy of muſic. Her bleſſings on my new labours followed; and now I was half a muſician again.

"Soon after I was appointed director of the opera, for which I compoſed many dramas, not only for Leipſic, where I eſtabliſhed the college of muſic which ſtill ſubſiſts, but for Sorau, Frankfort, and the court of Weiſſenfels. The organ of the new church was then juſt built, of which I was appointed organiſt and director of the muſic. This organ, however, I only played at the conſecration, or opening, and afterwards reſigned it, as a bone of contention for young muſical ſtudents to quarrel and ſcramble for. At this time the pen of the excellent Kuhnau ſerved me for a model in fugue and counterpoint; but in faſhioning ſubjects of melody, Handel and I were continually exerciſing our fancy, and reciprocally communicating our thoughts, both by letter and converſation, in the frequent viſits we made to each other."

According to Telemann's dates, all this muſt have happened between the years 1701 and 1703, when Handel, quitting Halle, arrived at Hamburgh, a place too diſtant from Leipſic for frequent viſits between theſe young muſicians to have been practicable.

Mattheſon's early connection and intercourſe there with

Handel, before his name as a great muſician had penetrated into other parts of Europe, were ſuch, that it is hopeleſs now to ſeek for better information than his writings furniſh, concerning ſo intereſting a period.

Mattheſon was a vain and pompous man, whoſe firſt wiſh in all his writings was to impreſs the reader with a due reverence for his own abilities and importance. It was his boaſt before his death, in 1764, at the age of eighty-three, “that he had printed as many books, on the ſubject of muſic, as he had lived years; and that he ſhould leave to his executors an equal number, in manuſcript, for the uſe of poſterity.”

In 1761, he publiſhed a Tranſlation of the Life of Handel, from the Engliſh; with additions and remarks, which are neither very candid nor liberal. But how ſhould the author of that book expect quarter from him, in which it is aſſerted, that “Mattheſon was no great ſinger, and only employed occaſionally.” In refutation of which he aſſures us, “that he conſtantly ſung the principal parts in the Hamburgh operas, during fifteen years, and with ſuch ſucceſs, that he could command the paſſions of his audience, by exciting in them, at his pleaſure, joy, grief, hope, and fear.” And who ſhall venture to doubt of his having poſſeſſed theſe powers, when their effects are thus atteſted *by himſelf?* And in a work of muſical biography and criticiſm, by Mattheſon, called *Grundlage einer Ehren-Pforte*, Foundation of a triumphal Arch, in honour of muſic and muſicians, publiſhed at Hamburgh 1740, in which there is a long and inflated account of himſelf and his works, which occupies thirty pages, we have, as well as in his annotations on the Engliſh Life, a more ample and ſatisfactory account of Handel’s juvenile compoſitions and adventures, than we have been able to find elſewhere.

After telling us that he arrived at Hamburgh in the ſummer of 1703, rich in genius and good diſpoſition: “Here,” ſays Mattheſon, “almoſt his firſt acquaintance was myſelf; as I met with him at the organ of St. Mary Magdalen’s church, July the 30th, whence I conducted him to my father’s houſe, where he was treated with all poſſible kindneſs as well as hoſpitality; and I afterwards not only attended him to organs, choirs, operas, and concerts, but recommended to him ſeveral ſcholars, particularly to one in a certain houſe, where every body was much devoted to muſic.

“At firſt he only played a *ripieno* violin in the opera orcheſtra, and behaved as if he could not count five; being naturally inclined to dry humour.

“At this time he compoſed extreme long airs and cantatas without end; of which, though the harmony was excellent, yet true taſte was wanting; which, however, he very ſoon acquired by his attendance at the opera.”

As theſe young muſicians lived much together in great intimacy, they had frequent amicable conteſts and trials of ſkill with each other; in which it appearing that they excelled on different inſtruments, Handel on the organ, and Mattheſon on the harpſichord, they mutually agreed not to invade each other’s province, and faithfully obſerved this compact for five or ſix years.

Mattheſon tells us, that in the year 1704, the opera-houſe at Hamburgh happening to be ſhut, leaving Handel behind him, he travelled to Holland, played on the famous organs, and heard the great performers in that country; made concerts at Amſterdam, and might have been elected organiſt of Haerlem; having had an offer of that place, with a ſalary of fifteen hundred Dutch goldens, equal to near a hundred and fifty pounds ſterling a year.

Handel, at this time, muſt have been compoſing his firſt opera. Mattheſon in his remarks on the Life of Handel, is particularly ſevere on that part of it which contains an account of the quarrel which happened between him and that compoſer, ſoon after the letter was written; accuſing the biographer not only of violating geography, chronology, and hiſtory, but of a wilful miſrepreſentation of facts, in relating the circumſtances of this breach between them.

This writer, with great ſelf-complaiſance and pedantry, is generally allowed to have been diligent in finding, and exact in ſtating facts, after telling us that Handel, when he firſt came to Hamburgh, notwithſtanding the exalted ſtation at which he ſoon arrived, had no better part aſſigned him in the opera, than the *ſecond ripieno violin*; informs us, that “though he then pretended to know nothing, yet he uſed to be very arch, for he had always a dry way of making the graveſt people laugh, without laughing himſelf. But his ſuperior abilities were ſoon diſcovered, when, upon occaſion of the harpſichord player at the opera being abſent, he was firſt perſuaded to take his place; for he then ſhewed himſelf to be a great maſter, to the aſtoniſhment of every one, except myſelf, who had frequently heard him before, upon keyed-inſtruments.”

According to Mattheſon’s own confeſſion, he acquired from Handel, by frequently meeting him at his father’s houſe, and practiſing with him, a knowledge of modulation, and method of combining ſounds, which he could have learned of no one elſe.

About this time an opera, called “Cleopatra,” compoſed by Mattheſon, was performed on that ſtage, in which he acted the part of Anthony himſelf, and Handel played the harpſichord; but Mattheſon being accuſtomed, upon the death of Anthony, which happens early in the piece, to take the harpſichord, in the character of compoſer, Handel refuſed to indulge his vanity, by relinquiſhing to him this poſt; which occaſioned ſo violent a quarrel between them, that at going out of the houſe, Mattheſon gave him a ſlap on the face; upon which, both immediately drew their ſwords, and a duel enſued in the market-place, before the door of the opera-houſe; luckily, the ſword of Mattheſon was broke againſt a metal button upon Handel’s coat, which put an end to the combat, and they were ſoon after reconciled.

Such is the account, which, long before the death of Handel, Mattheſon himſelf publiſhed, concerning the difference that happened between them during his reſidence at Hamburgh.

This rencontre happened the 5th of December, 1704; and, as a proof of a ſpeedy reconciliation, Mattheſon tells us, that on the 30th of the ſame month, he accompanied the young compoſer to the rehearſal of his firſt opera of “Almira,” at the theatre, and performed in it the principal part; and that, afterwards, they became greater friends than ever. This opera, though rehearſed at the end of 1704, was not publicly performed till the beginning of 1705, when it was greatly approved.

On the 25th of February of the ſame year, he produced his ſecond opera, called “Nero,” which had likewiſe a very favourable reception.

From 1705 to 1708, when Handel ſet two other operas, “Florindo” and “Dafne,” he furniſhed nothing for the ſtage; though he had many ſcholars, compoſed harpſichord-pieces, ſingle ſongs, and cantatas, innumerable.

During his reſidence at Hamburgh, Mattheſon allows, that Handel improved his own ſtyle greatly, by his conſtant attendance at the opera; and ſays, that he was even more powerful upon the organ, in extempore fugues and counterpoint,

point, than the famous Kuhnau of Leipſic, who was at this time regarded as a prodigy.

Handel having acquired by his operas at Hamburgh a ſum ſufficient to enable him to viſit Italy, ſet out for that ſeat of the Muſes, a journey after which every man of genius ſo ardently pants. He ſtaid ſome time at Florence, where he compoſed the opera of “Rodrigo.” From this city he went to Venice, where, in 1709, he produced his “Agrippina,” which is ſaid by his biographer to have been received with acclamation, and to have run thirty nights. Here he met with Domenico Scarlatti, Gaſparini, and Lotti.

The next place he viſited was Rome, where he had an opportunity of hearing compoſitions and performers of the firſt claſs. Here the elder Scarlatti and Gaſparini had brought vocal muſic to great perfection, and Corelli, inſtrumental. At cardinal Ottoboni's, by whom Handel was greatly careſſed and patronized, he had frequently the advantage of hearing the natural and elegant Corelli perform his own works. Here our young compoſer produced a ſerenata, “Il Trionfo del Tempo;” (the original ſcore of this work is in his majeſty's collection;) after which he proceeded to Naples, where he ſet “Acis and Galatea,” in Italian, to muſic, totally different from the little Engliſh drama, written by Gay, which he ſet in 1721, for the duke of Chandos.

When he returned to Germany, on quitting Italy, at the latter end of 1709, or the beginning of 1710, the firſt place at which he ſtopped was Hanover; where he found a munificent patron in the elector, who afterwards, on the death of queen Anne, aſcended the Engliſh throne, by the name of George the Firſt. This prince had in his ſervice, as maeſtro di cappella, the elegant and learned compoſer Steffani, whom Handel had met before at Venice, and who now reſigned his office of maeſtro di cappella to the elector, in his favour. This venerable compoſer ſerved him as a model for the ſtyle of chamber duets, as well as facilitated his introduction to the ſmiles of his patron, the elector, who ſettled on him a penſion of 1500 crowns, upon condition that he would return to his court, when he had completed his travels. Handel, acceding to this propoſition, went to Duſſeldorp, where he had a flattering reception from the elector palatine, who, likewiſe, wiſhed to retain him in his ſervice. But beſides the engagement into which he had entered with the elector of Hanover, he was impatient to viſit England, where a paſſion for dramatic muſic had already manifeſted itſelf in ſeveral awkward attempts at operas, and to which place he had received invitations from ſeveral of the nobility, whom he had ſeen in Italy and Hanover.

It was at the latter end of the year 1710, that he arrived in England; his reception was as flattering to himſelf as honourable to the nation, at this time no leſs ſucceſsful in war, than in the cultivation of the arts of peace. To the wit, poetry, literature, and ſcience, which marked this period of our hiſtory, Handel added all the blandiſhments of a nervous and learned muſic, which he firſt brought hither, planted, and lived to ſee grow to a very flouriſhing ſtate.

The firſt compoſition which he produced in England, was his famous opera of “Rinaldo,” performed in March 1711, and Handel is ſaid in the preface to have ſet it to muſic *in a fortnight*. This opera, in which the celebrated Nicolini and Valentini, the firſt Italian ſingers that appeared on our ſtage, performed; was the delight of the nation during many years; as it was revived in 1712, 1717, and 1731.

After remaining about a year in this country, and eſtabliſhing a great reputation on the ſolid baſis of the moſt exalted and indiſputable merit, both as a compoſer and performer, he returned to Hanover, on a promiſe made to his moſt powerful Engliſh friends to reviſit this kingdom again, as ſoon as he could obtain permiſſion of his electoral highneſs and patron. About the end of the year 1712, this permiſſion was granted for a limited time. And we find his “Paſtor Fido,” and “Theſeus,” in the liſt of Italian operas, brought on the Engliſh ſtage, this and the following year: and in 1715, “Amadige,” or “Amadis of Gaul.”

Not long after this ſecond arrival in London, the peace of Utrecht having been brought to a concluſion, Handel was preferred to all others, ſeemingly without a murmur from native muſicians, to compoſe the hymn of gratitude and triumph on the occaſion. Envy, though outrageous and noiſy at the ſucceſs of comparative abilities, is ſtruck dumb and blind by exceſs of ſuperiority. The grand “Te Deum” and “Jubilate,” which he ſet on this occaſion, were compoſed with ſuch force, regularity, and inſtrumental effects, as the Engliſh had never heard before. Purcell's “Te Deum,” in deſign, and expreſſion of the words, is, perhaps, ſuperior to all others; but in grandeur and richneſs of accompaniment, nothing but national partiality can deny Handel the preference. The queen ſettled on him for life a penſion of two hundred pounds per annum. And all who had heard Rinaldo, wiſhed him again employed for the opera; ſo that the multiplicity of buſineſs, and the many protectors and friends he met with in England, a little impaired the memory of our great compoſer with reſpect to continental connections; and he ſeemed to think of nothing leſs than returning to Hanover till after the death of queen Anne, in 1714, when his majeſty, George I. arriving in England, ſaved him the trouble of a German tour.

Handel, conſcious of his deficiency in reſpect and gratitude to a prince who honoured him with ſuch flattering marks of approbation and bounty, durſt not approach the court, till by the ingenuity and friendly interpoſition of baron Kilmanſegge, he was reſtored to favour in the following manner: The king, ſoon after his arrival in theſe kingdoms, having been prevailed on to form a party on the water, the deſign was communicated to Handel, who was adviſed to compoſe ſome pieces expreſsly for the occaſion; the performance of which he ſecretly conducted in a boat that accompanied the royal barge. Upon hearing theſe compoſitions, which have been ſince ſo well known, and ſo juſtly celebrated under the title of the “Water-Muſic,” his majeſty, equally ſurpriſed and pleaſed by their excellence, eagerly enquired who was the author of them; when the baron acquainted the king that they were the productions of a faithful ſervant of his majeſty, who, conſcious of the cauſe of diſpleaſure which he had given to ſo gracious a protector, durſt not preſume to approach his royal preſence, till he had aſſurances that by every poſſible demonſtration of duty and gratitude in future, he might hope to obtain a pardon. This interceſſion having been graciouſly accepted, Handel was reſtored to favour, and his compoſitions honoured with the moſt flattering marks of royal approbation. And as a ratification of the delinquent's peace, thus eaſily obtained, his majeſty was pleaſed to add a penſion of two hundred pounds a year to that which had been previouſly conferred on him by queen Anne; and not many years after, when he was employed to teach the young princeſſes, another penſion of the ſame value was added to the former grants, by her majeſty queen Caroline.

From the year 1715 to 1720, we find in the records of the Muſical Drama, no new opera that was ſet by Handel. The firſt three years of this period were chiefly ſpent at the earl of Burlington's, a nobleman, whoſe taſte and judgment in the fine arts were as exquiſite as his patronage to their votaries was liberal. And during the other two years, Handel ſeems to have been employed at Cannons, as maeſtro di capella to the duke of Chandos; who, among other ſplendid and princely kinds of magnificence, eſtabliſhed a chapel, in which the cathedral ſervice was daily performed by a choir of voices and inſtruments, ſuperior, at that time, perhaps, in number and excellence, to that of any ſovereign prince in Europe. Here Handel produced, beſides his anthems, the chief part of his hautbois concertos, ſonatas, leſſons, and organ fugues; which are all ſo maſterly, ſpirited, and exquiſite in their ſeveral kinds, that if he had never compoſed an opera, oratorio, Te Deum, duet, cantata, or any other ſpecies of vocal muſic, his name would have been held in reverence by true muſicians, as long as the characters in which they are written ſhould continue to be legible.

We come now to the buſieſt and moſt glorious period of Handel's life; who, arrived at that ſtage of exiſtence which Dante calls

> " Il mezzo del cammin di noſtra vita ;"

when the human frame and faculties have acquired their utmoſt ſtrength and vigour; was endowed with great natural powers, highly improved by cultivation; with a hand which no difficulties could embarraſs; a genius for compoſition unbounded; at the head of a profeſſion which facilitates acceſs to the great, and, with extraordinary abilities, enſures their patronage; high in the favour of the ſovereign, nobles, and public, of a great and powerful nation, at a period of its greateſt happineſs and tranquillity; when it was not only bleſt with leiſure and zeal to cultivate the arts of peace, but with power, liberally to reward thoſe whoſe ſucceſsful efforts had carried them beyond the bounds of mediocrity.

Such were Handel's circumſtances and ſituation, when a plan was formed, by the Engliſh nobility and gentry, for eſtabliſhing a fund for the ſupport of Italian operas, of which he was to be the compoſer and director: and, as his majeſty king George I. was pleaſed to ſubſcribe one thouſand pounds towards the execution of this deſign, and to let his name appear at the head of the ſubſcription, amounting to fifty thouſand pounds, this ſociety was called the " Royal Academy."

The progreſs and declenſion of this eſtabliſhment, will be found in the account of the COMMEMORATION *of Handel*, and in the articles OPERA, *Ital. of Feuds*, and BONONCINO, we ſhall only obſerve here, that till the year 1727, this academy was ſupported and continued to flouriſh, with the utmoſt ſplendour, delighting the public, and improving our taſte; but by the patrons and partizans of two great female ſingers of diſputable talents, Fauſtina and Cuzzoni, the ſubſcribers were ſo divided in their opinions of the merit of theſe two Sirens, that when the admirers of one of them began to applaud, the others began to hiſs.

A few years after, a quarrel happened between Handel and Seneſino, which broke up the academy, and was not only injurious to the fortune of our great compoſer, but the cauſe of infinite trouble and vexation to him during the reſt of his life.

It is now too late to determine who was the aggreſſor in this long and ruinous war; perhaps Handel exerciſed his power too roughly, and Seneſino was too impatient of controul. Perhaps too, the nobility carried their reſentment too far, in ſetting up another opera to the ruin of a man of ſuch uncommon worth and abilities; and, perhaps, if Handel's temper had at all reſembled his ſinger, in flexibility, a reconciliation might have been effected on no very mortifying or diſhonourable terms. It is painful to dwell on this part of his life, which was one continued tiſſue of loſſes and misfortunes. He produced thirty operas between the years 1721 and 1740; yet, after the diſſolution of the academy, in 1729, none were attended with the ſucceſs that was due to their intrinſic and ſuperior merit, though ſome of the beſt were poſterior to that period. Neglect and oppoſition conſpired to rob him at once of health, fame, and fortune.

In the midſt of opera ſquabbles, while he was oppoſed by the principal nobility and gentry of the Royal Academy, who ſeized on the theatre in the Haymarket, ſupporting an opera without his compoſitions, or the performance of his adherents; when, ſetting up for himſelf, at his own riſk, he engaged the theatre in Lincoln's-inn-Fields, and a new band of ſingers and inſtrumental performers, in order to make head againſt his powerful opponents. It was during this period that Handel, in the year 1732, began the performance of oratorios in the theatre. " Eſther," which he had compoſed for the duke of Chandos, at Cannons, in 1720, was the firſt; " Deborah," the ſecond; and " Athaliah," the third; which was performed in the public theatre at Oxford in 1733, when he opened the organ in ſuch a manner as aſtoniſhed every hearer. The late Mr. Michael Chriſtian Feſting and Dr. Arne, who were preſent, both aſſured us, that neither themſelves, nor any one elſe of their acquaintance, had ever before heard ſuch extempore, or ſuch premeditated playing, on that or any other inſtrument.

It was during theſe early performances of oratorios, that Handel firſt gratified the public by playing concertos on the organ, a ſpecies of muſic wholly of his own invention, in which he uſually introduced an extempore fugue, a diapaſon-piece, or an adagio, manifeſting not only the wonderful fertility and readineſs of his invention, but the moſt perfect accuracy and neatneſs of execution.

In 1740, the oratorio of " Saul" was performed for the firſt time at the theatre in Lincoln's-inn-Fields; and from this period, Handel may be ſaid to have devoted his labours ſolely to the ſervice of the church; as, except his " grand concertos for violins," and the " Fire-work Muſic," for the peace of Aix la Chapelle, 1748; we remember no other compoſitions than oratorios, that were either performed or publiſhed by him.

From 1740, when he totally quitted the opera-ſtage, to 1751, he produced fifteen original oratorios, and adapted Engliſh words to the muſic of a ſerenata, or morality, " Il Trionfo del Tempo," (the Triumph of Time and Truth,) which he had ſet to Italian words at Rome, 1709. Of theſe, the Meſſiah, Samſon, and Judas Macchabæus, were ſure to fill the houſe whenever they were performed; but though the reſt are hazardous, and fluctuating in favour, yet there is no one of them which an exquiſite and darling ſinger, ſuch as Mrs. Sheridan, or Mrs. Bates, could not render important and attractive.

It was after repeated miſcarriages, and a very ſevere illneſs, ſuppoſed to have been brought on by the joint effects of anxiety, mortification, diſtreſs, and diſappointment, that he was driven to the Hibernian ſhore.

Handel remained eight or nine months in Ireland, where he extended his fame, and began to repair his fortune. At his return to London, in the beginning of 1742, as he had relinquiſhed all thoughts of oppoſing the preſent managers of the opera, former enmities began to ſubſide; and, when he recommenced his oratorios at Covent-Garden, the Lent following, he found a general diſpoſition in the public to countenance and ſupport him. Samſon was the firſt he performed this year, which was not only much applauded by crowded houſes in the capital, but was ſoon diſſeminated, in ſingle ſongs, throughout the kingdom ; and, indeed, it has ever been in the higheſt favour of all his oratorios, except the Meſſiah, which this ſeaſon, to the honour of the public at large, and diſgrace of cabal and faction, was received with univerſal admiration and applauſe. And from that time to the preſent, this great work has been heard in all parts of the kingdom with increaſing reverence and delight ; it has fed the hungry, clothed the naked, foſtered the orphan, and enriched ſucceeding managers of oratorios, more than any ſingle muſical production in this or any country.

This *Sacred* Oratorio, as it was at firſt called, on account of the words being wholly compoſed of genuine texts of ſcripture, appearing to ſtand in ſuch high eſtimation with the public ; Handel, actuated by motives of the pureſt benevolence and humanity, formed the laudable reſolution of performing it annually for the benefit of the Foundling Hoſpital, which reſolution was conſtantly put in practice to the end of his life, under his own direction ; and, long after, under that of Mr. Smith and Mr. Stanley. In conſequence of theſe performances, the benefactions to the charity from the years 1749 to 1759, by eleven performances under Handel's own direction, amounted to - £6935 0 0

From 1760 to 1768, by eight performances under the conduct of Mr. John Chriſtian Smith - - - -	1332	0	0
From 1769 to 1777, nine performances under that of Mr. Stanley - -	2032	0	0
	£10,299	0	0

The organ in the chapel of this hoſpital was likewiſe a preſent from Handel ; and he bequeathed, as a legacy to this charity, a fair copy of the original ſcore of the Meſſiah.

From the period of his quitting Ireland, he continued his oratorios to the time of his death ; though late in life, like the great poets Homer and Milton, he was afflicted with blindneſs ; which, however it might diſpirit and embarraſs him at other times, had no effect on his nerves or intellects in public ; as he continued to play concertos and voluntaries between the parts of his oratorios to the laſt, with the ſame vigour of thought and touch, for which he was ever ſo juſtly renowned. To ſee him, however, led to the organ, after this calamity, at upwards of ſeventy years of age, and then conducted towards the audience to make his accuſtomed obeiſance, was a ſight ſo truly afflicting and deplorable to perſons of ſenſibility, as greatly diminiſhed their pleaſure in hearing him perform.

During the oratorio ſeaſon, we have been told that he practiſed almoſt inceſſantly ; and, indeed, that muſt have been the caſe, or his memory uncommonly retentive ; for, after his blindneſs, he played ſeveral of his old organ-concertos, which muſt have been previouſly impreſſed on his memory by practice. At laſt, however, he rather choſe to truſt to his inventive powers, than thoſe of reminiſcence ; for, giving the band only the ſkeleton, or ritornels of each movement, he played all the ſolo parts extempore, while the other inſtruments left him, *ad libitum ;* waiting for the ſignal of a ſhake, before they played ſuch fragments of ſymphony as they found in their books.

Indeed, he not only continued to perform in public, after he was afflicted with blindneſs, but to *compoſe* in private ; for we have been aſſured, that the duet and chorus in Judas Macchabæus, of " Sion now his head ſhall raiſe, Tune your harps to ſongs of praiſe," were dictated to Mr. Smith, by Handel, after the total privation of ſight.

The laſt oratorio at which he attended and performed, was on the 6th of April, and he expired on the 13th, 1759.

The figure of Handel was large, and he was ſomewhat corpulent and unwieldy in his motions, and his general caſt of countenance ſeemed rather heavy and ſour ; yet, when animated in converſation, his viſage was full of fire and dignity, and ſuch as impreſſed ideas of ſuperiority and genius ; and when he ſmiled, there was a ſudden flaſh of intelligence, wit, and good humour beaming in his countenance, which we hardly ever remember to have ſeen in any other.

Though he was generally rough and peremptory in his manners and converſation, he was totally devoid of ill-nature or malevolence ; indeed, there was an original humour and pleaſantry in his moſt lively ſallies of anger or impatience, which, with his broken Engliſh, were extremely riſible. His natural propenſity to wit and humour, and happy manner of relating common occurrences, in an uncommon way, enabled him to throw perſons and things into very ridiculous attitudes. Had he been as great a maſter of the Engliſh language as Swift, his *bon mots* would have been as frequent, and ſomewhat of the ſame kind.

Handel, with many virtues, was addicted to no vice that was injurious to ſociety. Nature, indeed, required a great ſupply of ſuſtenance to ſupport ſo huge a maſs, and he was rather epicurean in the choice of it ; but this ſeems to have been the only appetite which he allowed himſelf to gratify ; and though he was frequently rough in his language, and in the habit of ſwearing, a vice then much more in faſhion than at preſent, he was truly pious during the laſt years of his life, and conſtantly attended public prayers twice a day, winter and ſummer, both in London and Tunbridge.

It has been ſaid of him, that, out of his profeſſion, he was ignorant and dull ; but though we do not admit the charge, yet, if the fact was as true as it is ſevere, it muſt be allowed, in extenuation, that to poſſeſs a difficult art in the perfect manner which he did, and to be poſſeſſed by it, ſeems a natural conſequence ; and all that the public had a right to expect, as he pretended to nothing more. Accompliſhments can only amuſe our private friends and ourſelves in leiſure hours ; but ſo occupied and abſorbed was Handel, by the ſtudy and exerciſe of his profeſſion, that he had little time to beſtow, either on private amuſements or the cultivation of friendſhip. Indeed, the credit and reverence ariſing from theſe, had Handel poſſeſſed them, would have been tranſient, and confined to his own age and acquaintance ; whereas, the fame acquired by ſilent and cloſe application to his profeſſional buſineſs,

> " ——Nec Jovis ira, nec ignes,
> Nec poterit ferrum, nec edax abolere vetuſtas."

And it is probable, that his name, like that of many of his brethren, will long ſurvive his works. The moſt learned man can give us no information concerning either the private life or compoſitions of Orpheus, Amphion, Linus, Olympus, Terpander, or Timotheus, yet every ſchool-boy can tell us, that they were great muſicians, the delight of their ſeveral ages, and, many years after, of poſterity.

Though totally free from the ſordid vices of meanneſs and avarice, and poſſeſſed of their oppoſite virtues, charity and generoſity, in ſpite of temporary adverſity, powerful enemies, and frequent maladies of body, which ſometimes extended to intellect, Handel died worth upwards of twenty thouſand pounds ; which, except one thouſand to the fund for decayed muſicians and their families, he chiefly bequeathed to his relations on the continent.

His funeral was not public, like that of Rameau in France ; of Jomelli in Italy ; or of our Dryden and Garrick in England ;

England ; yet, when he was buried in Weſtminſter-Abbey, April 20th, 1759, the dean, Dr. Pearce, biſhop of Rocheſter, aſſiſted by the choir, performed the funeral ſolemnity. More general and national teſtimonies of regard and reverence were left to a later period, when all enmities, jealouſies, and operations of envy were ſubſided ; and when time, examination, and reflection had given new charms and importance to his works. And this pleaſing taſk was performed in a way ſo ample, magnificent, and honourable, that it will be difficult to find, either in ancient or modern hiſtory, a more liberal and ſplendid example of gratitude to a deceaſed artiſt, in any other country. See account of the COMMEMORATION *of Handel.*

Character of Handel as a Compoſer.—That Handel was ſuperior in the ſtrength and boldneſs of his ſtyle, the richneſs of his harmony, and complication of parts, to every compoſer who has been moſt admired for ſuch excellencies, cannot be diſputed ; and, while *fugue, contrivance,* and a *full ſcore,* were more generally reverenced than at preſent, he remained wholly unrivalled.

We know it has been ſaid that Handel was not the original and immediate inventor of ſeveral ſpecies of muſic for which his name has been celebrated ; but with reſpect to *originality,* it is a term to which proper limits ſhould be ſet before it is applied to the productions of any artiſt. Every *invention* is clumſy in its beginning ; and Shakſpeare was not the firſt writer of plays, or Corelli the firſt compoſer of violin ſolos, ſonatas, and concertos, though thoſe which he produced were the beſt of his time ; nor was Milton the inventor of epic poetry. The ſcale, harmony, and cadence of muſic being ſettled, it is impoſſible for any compoſer to invent a *genus* of compoſition that is *wholly* and *rigorouſly* new, any more than for a poet to form *a language, idiom,* and *phraſeology* for himſelf. All that the greateſt and boldeſt muſical inventor *can* do, is to avail himſelf of the beſt effuſions, combinations, and effects of his predeceſſors ; to arrange and apply them in a new manner ; and to add, from his own ſource, whatever he can draw, that is grand, graceful, gay, pathetic, or in any other way pleaſing. This Handel did in a moſt ample and ſuperior manner ; being poſſeſſed, in his middle age and full vigour, of every refinement and perfection of his time ; uniting the depth and elaborate contrivance of his own country with Italian elegance and facility : as he ſeems, while he reſided ſouth of the Alps, to have liſtened attentively in the church, theatre, and chamber, to the moſt exquiſite compoſitions and performers of every kind that were then exiſting.

We will not aſſert that his vocal melodies were more poliſhed and graceful than thoſe of his countryman and contemporary Haſſe ; or his recitatives, or muſical declamation, ſuperior to that of his rivals, Bononcini and Porpora. But in his inſtrumental compoſitions there is a vigour, a ſpirit, a variety, a learning, and invention, ſuperior to every other compoſer that can be named ; and, in his organ fugues, and organ playing, there is learning always free from pedantry ; and, in his choruſes, a grandeur and ſublimity which we believe has never been equalled ſince the invention of counterpoint.

HANDGRITH, in our *Old Writers,* peace or protection given by the king with his own hand. "Hæc mittunt hominem in miſericordia regis, infractio ſeu violatio pacis quam per manum ſuam dabit alicui." Leg. Hen. I.

The word is Saxon, from *hant,* or *hond, manus,* and *grith, pax.*

HAND-HABEND, in our *Ancient Cuſtoms,* denotes a thief taken in the very fact.

Hand, or *hond-habend,* from the Saxon *hond, hand,* and *habend, having,* is a circumſtance of manifeſt theft, when the party is taken with the mainor, or mainover, *i. e.* the thing ſtolen, in his hand.

Bracton alſo uſes *hand-berend* in the ſame ſenſe. *Sc. Latro manifeſtus.*

So in Fleta, "Furtum manifeſtum eſt ubi aliquis latro deprehenſus ſeiſitus de aliquo latrocinio hand-habbinde, et backberinde, et inſecutus fuerit per aliquem cujus res illa fuerit, quæ dicitur Sacborgh, et tunc licet inſecutori rem ſuam petere criminaliter ut furatam." Lib. 1. cap. 38. § 1.

HAND-HABEND alſo ſignifies the right which the lord has to judge and determine of this offence in his court.

HANDLESS, in *Mining,* the part of a hand-winding apparatus, or turnſtick and wallower, drewk, turn-bail, turn-barrel, roll and ſpindle, &c. which are uſed on the tops of coal-pits, at right angles to the ſpindle of the barrel, into which the handle is fixed.

HANDLING, a term uſed in reſpect of fighting cocks ; ſignifying the meaſuring the girth of them, by griping one's hands and fingers round the cock's body.

HANDLING, in *Painting,* is uſed to deſignate the mode in which a painter lays his colours on his ground ; of courſe it has the ſame meaning as the word *Execution* in the ſame art, which ſee.

HANDO, in *Geography,* a country of Africa, ſubject to Quoja.

HANDY-WARP, in our *Old Writers,* a kind of cloth mentioned in ſtat. 4 & 5 Phil. & Mar. cap. 5.

HANDYA, in *Geography,* a town of Hindooſtan, in the circar of Jyenagur ; 12 miles E. of Jyepour.

HANEBO, a town of Sweden, in the province of Helſingland ; 12 miles S.W. of Soderhamn.

HANEDAK, a town of Nubia, on the Nile ; 80 miles N.W. of Dongola.

HANEPARI, a town of Hindooſtan, in the Carnatic ; 20 miles N. of Tanjore.

HANG-BENCHES, in *Mining,* ſignify a part of the wooden ſtowres, or hand-winding apparatus, uſed at the ſmaller lead-mines in Derbyſhire.

HANGING *in* CHAINS. See CHAINS.

HANGING *of Gates,* in *Rural Economy,* the mode of fixing them upon their hinges or crooks. See GATE.

HANGING *Knees,* are knees whoſe arms are attached to the ſides of ſhips, in a vertical direction.

HANGING-*ſide,* in *Mining,* ſignifies the up-check or over-hanging ſide of a hading vein. M. Werner ſays (tranſlation of his "New Theory of Veins," p. 81.), it happens almoſt always, that the correſponding-ſtrata on the hanging-ſide of a vein are found much lower down than on its laying ſide. This difference of level in the parts of the ſame ſtratum or bed, bears a proportion to the ſize of the vein, being always greateſt in thoſe which are of moſt conſiderable magnitude. Mr. John Williams (Mineral Kingdom, ſecond edition, vol. i. p. 381.), denominates theſe *ſlip-veins,* and ſeems of opinion, that where one ſide of the vein is thus ſunk down, that ſuch veins are generally narroweſt at the top ; and yet M. Werner, in the work above-quoted pages 63 and 162, aſſerts generally, "that veins, in proportion as they ſink deep, become narrow, and at laſt terminate in wedges." Too much, of what Mr. Weſtgarth Forſter ſays on the ſubject of veins, in his recent "Treatiſe on a Section of Strata," is copied verbatim from Mr. Williams's work, without acknowledgment, to inſpire much confidence in what he ſays on ſlip-veins. From Mr. Farey's recent examination of the Derbyſhire mines, as detailed in his Report on that county, it does not appear probable that the hanging-ſide in the hading veins there are lower or higher than the other, except where a fault has broken through the vein, ſince its formation, and introduced rolled pebbles or other extraneous matters into the broken vein.

HANGINGS, linings for rooms, made of arras, tapeſtry, or the like.

HANGLIP, Cape, in *Geography,* a cape on the ſouthern extremity of Africa, and E. ſide of Falſe bay. S. lat. 34° 16′. E. long. 18° 44′.

HANGMAN's Point, a cape of Ireland, at the entrance of Kinſale harbour; two miles S. of Kinſale. N. lat. 51° 47′. W. long. 8 29′.

HANG-NEST Oriole, and alſo *Hang-neſt* American, in *Ornithology*, the trivial names of the Linnæan Oriolus *nidipendulus*, which ſee.

HANGO, or Ingo, in *Geography*, a ſea-port town of Sweden, in the province of Nyland, on the Baltic; 30 miles W. of Helſinglors. N. lat. 60° 3′. E. long. 23° 56′.

HANG-TCHEOU-FOU, or Han-choo-foo, a city of China, the metropolis of the province of Tche-kiang, is one of the richeſt, beſt ſituated, and largeſt cities of the empire, and conſidered by the Chineſe as "the paradiſe of the earth." It is four leagues in circumference, excluſive of its ſuburbs, and the number of its inhabitants, little inferior to thoſe of Pekin, is computed at more than a million.

Its ſituation between the baſin of the great canal, and the river Tſien-tang, which falls into the ſea at the diſtance of about 60 miles to the eaſtward; the tide which at full increaſes the width of this river to about four miles oppoſite the city, and which at low-water leaves a fine level ſtrand about two miles broad, render it the grand emporium for all kinds of merchandize that paſs between the northern and ſouthern provinces. Notwithſtanding its extent, population, manufactures, and trade, its appearance, excepting its walls, is mean. The higheſt houſes are only two ſtories; the ſtreets are narrow but well paved; and the principal of them conſiſt altogether of ſhops and warehouſes, not inferior to thoſe of the moſt ſplendid kind in London. The manufacture of its ſilk and ſatins is chiefly executed by women; and theſe articles, together with furs and Engliſh broad-cloths, occaſion a very briſk and extenſive trade. The ladies, in lieu of linen, wear next them a ſilk netting; over this a waiſtcoat, and drawers of ſilk, lined, in cold weather, with furs; and over all a ſatin robe, neatly gathered round the waiſt, and retained by a faſh. The country about this city produces abundance of excellent ſilk; and it is ſaid that 60,000 perſons are employed in the ſurrounding towns and villages. As this place is the capital of the province, it is garriſoned by about 10,000 men, Chineſe and Tartars; and it has under its juriſdiction ſeven cities of the ſecond and third claſs. Several canals are cut to aid the commerce of the town; and it derives great advantage from a lake, about ſix miles in circumference, called "Si-hou," which waſhes its walls on the weſtern ſide, the water of which is pure and limpid, and the banks of which are covered with flowers. Halls and open galleries, ſupported by pillars, and paved with large flagſtones, have been erected here on piles, for the convenience of thoſe who are fond of walking; cauſeways, caſed with cut ſtone, traverſe the lake in different directions; and the openings which are left in them at intervals, for the paſſage of boats, are covered by handſome bridges. In the middle of the lake are two iſlands, to which company reſort, after having amuſed themſelves with rowing; and on theſe a temple and ſeveral pleaſure-houſes have been conſtructed for their accommodation. The emperor has a ſmall palace in the neighbourhood. The Engliſh ambaſſador viſited this place in November, 1793; 600 miles E.S.E. of Pe-king. N. lat. 30° 20′. E. long. 119° 46′.

HANGWITE, Hangwita, a mulct impoſed for the hanging a thief, or felon, without courſe of law; or even for ſuffering him to eſcape out of legal cuſtody.

The word is alſo written, corruptly, *hangwith*, or *hankwite.* It is formed from the Saxon *hangian, to hang,* and *wite, mulct, compenſation.*

Hangwite, *to be quit of, quietus eſſe de hangwita,* in *Royal Charters*, denotes an immunity or freedom from the mulct or penalty above mentioned. "Quit de larron pendu ſans ſerjeants le roy."

HANHIKIVI, in *Geography*, a ſmall iſland on the E. part of the gulf of Bothnia. N. lat. 64° 13′. E. long. 24° 12′.

HANIG, in our *Old Writers*, a term for cuſtomary labour to be performed.

HANIMMET, in *Geography*, a town of Africa, in the empire of Morocco; 30 miles E. of Morocco.

HANK, a town of Egypt; 10 miles N.E. of Cairo.

Hank *for bank*, in *Sea Language*, is a phraſe uſed for two ſhips which tack and make a progreſs to windward together.

Hank, a term, provincially employed to ſignify a withe or rope for faſtening a gate, &c.

Hanks, in a *Ship*, are certain wooden rings fixed upon the ſtays of a ſhip, whereby to confine the ſtay-ſails to them at different heights. They are a later invention, and much more convenient than the grommets, and uſed inſtead of them.

HANKIUS, Martin, in *Biography*, was born at Breſlaw in 1633. He was educated partly in his native city, and partly at Jena, where he acquired a reputation which cauſed him to be invited to the profeſſorſhip of morals and hiſtory at Gotha. In 1661 he was called to a ſimilar office at Breſlaw, where he was alſo librarian, rector of the college, and inſpector of the ſchools. By many learned works Hankius extended his fame throughout Germany. He cloſed a very laborious life, in 1709, at the age of ſeventy-ſix. His principal works are, "De Romanarum Rerum Scriptoribus," two vols. 4to.; "De Byzantinarum Rerum Scriptoribus, 4to; various Tracts on the Hiſtory and Antiquities of Sileſia, &c. Moreri.

HANNA, in *Geography*, a town of Lithuania, in the palatinate of Brzeſc; 24 miles S. of Brzeſc.

HANNACHREEN, a ſmall iſland near the W. coaſt of Ireland; 6 miles E. of Rinvell point. N. lat. 53° 36′. W. long. 9° 10′.

HANNAH Bay, a bay in the S. part of James's bay, in Hudſon's bay, where the Hudſon's bay Company have a factory. N. lat. 51° 12′. W. long. 80°.

Hannah's *Town*, a town of America, in Weſtmoreland, Pennſylvania; 26 miles E. of Pittſburg.

HANNAQUAW, in *Ornithology*, the name by which Bancroft diſtinguiſhes the Phaſianus parraka.

HANNAS, in *Geography*, a town of Sweden, in the province of Smaland; 90 miles N. of Calmar.

HANNEMAN, Adrian, in *Biography*, a painter, born at the Hague in 1611. He was a diſciple of Hubert Raveſtein, but formed his taſte by ſtudying the works of Vandyke, which he frequently copied ſo ſucceſsfully, that his pictures have been taken for originals by that great maſter. He uſually imitated him in the airs of his heads and the hues of his colouring; but his compoſitions are hard, ſtiff, and ill ſet together, and ſeldom is his whole picture equally completed.

He was in England, practiſing his art, for ſixteen years, and has left many portraits in the houſes of the great. After his return to the Hague he became the favourite painter of the princeſs Mary of Orange, ſometimes employing himſelf upon ſubjects of an hiſtorical and allegorical nature. Of the latter kind is a large picture in the hall formerly of the States of Holland, repreſenting peace by the figure of a beautiful woman ſeated on a throne, holding a dove on her knees, and crowned with wreaths of laurel by two genii. The compoſition is rich, is highly laboured, and painted with great clearneſs and force. He died in 1680, aged 69.

HANNEMANN, John Lewis, a phyſician, was born at Amſterdam. Having relinquiſhed the ſtudy of theology, he turned his attention to medicine, took his firſt degrees in that ſcience, and practiſed the profeſſion in ſeveral parts of Germany. When ſettled at Hamburgh, in 1675, he was invited to a profeſſorſhip in the univerſity of Kiel, in Holſtein. In the ſame year he received the degree of doctor at Copenhagen, and from that time continued to fulfil the duties of his profeſſorſhip at Kiel during a period of about 50 years. In the year 1680 he was elected a member of the Acad. Naturæ Curioſorum, under the appellation of Neſtor II. which ancient perſonage he appears to have reſembled in ſtrength of conſtitution; for he entered into a ſecond marriage in 1718, when at the age of 78. He died on his birth day, the 25th of October 1724, at the age of 84, and bequeathed his library to the univerſity. His prejudices in favour of the ancients were ſo deeply rooted, that he ſet up an obſtinate oppoſition to the doctrine of the circulation of the blood. His writings, which were not few, abound with other inſtances of prejudice and defective judgment, which render them of little value at preſent. Eloy Dict. Hiſt.

HANNIBAL, ſon of Hamilcar, a famous Carthaginian general, was, as we have ſeen (ſee Hamilcar), educated in his father's camp, and inured from early life to all the labours of the field. When he was only nine years old, he attended his father into Spain, and, though ſo young, fervently took a ſolemn oath never to be at peace with the Romans. After the death of Hamilcar he was appointed to the command of the cavalry in Spain; and, upon the death of Aſdrubal, he was entruſted with the ſole command of all the armies of Carthage, though at that time not 25 years of age. During the next three years his ſucceſs was ſo great that he ſubdued all the nations of Spain which oppoſed the Carthaginian power, and took Saguntum after a ſiege of eight months. This city was in alliance with the Romans, and its fall was the cauſe of the ſecond Punic war, which Hannibal prepared to ſupport with all the courage and prudence of a conſummate general. He levied three large armies, one of which he ſent to Africa, a ſecond he left in Spain, and he marched at the head of the third towards Italy. He came to the Alps, which had till this moment been regarded as inacceſſible, and had never been paſſed, as it was believed, but by Hercules. After much trouble, however, and almoſt inceſſant exertion, he gained the ſummit in about nine days; and had made the path ſo clear, that his elephants and heavy baggage was eaſily tranſported acroſs theſe immenſe mountains, but it was with the amazing loſs of nearly thirty thouſand men. Conquerors are not apt to calculate, or even regard the coſts of an expedition. It is ſufficient for them that it ſucceeds; and the deſtruction of their men gives them little or no concern. As Hannibal advanced into the country, he was met by Scipio; an engagement enſued, the Romans were defeated, and the conſul wounded. The Carthagininians next croſſed the Po, when the Roman army, being reinforced by the arrival of a large body of men under the conſul Sempronius, a general engagement was brought on, which terminated in the complete victory of the Carthaginians. This ſucceſs, and the deep policy of Hannibal, drew over to his party many of the Ciſalpine nations, from whom he obtained vaſt aſſiſtance in numerous bodies of well diſciplined men. He is ſaid, however, to have placed ſo little confidence in their attachment, that he rarely appeared twice in the ſame dreſs, in order that he might avoid any attempt that might be made on his life. He now croſſed the Apennines, invaded Etruria; and having defeated the conſul Flaminius, he met the two conſuls, Terentius and Emilius, at Cannæ, when that engagement enſued which has been ſo long celebrated on the page of hiſtory. In this conteſt the ſlaughter was ſo great, that no leſs than 40,000 Romans were killed; and, as an evidence of the greatneſs of the victory, Hannibal ſent to Carthage three buſhels of gold rings that had been taken from nearly 6000 Roman knights ſlain in battle. It ſeemed now that nothing remained to prevent him from putting an end to the republic. He was urged with the moſt preſſing entreaties to march immediately to the gates of Rome; and he has been reproached with not knowing how to make uſe of the victory which he had ſo glorioſly achieved. This cenſure, perhaps, did not apply to Hannibal, inaſmuch as it is ſcarcely poſſible to conceive that after ſo hard a fought battle his own army were in a condition to march to another attack, and againſt troops that had not been in action, but were waiting as a reſerve againſt any emergency. The immediate conſequence of this victory was the defection of moſt of the Roman allies in that part of Italy, and the ſurrender of the opulent city of Capua, to which the Carthaginian army advanced; and here the conquerors ſoon forgot their warlike habits in the pleaſures and riot of a luxurious city. From this circumſtance it has with much propriety been ſaid that Capua was a Cannæ to Hannibal. After the battle the Romans became more cautious; and when the dictator, Fabius Maximus, had defied the artifice as well as the valour of Hannibal, they began to anticipate better times. Marcellus, who ſucceeded Fabius in the field, firſt taught his countrymen that Hannibal was not invincible. At the ſuggeſtion of Scipio it was determined that war ſhould be carried into Africa, in order to withdraw Hannibal from Rome. When Carthage ſaw the enemy on her coaſts ſhe recalled her general from Italy, who is ſaid to have obeyed the ſummons with the moſt poignant regret. With tears in his eyes he left a country, which, for 16 years, he had kept in continual alarm, and which he began to conſider almoſt as his own property. He and Scipio met near Carthage. A general engagement enſued; the field of conteſt and of carnage was near Zama. Victory declared in favour of the Romans, and it was reported that 20,000 Carthaginians were killed on the ſpot, and an equal number made priſoners. Hannibal, unuſed to defeat, fled to Adrumetum; and now the Romans, in their turn, granted peace only on very hard terms. His credit was not deſtroyed among his countrymen by the calamitous iſſue of this battle. He was employed in ſome other military expeditions, till the Roman ſenate, refuſing to reſtore their hoſtages while Hannibal was ſuffered to be at the head of an army, he was neceſſarily deprived of his command. The office of pretor was now conferred upon him; and in executing it he diſplayed talents that rendered him great as a ſtateſman as he had been illuſtrious as a general. He regulated the finances, rectified abuſes in the adminiſtration of juſtice, and expoſed various frauds and corruptions in the public officers. He was too honeſt for the purlieus of a court, and was obliged to withdraw from his country. At Tyre he was received with all the diſtinction due to his character. From thence he paſſed by Antioch to Epheſus, where Antiochus then was, with whom he had many conferences concerning his meditated war with the Romans. He adviſed that Italy ſhould be made the ſeat of war; and he offered, if placed at the head of a ſufficient body of troops, to make a deſcent on that country, and keep the enemy engaged till Antiochus ſhould arrive with the main force. The Carthaginians became jealous of the talents and exertions of him, whom, on account of his integrity, they had driven from their country. They apprized their inveterate enemies, the Romans, of what was going on, in order that they might counteract his influence. Through the artifices of the Romans, Antiochus began to be ſuſpicious of the fidelity of the veteran commander; and though there was no reaſon for the jealouſy, the monarch was baſe enough to meditate a deſign of delivering him up into the hands of his enemies. Hannibal was apprized of the fact in time to prevent the treachery; and he fled to Pruſias, king of Bithynia. Him he endeavoured to excite againſt the Romans, thus in every inſtance proving that he was not regardleſs of the oaths he had taken in his childiſh years. Roman vengeance followed him to Bithynia, and an embaſſy was ſent to demand of Pruſias inſtantly to give up Hannibal. When he found there were now no means of eſcape, and that Pruſias had actually ſurrounded his houſe with a troop of ſoldiers, he ſwallowed a poiſon which he had always ready againſt ſuch an emergency, and died in the year B.C. 183, at the age of 63. With his laſt breath he is ſaid to have exclaimed: "Solvamus diuturnâ curâ populum Romanum, quando mortem ſenis expectare longum cenſet." Univ. Hiſt. Corn. Nepos.

HANNIBAL, in *Geography*, a military townſhip in New York, on lake Ontario; 10 miles S. by W. of Fort Oſwego.

HANNO, in *Biography*, a Carthaginian commander, celebrated for his voyage of diſcovery, is ſaid to have undertaken the circumnavigation of Africa, by order of the ſtate, which he completed from the ſtraits of Gibraltar, to the extremity of Arabia. He drew up an account of his voyage in the Punic language, which, though not entitled to much credit, was tranſlated into the Greek language. A ſhort work, under the name of the "Periplus of Hanno" is extant, and was firſt publiſhed by Froben, in 1533. It was reprinted in Hudſon's "Geographiæ Veteris Scriptores Græci minores," in 1698. Its authenticity is much doubted, and it has been aſcribed to ſome Greek in Sicily. Bayle. Moreri.

HANNOYS, in *Geography*, a ſmall iſland in the Engliſh channel, about half a mile from the W. coaſt of the iſland of Guernſey.

HANOVER, the chief city of the Hanoverian dominions, is ſituated in the principality of Calenberg, among numerous gardens and villas, on the river Leine, which divides it into the Old and New Towns. Hanover, or Altſtadt Hanover, lies on the left ſide of the Leine, which, running in two channels between the old and new towns, and thus forming an iſland, unites into one ſtream again, and then becomes navigable. The town is fortified, and contains about 1200 houſes, among which are ſeveral large and handſome buildings. The elector's palace fronting the Leine, having been deſtroyed by fire, was rebuilt with great magnificence in 1741. This was the ſeat of the privy-council, of the regency, and of the commiſſioners of war. In a ſplendid chapel, belonging to this palace, was kept a treaſure highly valued, conſiſting of relics, gold and ſilver plate, and gems collected by duke Henry the Lion, in his journey to the Eaſt in 1171, and the ſucceeding years, which was firſt lodged at Brunſwick, and from thence brought to Hanover. The ſtate-houſe is a grand ſtructure. Hanover contains three pariſh churches, a poor-houſe, and three hoſpitals. In this town are manufactures of lace, ſtuff, ſtockings, ribbons, &c.; the tanneries form a conſiderable branch of trade, and alſo a kind of white beer, invented in 1526 by one Brochar, whoſe name it bears. Hanover was unknown before the year 1163.

The Neuſtadt Hanover is ſituated on the right ſide of the Leine, oppoſite to Old Hanover, and communicates with it by means of bridges. This town is fortified, and though it contains hardly 400 houſes, is well built and populous. The civil juriſdiction is veſted ſolely in its magiſtracy. It contains ſeveral valuable manufactures; and a library particularly rich in books of hiſtory and politics; 58 miles S.E. of Bremen. N. lat. 52° 23′. E. long. 9° 43′.

HANOVER, *Electorate of*, called alſo the electorate of Brunſwick Luneburg, a ſtate of Germany on the N. of the Mayn, containing about 8224 ſquare miles, with 850,000 inhabitants, and the computed revenue of 962,500*l.* ſterling, and a military force eſtimated at 20,000, or, by Hoeck computed at 25,970 perſons. This electorate is ſituated in the circle of Lower Saxony, and compriſes the duchy of Lunenberg, Bremen, and Verden, and Saxe-Lauenburg adjacent to Holſtein on the northern ſide of the Elbe; with the countries of Calenberg and Grubenhagen in the ſouth, and thoſe of Diepholtz and Hoya in the weſt, and that of Dunneberg in the eaſt. The compact part of the Hanoverian dominions extends in length, E. to W., about 180 miles, and in breadth N. to S. about 100 miles; while the detached duchy of Grubenhagen, with ſouthern Calenberg or the country of Gottingen, is about 80 miles in length by 30 in its greateſt breadth. The electors of Hanover ſpring from the ancient dukes of Brunſwick. Erneſt died in 1698, having married Sophia daughter of Elizabeth, daughter of James I. of England. He was ſucceeded by his ſon George Lewis, elector, in 1698, who became king of England in 1714.

The religion of this electorate is Lutheran; it contains about 750 pariſh churches, with ſeven ſuperintendants. The government was, before the conqueſts of the French, conducted by a council of regency, and there were provincial ſtates, though ſeldom ſummoned. The literature of this country has deſerved conſiderable applauſe ſince the inſtitution of the univerſity of Gottingen by George II. (See GOTTINGEN.) The manufactures and commerce of this electorate are pretty conſiderable, in metals from the Hartz, linen, cotton, ſome broad cloths, &c. The ſilver fabrics of Zell are celebrated in Germany. The chief exports are metals, coarſe linens, timber, peat, with ſome cattle and grain. The aſpect of the country is plain, partaking ſomewhat of the ſandy nature of Brandenburg, except in the ſouth, where riſe the lofty and pictureſque mountains of the Hartz. The agricultural products are wheat, rye, barley, oats, peas, haricots, and pot-herbs of all kinds, with abundance of potatoes, good fruits, flax, hemp, tobacco, madder, &c. Wood abounds both for fuel and building, and affords conſiderable quantities of tar and pitch. Bees are particularly regarded. Horſes, cattle, and ſheep are numerous; and game is not rare. The chief rivers are the Elbe, towards the north, the Weſer and the Leine on the weſt, and the Aller and Ilmenau in the centre. It has a few ſmall lakes, ſuch are thoſe of Diepholtz and Stinhuder. The Hanoverian dominions contain many ſmall foreſts, and woods, beſides thoſe of the *Hartz*; which ſee. The mineralogy is rich, conſiſting of ſilver, copper, lead, iron, cobalt, and zinc; with marble, ſlate, coal, turf and limeſtone. Two curious mineral ſubſtances, boracite and ſtaurolite, are found, the former in the Kalkberg, the latter at Andreaſberg in the Hartz. In October 1801 Hanover, was taken poſſeſſion of by the king of Pruſſia, but evacuated in November. In 1803 it was invaded by the French.

Hanover, a bay in the ſea of Honduras, on the E. ſide of the peninſula of Yucatan, from which it receives the waters of the Rio Honde. N. lat. 18° 45′. W. long. 89° 15′.—Alſo, a townſhip in Luzerne county, Pennſylvania. —Alſo, a townſhip in Waſhington county.—Alſo, *Eaſt* and *Weſt Hanover*, two townſhips in Dauphine county in the ſame ſtate.—Alſo, a poſt-town, called "M'Alliſter's town," in York county, Pennſylvania, containing about 160 dwellings, a German Lutheran, and a German Calviniſt church; 18 miles S.W. of York.—Alſo, a poſt-town in Plymouth county, Maſſachuſetts, 25 miles S.E. of Boſton; incorporated in 1727, and containing 958 inhabitants.—Alſo, a poſt-town of New Hampſhire, on the E. ſide of Connecticut river, in Grafton county. Dartmouth college in this town is ſituated on a plain in N. lat. 43° 43′. W. long. 72° 14′; for an account of which, ſee College.—Alſo, a townſhip in Morris county, New Jerſey, 16 miles N.W. of Elizabeth town; in which is a ridge of hills, 40 miles from the ſea, having a number of mills, which ebb and flow about ſix feet twice in every 24 hours.—Alſo, a county of Virginia, lying between Pamunky and Chickahominy rivers, 48 miles long, and 22 broad, containing 6211 free inhabitants, and 8192 ſlaves.—Alſo, a ſmall poſt-town of Virginia, in the laſt-mentioned county, on the W. ſide of the Pamunky; 110 miles N.N.W. of Waſhington city.

Hanover, *New*, the weſtern part of North America, bordering on the coaſt of the North Pacific ocean, ſituated between New Cornwall, and New Georgia, ſo called by capt. Vancouver, who explored the coaſt in 1792 and 1793; extending from N. lat. 45° 30′ to 53° 15′.

Hanover, *New*, a fine large iſland in the Pacific ocean, ſo called by Capt. Carteret in 1767, about 30 miles in length. Between this iſland and New Ireland there is a ſtrait or paſſage, which turns away to the N.E.; in which paſſage are ſeveral ſmall iſlands, upon one of which there is a remarkable peak: this iſland was called "Byron's iſland," and the paſſage, or ſtrait, was called "Byron's ſtrait." The land of New Hanover is high; it is finely covered with trees, among which are many plantations, and the whole has a moſt beautiful appearance. The S.W. point, called "Queen Charlotte's foreland," lies in S. lat. 2° 29′. E. long. 148° 27′.

HANSBACH, or Hanspach, a town of Bohemia, in the circle of Leitmeritz, in which are manufactures of cotton, thread, and paper; 12 miles N. of Kamnitz.

HANSE, or Hans, an ancient name for a ſociety or company of merchants; particularly that of certain cities in Germany, &c. hence called *hanſ.-towns*.

The word *hanſe* is obſolete High Dutch, or Teutonic; and ſignifies, as Lambecius obſerves in his "Origines Hamburgenſes," *alliance*, *confederacy*, *aſſociation*, &c. In this ſenſe it is uſed in two of king John's charters, in 1199, to Dunwich in Norfolk, and the city of York. Some, as Werdenhagen, who has been followed by many later authors, derive it from the three German words, *an-der-ſee*, that is, *on the ſea*; becauſe the firſt *hanſe towns* were all ſituate on the ſea-coaſt; whence the ſociety is ſaid to have been firſt called *an-der-ſee ſteten*, that is, *cities on the ſea*; and afterwards, by abbreviation, *hanſee*, and *hanſe*.

Hanse *Towns* denote certain free towns of Germany, and the North, united in ſtrict league, under laws and magiſtrates of their own appointing, for the better carrying on of commerce, and for their mutual ſafety and aſſiſtance.

This celebrated aſſociation, which makes ſo great a figure in the hiſtory of commerce, is ſuppoſed by Werdenhagen to have commenced in the year 1169, immediately after the incurſions and piracies of the Danes, &c. The learned Lambecius is of opinion, that it did not properly commence till after the league between Lubeck and Hamburgh, in the year 1241; Thuanus, in lib. li. Hiſt. Sui Temp. traces the origin of it to the year 1200; others trace its firſt riſe to the year 1140; but be its origin when it will, it was confirmed and re-eſtabliſhed in 1226 and 1284; and an extraordinary general aſſembly was held every ten years, at which they ſolemnly renewed their league, admitted new members, and excluded old ones, if they were refractory, &c.

It began with a league of mutual defence between the cities of Lubeck and Hamburgh, which were moſt expoſed to the piratical incurſions of the barbarous nations that ſurrounded the Baltic, and it afterwards conſiſted of twelve towns, ſituate on the coaſts of the Baltic ſea, or not far from it. But its ſtrength and reputation increaſing, there was ſcarcely any trading city in Europe that did not deſire to be admitted into it. However, it ſeems to have been a ſtanding rule of this confederacy, that no city ſhould be admitted into the *hanſe* or *hanſeatic* league, but ſuch as were either ſituated on the ſea, or on ſome navigable river, commodious for maritime commerce.

The moſt conſiderable cities ſcattered through thoſe vaſt countries which ſtretch from the bottom of the Baltic to Cologne on the Rhine, joined in this famous league, which, in proceſs of time, became ſo formidable, that its alliance was courted, and its enmity was dreaded by the greateſt monarchs. The members of this powerful aſſociation formed the firſt ſyſtematic plan of commerce known in the middle ages, and conducted it by common laws enacted in their general aſſemblies. They ſupplied the reſt of Europe with naval ſtores, and pitched on different towns, the moſt eminent of which was Bruges in Flanders, where they eſtabliſhed ſtaples, in which their commerce was regularly carried on. Thither the Lombards brought the productions of India, together with the manufactures of Italy, and exchanged them for the more bulky, but not leſs uſeful, commodities of the North. The hanſeatic merchants diſpoſed of the cargoes which they received from the Lombards in the ports of the Baltic, or carried them up the great rivers into the interior parts of Germany.

Under our king Henry III. who, in the year 1266, made a conſiderable grant of immunities to the hanſe towns, the hanſe conſiſted of no leſs than ſeventy-two cities; to which were afterwards added ſeveral more. France furniſhed to the confederacy Calais, Rouen, St. Malo, Bourdeaux, Bayonne, and Marſeilles; Spain, Barcelona, Seville, and Cadiz; England, London; Portugal, Liſbon; the Low Countries, Antwerp, Bruges, Rotterdam, Oſtend, and Dunkirk; and Italy and Sicily, Meſſina, Leghorn, and Naples. However, the number of the hanſe towns, which were probably members of the hanſeatic league, and contributed to its ſupport, was ſixty-four, in the year 1370, which was the period when this mercantile confederacy was in its zenith of power and glory; moſt of which have long ſince deſerted the league; ſome about the year 1512, and ſome afterwards. Beſides theſe there were forty-four towns that were probably allies of the confederacy, and were exempted from annual contributions, and to theſe ſeveral others, ſuch as thoſe above-mentioned, were added.

As the members of the hanſe aſſociation exerciſed a juriſdiction among themſelves, they were divided into four claſſes, colleges, or provinces, diſtinguiſhed by the names of their four principal cities, which were thoſe of Lubeck, Cologn, Brunſwick, and Pruſſia or Dantzick. Theſe four cities were the heads of the four claſſes, in which were held their courts of judicature; and Lubeck was the head of the whole hanſe.

Beſides this, the hanſe had four principal factories, or ſtaples, called the *comptoirs* of the confederacy: theſe were at London, Bruges, Novgorod, and Bergen; that of Bruges was afterwards removed to Antwerp. But the firſt and principal was that of Lubeck, which long remained the head of the aſſociation. That of London was called *Guildhalla Teutonicorum*, or the *Steel-yard*; which ſee. The factory in London was complained of by the Engliſh merchants in 1551, for having ingroſſed the woollen cloth trade, ſo that it had exported 50,000 pieces, while all the Engliſh together had ſhipped off only 1100 pieces. And, therefore, in the following year, in the reign of Edward VI. the privileges this company had obtained were revoked. Queen Mary, who aſcended the throne in the next year, ſuſpended the execution of the act for three years; but after that term, either by reaſon of ſome new ſtatute, or in purſuance of that of king Edward, the privileges of the company were no longer regarded, and all efforts of the hanſe towns to recover this loſs were ineffectual. In the beginning of Elizabeth's reign, the merchants of the hanſe towns made loud complaints; to which ſhe prudently replied, that ſhe would ſtill protect them in the privileges and immunities of which ſhe found them poſſeſſed; with this anſwer they were not ſatisfied; and their commerce was ſoon after ſuſpended for a time, to the great advantage of the Engliſh merchants, who took the whole trade into their own hands, and, encouraged by ſucceſs, divided themſelves into ſtaplers and merchant adventurers; the former reſiding conſtantly at one place, and the latter trying their fortunes in other towns and ſtates abroad with cloth and other manufactures. This ſucceſs ſo enraged the hanſe towns, that they attempted, by every method which they could deviſe, to draw upon the Engliſh merchants the ill opinion of other nations and ſtates. They prevailed ſo far as to obtain an imperial edict, by which the Engliſh were prohibited all commerce in the empire. The queen, by way of retaliation, retained 60 of their ſhips, which had been ſeized in the river Tagus with contraband goods of the Spaniards. Theſe ſhips the queen intended to have reſtored, as deſiring to have compromiſed all differences with thoſe trading cities; but when ſhe was informed that a general aſſembly was held at Lubeck, in order to concert meaſures for diſtreſſing the Engliſh trade, ſhe cauſed the ſhips and cargoes to be confiſcated; and the hanſe ſtates were informed, that ſhe had the greateſt contempt imaginable for all their proceedings.

The government of the hanſe was at firſt ariſtocratical: then it came under the ſole direction of the grand-maſter of the Teutonic order; and, at length, divers princes and lords made intereſt for it.

The end of the fourteenth century, and the beginning of the fifteenth, were the moſt flouriſhing times of this alliance. Theſe towns were then in a condition to proclaim war againſt kings: hiſtory is not ſilent as to that they waged againſt Waldemar III. king of Denmark, about the year 1348, when they took ſuch revenge of the Daniſh fleet in the Sound, for having interrupted their commerce, that Waldemar, for the ſake of peace, gave up the whole of Schonen for 16 years, in conſequence of which they commanded the paſſage of the Sound in their own right. In 1428 they made war againſt Eric, king of Denmark, in which was the hanſeatic fleet, conſiſting of two hundred and fifty ſhips, containing about twelve thouſand regular troops, beſides the ſeamen; who ſacked and plundered the coaſt of Jutland, &c. and obliged him to make peace with them. This ſingular republic, deſtitute of any territory, not only waged war againſt Denmark, but placed Albert of Mecklenburg on the throne of Sweden. Norway alſo fell into the vileſt ſubjection, and Bergen may be ſaid to have been garriſoned by the hanſeatic league. Many privileges were granted and confirmed to them by the kings Lewis XI. Charles VIII. Lewis XII. and Francis I. of France, as well as by the emperor Charles V. and other ſovereigns. At length, however, the ſeveral princes, whoſe principal cities were entered into the aſſociation, began to think it policy to put ſome bounds to the power, which, in time, might have proved formidable to themſelves. The means were eaſy and ſhort: each withdrew the merchants of his country from the aſſociation: by which in a little time, from the great number of cities it had comprehended, the aſſociation found itſelf ſunk to thoſe few which had begun the confederacy; which henceforth was called the *Teutonic hanſe:* though theſe continued to be ſo conſiderable in point of commerce, that they were admitted to make treaties with the greateſt kings.

The diviſions that prevailed among them contributed greatly to their fall: nor muſt it be forgotten, that the eſtabliſhment of the republic, and commerce of Holland, had its ſhare in reducing their importance.

The four cities which formed the league, were Lubeck, Cologn, Brunſwick, and Dantzick, which were called *mother towns*; as thoſe afterwards added to them were called *daughters.*

A great number of towns in Germany retained the title of *hanſe* towns; but this was rather an empty title which they affected, than any argument of their continuing to trade under the laws and protection of the ancient alliance; there being ſcarce any but Lubeck, Hamburgh, Bremen, Roſtock, Brunſwick, and Cologn, that were truly *hanſeatic*, and that had deputies at the aſſemblies held on the common occaſions of the league.

The great trade the Dutch maintained with the hanſe towns, contributed not a little towards maintaining ſome part of them in their ancient reputation; and it was principally to their alliance with that flouriſhing republic, that they owed the preſervation of their liberties; the ſuccours which ſome of them had received from the Dutch having ſaved them more than once from the enterprizes of the neighbouring princes.

However, at the end of the 16th century, the rupture with England, and alſo the independence of Holland, both already noticed, were highly injurious to this league; and in 1630, when a general aſſembly was ſummoned to Lubeck, none of the hanſeatic towns ſent deputies except to notify their dereliction. Such was the fall of this unexampled confederacy, which had often abuſed its advantages, and repaid favour with inſult; but which greatly contributed to the diffuſion of commerce and the arts of civilization, boaſted an opulence ſuperior to that of monarchs, and imparted the firſt tincture of wealth and eaſe to the north of Europe, though its effects (ſays Pinkerton) have ſtrangely eſcaped the notice of moſt hiſtorians. At preſent the hanſeatic league compriſes only three cities, Lubeck, Hamburg, and Bremen; and in the definitive treaty of indemnities, 25th February, 1803, they are acknowledged as hanſeatic cities, with the guarantee of their juriſdiction, and perpetual neutrality.

We refer for further particulars, to vol. i. of the "Chron. Deduction" of Anderſon, who has mentioned the chief facts with reſpect to the commercial progreſs of the hanſe towns, the extent of the privileges which they obtained in different countries, their ſucceſsful wars with ſeveral monarchs, as well as the ſpirit and zeal with which they contended for thoſe liberties and rights without which it is impoſſible to carry on commerce with advantage.

HANSEATIC, ſomething belonging to the alliance, or company of the hanſe.

Thus we ſay, the hanſeatic body; the hanſeatic towns, &c.

HANSGRAVE, the title of an officer in Germany. The hanſgrave is the chief of a company or ſociety.

The word is compounded of the German *hanſe* and *graf*, *count*. See Grave.

HANSHAGEN, in *Geography*, a town of Pruſſia, in Natangen; 10 miles N.N.W. of Heilſberg.

HANSOOTE, a town of Hindooſtan, in Guzerat; 15 miles S.W. of Baroach.

HANTAM, one of the tranſmontane diviſions of Stellenboſch, in Southern Africa, is a Table mountain, riſing from the ſurface of the Bokkeveld mountain, on its eaſtern extremity, and is ſurrounded by a number of farms that receive a ſupply of water from rills iſſuing out of the baſe of the mountain. Horſes and cattle are the produce of the Hantam. The inhabitants of this diviſion are liable to the depredation of the Bosjeſmans Hottentots, againſt whom they make regular expeditions, in the ſame manner as from the Sneuwberg.

HAN-TCHAO, a ſmall iſland in the Chineſe ſea, near the coaſt of Cochin-china, at the entrance of the harbour of Turon. N. lat. 16 12′. E. long. 108° 12′.

HAN-TCHEOU, a town of Corea, in the province of Hoang-hai, on the river Tchou-nang; 140 miles N.N.W. of Kin-kitchao. N. lat. 39° 38′. E. long. 125° 31′.

HAN-TCHONG-FOU, a large and populous city of China, in the province of Chen-ſi, ſituated on the river Han, which waters the whole country belonging to its diſtrict. It has under its juriſdiction 16 cities, of the ſecond and third claſs. The adjacent country is fertile, and abounding with mountains and foreſts. The principal articles of commerce are honey, wax, muſk, and cinnabar. The moſt remarkable thing in this country is the high-way, cut acroſs the mountains, which conducts to the capital. It was made by an army, in the courſe of a military expedition. In the execution of it, mountains were levelled, and bridges conſtructed which reach from one to another; and when the interpoſing valleys appeared too wide, large pillars were erected to ſupport them. N. lat. 32 59′. E. long. 106° 44′.

HANTELODE, in our *Old Writers*, ſignifies an arreſt. The word is Saxon, from *hant*, *hand*, and *load*, *i. e. laid; manus immiſſio*, becauſe arreſts are made by laying hold on the debtor, &c.

HANTOL, in *Botany*, a tree of the Philippine iſlands, whoſe fruit is called the falſe mangoſtan, rather from its appearance (though it has neither a calyx at the baſe, nor a radiated ſtigma at the ſummit, like the true one, ſee Garcinia), than from any agreement in flavour. It has indeed a ſlight acid taſte, which is ſaid not to be diſagreeable at firſt, but leaves a flavour of garlic. This fruit ſerves chiefly to make a ſyrup, jelly, or other ſweetmeat for the table. Lamarck. Dict. v. 3. 69. See Sandoricum.

HANTON-HOTUN, in *Geography*, a town of Chineſe Tartary; 17 miles N.W. of Ningouta.

HANTS, a county of Nova Scotia, beginning about 30 miles from Halifax, and containing the townſhips of Windſor, Falmouth, and Newport, with ſeveral unſettled tracts. It is about 20 miles ſquare, and well watered. It is interſected by ſeveral navigable rivers.

HANWAY, Jonas, in *Biography*, was born at Portſmouth in the year 1712; at an early age he was put apprentice to a merchant at Liſbon, where he acquired the Portugueſe language. In 1743, he entered partnerſhip with the Engliſh houſe of Dingley, at Peterſburgh, and the mercantile tranſactions of that houſe brought him acquainted with the trade lately commenced on the Caſpian ſea. The concerns of the partnerſhip obliged one of the firm to be conſtantly in Perſia. Mr. Hanway gladly ſeized the opportunity of viſiting that country, and arrived at Aſtrabad in the latter part of that year, with a cargo of Engliſh goods. In this expedition his health was materially injured, but he was enabled to obtain a knowledge of the manners, the cuſtoms, and modern hiſtory of Perſia, which few Europeans ever before poſſeſſed. Upon his return he publiſhed, in four volumes 4to., his "Hiſtorical Account of the Britiſh Trade over the Caſpian Sea; with a Journal of Travels from London, through Ruſſia, Perſia," &c. This work abounds with curious and inſtructive matter, but is too prolix to be read with real ſatisfaction. From this time, Mr. Hanway was frequently before the public as an author: all his publications related to ſome point of public good, in promoting ſchemes of charity and utility, or in propoſing means of bettering the condition, and mending the morals of the lower claſſes of ſociety. He was the principal founder of the Marine Society, intended to train young and deſtitute lads to the ſervice of the navy; he was particularly active in the ſucceſs of the Magdalen charity, which it is hoped has been of vaſt advantage to a number of the moſt pitiable objects in the city of London, in withdrawing them from the paths of proſtitution, and rendering them uſeful members of the community. The inſtitution of Sunday-ſchools is almoſt wholly the work of Mr. Hanway; and the forlorn climbing-boys, frequently ſold by baſe and infamous parents, to the ſervice of more cruel maſters, claimed a large portion of his humane interference. His fellow-citizens thought ſo highly of his active worth, that a deputation of Britiſh merchants waited on the miniſter lord Bute, with a requeſt that ſome public favour might be conferred on a man, who had done ſo much ſervice to the community, at the expence of his private fortune. Mr. Hanway was, in conſequence, made a commiſſioner of the navy, an office which he held about 20 years, when he reſigned it; the ſalary was, however, continued to him through life. He died in the year 1786, and a monument was raiſed to his memory by ſubſcription. The beſt and moſt important memorial he erected to his own fame, in a little work intended for the lower claſſes upon their entrance into life: it is entitled "Advice from Farmer Trueman to his Daughter Mary, upon her going to ſervice," &c. One of the editors of this work, a lady of diſtinguiſhed literary attainments, has obſerved that "Mr. Hanway has written profeſſedly for the poor, and his memory will live and be reſpected in the character of Farmer Trueman, long after the period when all worldly diſtinctions will have ceaſed to be of any value." See the work printed for Johnſon & Co. See alſo Gen. Biog. and Monthly Review, vol. xliii.

Hanway's *Point*, in *Geography*, a cape on the N. coaſt of Egmont iſland. S. lat. 10° 42′. E. long. 164° 22′.

HANXLET, a ſmall iſland in the eaſtern part of the gulf of Bothnia. N. lat. 63° 19′. E. long. 21° 30′.

HAN-YANG-FOU, a city of China, of the firſt rank, in the province of Hou-quang, at the conflux of the rivers Han and Yan-tſe: it is rich, populous, and commercial. N. lat. 30° 36'. E long. 113° 44'.

HAO, a *weight* uſed in China, the one 10,000dths of their foot, = $\frac{1}{10000}$ li, = $\frac{1}{1000}$ fen, = $\frac{1}{10}$ inch of China. See Philoſophical Magazine, vol. 36, p. 428.

HAP, or HAPP, in *Law*, ſignifies to catch or ſnatch a thing. Thus we meet with, to *hap* the poſſeſſion of a deed-poll. Littleton, fol. 8. alſo, to *hap* the rent. If partition be made between two parceners, and more land be allowed the one than the other, ſhe that hath moſt of the land charges it to the other, that *happeth* the rent whereon aſſize is brought.

HAP, in *Agriculture*, a term provincially uſed to ſignify the covering of ſeed with mould or earth.

HAPAEE, in *Geography*, a cluſter of iſlands among the Friendly iſlands, in the South Pacific ocean, each of them about ſix or ſeven miles long, and of a ſimilar height and appearance. The northernmoſt is called Haanno, the next Foa, the third Lefooga, and the ſouthernmoſt Hooleiva. They extend S.W. by S. and N.E. by N. about 19 miles. The N. end lies in S. lat. 19° 39', and 33' of longitude to the eaſt of Annamooka. Between them are many ſmall iſlands, ſand-banks, and reakers. Lefooga is the moſt fertile, and of courſe the beſt inhabited. Along the N.W. of this iſland there is anchorage. The inhabitants are very hoſpitable, and fond of dancing and other amuſements. They lie about S. lat. 19° 39' to 19° 53', and E. long 185° 36' to 185° 45'.

HAPAJERSIN, a town of Sweden, in Eaſt Bothnia; 30 miles S.S.W. of Braheſtad.

HAPALANTHUS, in *Botany*. See CALLISIA.

HAPIREAN, in *Geography*, a town of Chineſe Tartary, in the county of Hami.

HAPIREAN *Poulee*, a town of Aſia, in Thibet; 25 miles W.N.W. of Orto.

HAPPINESS, in *Ethics*. See GOOD.

HAQUE, in our *Old Writers*, a little hand-gun, prohibited to be uſed for deſtruction of game, &c. by ſtatute 33 Hen. VIII. cap. 6. and 2 & 3 Ed. VI. cap. 14.

There is alſo the *half-haque*, or *demi-haque*, within the ſaid acts.

HAQUENY, HACKNEY, an old French word for an ambling horſe.

HAQUEBUT, a kind of fire-arm, otherwiſe called an *hagbut* or *harquebuſs*.

HARA, in *Geography*, a lake of Thibet. N. lat. 36° 42'. E. long. 97° 19'.

HARA *il Coma*, a town of Little Bukharia; 15 miles N. of Acſu.

HARACH, in the *Eaſtern Revenues*, is a poll-tax laid on the Chriſtians and Jews in Egypt. This had long been in the hands of the Janizaries, but of late has got into the power of an officer, called thence the *harach aga*, ſent from Conſtantinople. Before this the Chriſtians paid but a trifle, by capitulation with ſultan Selim; and this capitulation the Coptis ſay they have in their own hands; it was only two dollars and three quarters a head. The great men conſented to this: and now they pay their two or three quarters, or five and a half, or eleven, according to their ſubſtance, each dollar being about half a crown. The perſons who pay this are thoſe only who have arrived at the age of ſixteen. Pocock's Egypt, p. 173.

HARACHER-HOTUN, in *Geography*, a town of Thibet; 160 miles W. of Tourfan. N. lat. 43° 4'. E. long. 86° 16'.

HARÆ, in *Ancient Geography*, *Tarecca*, a town of Syria in the Palmyrene, mentioned in the Theodoſian table; ſituated to the eaſt of a chain of mountains, and almoſt N. of Palmyra, towards N. lat. 34° 25'.

HARAKER, in *Geography*, a town of Sweden, in the province of Weſtmanland; 12 miles N. of Weſteras.

HARAM, a ſmall iſland in the Red ſea, near the coaſt of Arabia. N. lat. 22° 18'.

HARAM. See HAREM and SERAGLIO.

HARAMFOE, in *Geography*, a ſmall iſland in the North ſea, near the coaſt of Norway. N. lat. 62° 36'.

HARAN, otherwiſe CHARRÆ, in *Ancient Geography*, a city of Meſopotamia, whither Abraham firſt retreated after he left Ur; and where Terah, Abraham's father, died and was buried. (Gen. xi. 31, 32.) At Haran, or Charræ, Craſſus, the Roman general, was defeated and ſlain by the Parthians. It was ſituated between the Euphrates and the river Chebar, at a conſiderable diſtance from the confluence of theſe rivers.

HARANGUE, a modern French name for a ſpeech, or oration, *i. e.* a diſcourſe made by an orator in public.

Menage derives the word from the Italian *arenga*, which ſignifies the ſame: formed, according to Ferrari, from *arringo*, a *juſt*, or *place of juſting*. Others derive it from the Latin *ara*, *altar*; becauſe the firſt harangues were made before altars: whence the verſe of Juvenal.

> "Aut Lugdunenſis rhetor dicturus ad aram."

The word is alſo frequently uſed in an ill ſenſe: *viz.* for a too pompous, prolix, or unſeaſonable ſpeech or declamation. In Homer, the heroes generally harangue before they come to fight; as, in England, criminals harangue on the ſcaffold before they die.

HARATCH, in *Geography*, a river of Africa, anciently called "Savus," which runs into the ſea; 6 miles S. E. of Algiers.

HARBAGHE', a town of Nubia, on the left bank of the Nile; 63 miles N. of Sennaar. N. lat. 14° 40'. E. long. 33° 5'.

HARBINGER, an officer of the king's houſhold, having four yeomen under him, who ride a day's journey before the court when it travels to provide lodgings, &c.

HARBO, in *Geography*, a town of Sweden, in Weſtmanland; 20 miles N. N. W. of Upſal.

HABOROUGH, or MARKET-HARBOROUGH, a market town in the hundred of Gaſtre, and county of Leiceſter, England, is ſituated near the bank of the river Welland. It is now a reſpectable well-built town, having been lately very materially improved, and ſeveral new houſes having been erected. Many of the buildings are, however, included in the pariſhes of Great and Little Bowden; to the former of which this town is attached. In the Teſta de Nevill this place is called both Herberburr Buggedon, and Haverberg, and by the latter name it is deſignated in moſt other ancient writings wherein it is mentioned: haver being, as Johnſon informs us, a common word, in the northern counties, for oats. Harborough has a ſtrong claim to Roman antiquity. On the eaſt ſide of the town are traces of an ancient encampment, which, from its form, may be conſidered of Roman origin. At a ſhort diſtance, both eaſt and weſt, Roman urns, and other pottery, have been diſcovered; and even in the ſtreet, an ancient drain was lately found, a few feet below the ſurface, which appeared to be of Roman maſonry. The encampment was of a ſquare form, and included about ſix acres of land; the banks and foſs are nearly levelled, the moſt conſpicuous remains being in an old incloſure, called the King's Head Cloſe. Near this ſpot, in the year 1779, were diſcovered two ſepulchral urns, one of a large ſize, the other ſmaller. It is rather a curious circumſtance, that Harborough has no land or fields belonging to it; whence originated the local proverb, that "A gooſe will eat all the graſs that grows in Harborough field." In eccleſiaſtical affairs, this town is dependent on the pariſh of Bowden Magna: its chief religious ſtructure being only a chapel of eaſe. This building, however, is large, handſome, and nearly uniform in its ſtyle of architecture. It may be fairly ranked with the fineſt religious edifices in the county; and conſiſts of a nave, two aiſles, a chancel, with two tiers of windows, two porches, and a tower with a ſpire. This chapel is mentioned in an eccleſiaſtical record of 1344, where it is noticed as a parcel of the rectory of Bowden Magna. Mr. Nichols ſuppoſes it to have been erected by Geffrey le Scope, "whoſe arms were repeated on the ſteeple." In this town are three meeting-houſes; for Preſbyterians, Quakers, and Methodiſts. In the principal ſtreet is a large town-hall; and near the chapel is a charity-ſchool founded by Mr. Smith. In the time of queen Elizabeth, a large manufactory of ſhoes for foreign trade was eſtabliſhed here; and at preſent the making of tammies, ſhalloons, plain and figured laſtings, &c., affords employment to many poor families in the town and its vicinity. The buſineſs in theſe articles is very conſiderable; and Mr. Nichols obſerves, that in ſome years "it is computed that 30,000*l.* has been returned in the article of tammies only." Harborough is 83 miles diſtant from London; has a weekly market on Tueſday, and two annual fairs, one held by charter, the other eſtabliſhed by cuſtom; and contained, in 1801, 330 houſes, and 1716 inhabitants.

Harborough appears to have been the head-quarters of the king's army, previous to the memorable battle of Naſeby, in Northamptonſhire, which proved ſo fatal to the royal cauſe in June 1645. Nichols's Hiſtory of Leiceſterſhire, vol. ii. part. 2. fol. 1798.

Harborough *and Stamford Canal*, is a line of inland navigation which was projected in the year 1810, and ſurveyed by Mr. Benjamin Bevan the engineer, and for which a bill is at this time before parliament (Feb. 1811); it is propoſed to commence at the head of the Welland navigation at Stamford bridge, and follow pretty cloſely the courſe of the Welland on its ſouthern ſide, until within 2½ miles of Market Harborough, where it is to croſs the Welland, and proceed weſt about two miles, to join the north-eaſtern point of the loop of the Leiceſterſhire and Northamptonſhire Union canal, in the pariſh of Great Bowden, from whence the communication by water is now open to the wharf, at the north-weſt end of Market Harborough town, or to the intended Grand Union canal at Gumley, as well as to Leiceſter, Loughborough, the Trent, and all its connecting navigations. A large reſervoir is intended, about three miles from Harborough, near the Leiceſter road, on its eaſt ſide, in Weſt Langton, and two ſmaller ones, half a mile ſouth-eaſt of Huſband's Boſworth, the feeder from which laſt will fall into the Union canal, about a mile from the head of the intended Harborough and Stamford canal, where the feeder from the other will fall alſo into the Union canal.

HARBOUR, a ſea-port, or a ſtation where ſhips may ride ſafe at anchor.

The word is chiefly applied to thoſe cloſed and ſecured with a broom, or chain, and that are furniſhed with a mole, &c. See Port.

To Harbour, *verb*; popularly ſignifies to lodge, receive, or entertain; or to find a retiring place.

Among hunters, a hart is ſaid to *harbour*, when he goes to reſt; whence to *unharbour* a deer, is to diſlodge him.

Harbour *Iſland*, in *Geography*, one of the ſmaller Bahama iſlands, north of Eleuthera. N. lat. 25° 56'. W. long. 76° 44'—Alſo, a ſmall iſland, near the coaſt of North Carolina, in Pamlico ſound. N. lat. 34° 50'. W. long. 76° 32'.

Harbour, a ſmall iſland in the Engliſh channel, near the coaſt of France. N. lat. 48° 39'. W. long. 1° 59'.

Harbour, *Cape*, a cape of North America, on the coaſt of Maine, at the north extremity of Wells bay. N. lat. 43° 18'. W. long. 70° 24'.

HARBURG, a ſmall iſland in the Red ſea. N. lat. 16° 5'.

Harburg, or *Hearburg*, a town of Germany, on the Wernitz; 6 miles S. E. of Nordlingen.—Alſo, a ſea-port town of Germany, in the principality of Luneburg-Zell, on the Saave, which runs through it into the Elbe. The inhabitants carry on a conſiderable trade in bleaching wax, refining ſugar, manufacturing ſtarch, ribbons, hats, and ſtockings. They alſo ſend wood for building to Holland, maſts, &c. Paſſage-boats ſail from Harburg every day with paſſengers and goods, at a fixed price; 7 miles S. of Hamburg. N. lat. 53° 28'. E. long. 9° 56'.

HARCAS, a town of Tartary, and principal reſidence of the khan of the Calmucks, on the river Ili.

HARD Bodies, in *Philoſophy*, are ſuch bodies as are abſolutely inflexible by any ſhock or colliſion whatſoever.

This is the common meaning of the term: but Huygens, by hard bodies (*corpora dura*) meant what others call perfectly elaſtic bodies; for he thus expreſſes himſelf: "Quæcunque ſit cauſa, corporibus duris, a mutuo contactu reſiliendi cum ſe invicem impinguntur: ponimus, cum corpora duo inter ſe æqualia, æquali celeritate, ex adverſo ac directe ſibi mutuo occurrunt, reſilire utrumque eadem qua advenit celeritate." Huyg. De Motu Corp. ex Percuſſ. Hypoth. 2. But this hypotheſis is conſiſtent only with perfect elaſticity, and not with the common ſuppoſition of hardneſs or inflexibility, which produces no reſilition.

The laws of motion for hard bodies are the ſame as for ſoft bodies, and theſe two ſorts of bodies might be comprized under the common name of *unelaſtic*. See Collision.

Some who follow Leibnitz's doctrine, concerning the meaſure of the moving force of bodies, deny the exiſtence of hard or inflexible bodies. And it is ſo far true, that no experience ever taught us, that there are any ſuch. The hardeſt bodies, to appearance, do not preſerve their figures in colliſion, ſuch bodies being only elaſtic, yielding to the ſhock, and then reſtoring themſelves. See Elastic.

M. Bernouilli goes ſo far as to ſay, that hardneſs, in the vulgar ſenſe, is abſolutely impoſſible, being contrary to the law of continuity. For ſuppoſing two ſuch hard bodies of equal maſſes, and with equal velocities, to meet directly, they muſt either ſtop or return after the colliſion. The firſt ſuppoſition is commonly admitted; but then it follows, that theſe bodies muſt inſtantaneouſly paſs from motion to reſt, without going through ſucceſſive diminutions of their velocities till they ſtop: but this is thought to be contrary to the fundamental laws of nature. See Bernouilli Oper. tom. iii. p. 10.

Hence this author rejects perfectly ſolid and inflexible atoms, which others think a conſequence of the impenetrability of matter. See Maupert. Mem. de l'Acad. Berlin. tom. ii. p. 284.

Hard, in *Engineery*, ſignifies a ford or paſſable place in a river, particularly in and near the Fens, where many of theſe formerly occurred, compoſed of gravel, probably brought thither for the purpoſe, and which proved very detrimental to navigation in dry ſeaſons, as well as obſtructed and augmented the floods in wet ones, until they were removed; frequent mention is made of theſe hards by Mr.

Smeaton, and other writers on the navigation and drainage of theſe diſtricts.

Hard-*coals*, in *Mining*, are ſuch as can be dug and raiſed in large lumps, and are of a free or open-burning quality; they are ſometimes called ſpire-coal, and ſtone-coal, and ſeem the lithanthrax of ſome authors. The great preference ſhewn by the dealers and conſumers of coal in the midland counties to this kind, in rejection of the ſoft or tender coals, (which is the character of by far the greater number of coal-ſeams,) unleſs of the very beſt crozling or melting quality, occaſions an inconceivable waſte to be made in the pits of all but hard coals. The Report to the Board of Agriculture on Derbyſhire, very properly calls the attention of that body, and the legiſlature, to this important ſubject.

Hard-*corn* ſignifies wheat in Suſſex and ſome other counties.

Hard *horſe*, in the *Manege*, is one that is inſenſible of whip or ſpur.

Hard-*iron*, the common name of the weed corn crowfoot, in ſome places.

Hard-*lead*, in *Mining*, is applied to the ſquare-ended pieces, or half pigs, which are made at the ſlag-hearths, or mills, attached to the cupolas or reverberatory furnaces (where ſoft lead is made,) in Derbyſhire, from the drawn ſlag of the cupolas. This hard-lead, though unfit for rolling, and ſome other purpoſes, is much eſteemed by the red-lead makers, and the ſhot-makers.

Hard-*a-lee*, in *Sea Language*, denotes the ſituation of the helm, when it is puſhed cloſe to the lee-ſide of the ſhip, either to tack or keep her head to the wind, when lying-by, or trying. It expreſſes alſo the order to put the helm in this poſition.

Hard-*a-weather*, is the order to put the helm cloſe to the weather or windward ſide of the ſhip, and it ſignifies this poſition of the helm.

HARDALES, in *Geography*, a town of Spain, in the province of Seville; 10 miles S. W. of Antequera.

HARDANGER, *Gulf of*, a bay of the North ſea, on the coaſt of Norway. N. lat. 59° 50′. E. long. 6°.

Hardanger, mountains of Norway, in the province of Bergen; 60 miles E. of Bergen.

HARDBERG, a town of Germany, in the duchy of Stiria; 52 miles S. of Vienna. N. lat. 47° 18′. E. long. 15° 46′.

HARDEN's Creek, a river of America, in Kentucky, which runs into the Ohio. N. lat. 37° 40′. E. long. 86° 56′.

HARDENBURG, a town of the duchy of Berg; 13 miles E. N. E. of Duſſeldorf.—Alſo, a town of Holland, in the department of Overyſſel, on the Vecht; 10 miles S. W. of Covorden. N. lat. 52° 37′. E. long. 6° 27′.

HARDENING, the act of communicating a greater degree of hardneſs to a body than it had before.

The hardening and tempering of iron and ſteel make a conſiderable article in the mechanical arts.

There are divers ways of effecting it: as by the hammer, quenching it when hot, in cold water; caſe-hardening, &c. See Tempering and Steel.

Hardening, *Hammer*, is moſtly uſed on iron and ſteel plates, for ſaws, ſprings, rules, &c.

Hardening, *Caſe*, which is a ſuperficial converſion of iron, into ſteel (ſee Case-*hardening*) is thus performed: take cow horn or hoof, dry it well in an oven, and beat it to powder; put as much bay-ſalt as of this powder into ſtale urine, or white-wine vinegar, and mix them well together; cover the iron, or ſteel, all over with this mixture, and wrap it up in loam, or plate-iron, ſo as the mixture touch every part of the work; then put it in the fire, and blow the coals to it, till the whole lump have a blood-red heat, but no higher; laſtly, take it out, and quench it. See Steel, under which article other proceſſes for this purpoſe are deſcribed.

Hardening *of the ſtrata*, in *Geology*, is a point on which theoriſts have been much divided: Dr. Hutton, and his commentator, Mr. Playfair, have contended, that fire or heat was neceſſary for the conſolidation of the ſtrata, after their depoſit in a ſoft or pulverulent form, in the depths of the ocean.

Mr. Kirwan ſuppoſes this hardening to have been in part chemical, and to have followed immediately their depoſition, and partly the effect of ſubſequent infiltration (Geo. Eſſays, p. 45.). While others have referred to deſiccation or drying, ſince the waters retracted, as alone ſufficient to account for the hardening of the terreſtrial ſtrata. Thoſe who attentively conſider the vaſt maſs and ſucceſſion of different ſtrata, which have been explored, below the level of, and even under the coaſts of the ocean, as at Newcaſtle, Whitehaven, Borrowſtowneſs, and in Cornwall, &c., will readily perceive, that drying, in its literal ſenſe, by expoſure to the air, as may be alleged with reſpect to the ſuperficial ſtrata of mountains, and to dry land in general, could have had no part in producing the induration or hardening of theſe ſub-marine ſtrata, and which, nevertheleſs, are found ſo exactly ſimilar to the parts of the ſame ſtrata expoſed to the air, that the inference ſeems clear, that to the chemical principles which produced the depoſition of the ſtrata, is their hardening entirely to be aſcribed.

Hardening *of Timber*. The Venetians are famous for the ſoundneſs of their ſhips, which do not rot as thoſe of other nations, but will endure much longer than the others. Tachenius tells us, that the whole ſecret of this conſiſts in the manner of their hardening their timber intended for this ſervice; and that this is done by ſinking it in water while green, and leaving it there many years. This prevents the alkali, or that ſalt which furniſhes the alkali in burning, from exhaling afterwards; and by this means the timber becomes almoſt as incorruptible as ſtone. It is evident that the exhaling of this ſalt, and the rotting of wood, have ſome very great connection with one another, ſince the more ſound any piece of timber is, the more ſalt it proportionably yields; and the wood which is rotten is found on trial to contain no ſalt at all. Tachen. Hippoc. Chym.

HARDEPSEN, in *Geography*, a town of Weſtphalia, in the principality of Calenberg, having a conſiderable manufacture of leather; 10 miles N. W. of Gottingen.

HARDER, John-James, in *Biography*, an eminent phyſician, was born at Baſle on the the 17th of September, 1656, and was educated in his native city until the year 1676, when he went to complete his ſtudies in anatomy and ſurgery, in France. On his return to Baſle, in 1678, he took the degree of M. D.: in 1685 he was admitted into the faculty, and became ſucceſſively profeſſor of philoſophy, anatomy, botany, and the theory of phyſic in the ſchools of his native city. Uniting the qualities of a man of ſcience and amiable diſpoſitions with thoſe of a ſucceſsful practitioner, he was ſo much ſought after by the German princes, that, after he had attained the age of thirty, his profeſſional occupations no longer admitted of the ſtudies of the cloſet. He was honoured with the title of count palatine by the emperor Leopold in 1694. His life was terminated in 1711, or, as ſome affirm, in 1718, by a tertian fever, and his death occaſioned univerſal regret. The works, which he left, are the reſult of the ſtudies of his youth, and their value leads us to lament that the labours of practice deprived us of the reſearches of more mature age. He publiſhed ſix different treatiſes between the years 1671 and 1687, chiefly relating to anatomy and phyſiology. See Eloy. Dict. Hiſt.

Harder, in *Ichthyology*. See Gobius *Gronovii*.

HARDERWYCK, or Hardewick, in *Geography*, a ſea-port town of Holland, in the ſtate of Guelderland, ſituated on the Zuyder ſea. It was taken by the French in 1795; 25 miles N. E. of Utrecht. N. lat. 52° 24'. E. long. 5° 31'.

HARDI, Alexander, in *Biography*, who flouriſhed in France during the reigns of Henry IV. and Lewis XIII., was a moſt copious dramatic writer, and is ſaid to have produced more than 600 pieces: but his ſelect works were publiſhed in five large volumes octavo. Fertility of invention was his great quality, and he is praiſed for having adopted the true ſtyle of dramatic poetry. Before the time of Corneille, he was accounted the principal French tragedian. He died about the year 1630. Moreri.

HARDICANUTE, king of England and Denmark, is chiefly known by his bodily accompliſhments. By remaining ſo long in Denmark, he had been nearly deprived of his ſhare in the kingdom, yet he did not abandon his pretenſions, but had determined before Harold's death to recover by arms what he had loſt, either by his own negligence, or by the neceſſity of his affairs. The death of his brother gave him poſſeſſion of the crown in England, without a ſtruggle. His firſt action as king, was to cauſe the dead body of his brother to be dug up and thrown into the Thames; this brutal but impotent deed he performed a ſecond time when it had been recovered and buried by ſome fiſhermen. Hardicanute ſoon loſt the affections of the Engliſh, as well by the brutality of his conduct as by his renewing the impoſition of Danegelt, and obliging the nation to pay a great ſum of money to the fleet which brought him from Denmark. Diſcontents ran high in many places, and in Worceſter the populace roſe and put to death two of the collectors of his taxes. The king, enraged at this oppoſition, ſwore vengeance againſt the city, and ordered three of his noblemen to execute his menaces with the utmoſt rigour. They ſet fire to the place, and delivered it up to the ſoldiery to be plundered; the lives of the inhabitants they ſpared, but ſent them into a ſort of exile, till, by their interceſſions, they had appeaſed the wrath of the king, and obtained his pardon. The violent government of Hardicanute was of very ſhort duration; he died as he was joining in the celebration of the nuptials of a Daniſh lord. He had ſucceeded his father to the throne of Denmark in the year 1035; to that of England in 1035, and he died in 1041. Hume.

HARDIN, in *Geography*, a county of America, in Kentucky, containing 3597 inhabitants, of whom 310 are ſlaves.

HARDING, Thomas, in *Biography*, a zealous Catholic divine, was born at Beckington, in Devonſhire, about the year 1512. He was educated in grammar learning at Barnſtaple and Wincheſter, and from the latter place he was ſent to New College, Oxford. He took his degrees, and was appointed fellow of his college with great applauſe. He had acquired a high reputation for his ſkill in the learned languages, and was appointed by Henry VIII. profeſſor of Hebrew to the univerſity. During the reign of Edward VI. he profeſſed himſelf a Proteſtant, and was zealous in the cauſe, but when Mary aſcended the throne, and avowed her intentions of reſtoring the popiſh religion, he ſpeedily renounced the Proteſtant faith, and for his ready conformity was rewarded with a prebend in the church of Wincheſter, and immediately after proceeded doctor of divinity at Oxford. In 1555, he was appointed treaſurer of the cathedral of Saliſbury. On the acceſſion of Elizabeth he was deprived of his treaſureſhip, and not being prepared for another change in his religious faith, he reſigned his preferments and withdrew to the Low Countries. Here he ſtood forth the defender of his principles, and was regarded as one of the ableſt advocates of the Catholic cauſe. He was author of many works, of which the titles are enumerated in Wood's Athen. Gen. Biog.

HARDION, James, was born at Tours in 1686. He was chiefly educated among the Jeſuits at Paris. In 1711 he was admitted into the Academy of Inſcriptions as a pupil, in 1713, he became an aſſociate, in 1728, a penſionary, and in 1730, he was elected into the French academy. He now began a "Hiſtory of the Origin and Progreſs of Rhetoric in Greece," on which ſubject he publiſhed twelve diſſertations, when he was appointed, in 1748, to inſtruct the princeſſes of France in geography, hiſtory, &c. For their uſe he publiſhed ſeveral excellent pieces, written in a pure and unaffected ſtyle, and drawn from the moſt authentic ſources. He was appointed keeper of the royal library, and died in 1766. His principal work was an Univerſal Hiſtory, in 18 vols. 12mo.

HARDMARK, in *Geography*, a town of Norway, in the dioceſe of Chriſtianſand; 11 miles S.S.W. of Chriſtianſand.

HARDNESS, Durities, in *Philoſophy*, that quality in bodies whereby their parts cohere firmly together, ſo as to reſiſt the touch; or it denotes that degree of reſiſtance which bodies preſent to any power that may be applied in order to ſeparate their parts.

In this ſenſe, hardneſs coincides with what, on other occaſions, we call *firmneſs*, and ſometimes *ſolidity*; in oppoſition to *fluidity*.

More ſtrictly ſpeaking, a body is ſaid to be hard, when its parts mutually cohere, ſo as not to yield inwards, or give way to an external impulſe; and therefore are not ſubject to any motion in reſpect of each other, without breaking the body. In which ſenſe hardneſs ſtands oppoſed to ſoftneſs, where the parts do readily give way. The different degrees of the attraction both of aggregation and of coheſion between the particles of the ſame ſubſtance, or of different ſubſtances, ſeem to form the whole gradation from the moſt fluid to the moſt ſolid body, whether ſimple or compound. The ſtates intermediate between theſe extremes are expreſſed by the various names of fluid, clammy; ſoft, glutinous, tenacious, hard, brittle, rigid, &c. But as theſe names are incapable of any preciſe definitions, their meanings are commonly underſtood with conſiderable latitude. The ſtate of a given body in this reſpect is aſcertained, either by obſerving the weight or force which is required to diſunite its parts, or by comparing it with other bodies; as when it is ſaid, that a ruby is ſofter than a diamond, but harder than the hardeſt ſteel, becauſe with it you may ſcratch the ſteel but not the diamond. In the formation of ſeveral ſtony concretions; in the cryſtallization of ſalts, after having been diſſolved in water; in the cooling of certain metals after fuſion, &c. a regular arrangement of parts is generally obſerved; the particles of bodies manifeſting a tendency to join in a particular way. It has likewiſe been obſerved, that in the formation of ſtony concretions, and in ſome other proceſſes, the ſlower the operation is performed, the harder are the bodies, which reſult from theſe operations. Theſe facts have ſuggeſted a ſuppoſition that the particles of the ſame ſort of matter have an attraction towards each other with certain ends, and a repulſion with the oppoſite parts. Hence, when they are placed in ſuch a ſituation as may allow them to follow that natural inclination, *viz.* when they are rendered fluid by heat, or by ſolution in water, &c. then they adhere to each other with their friendly parts. Alſo, when the operation proceeds ſlowly, the particles have more time to arrange themſelves properly, and conſequently form a harder body than when the operation proceeds more expeditiouſly. (Higgins on Light.) See Cohesion and Elastic *Bodies*.

The Peripatetics make hardneſs a ſecondary quality; as ſuppoſing it to ariſe from *dryneſs*, which is a primary one, and to be in proportion to it.

Its remote cauſes, according to them, are either heat or cold, according to the diverſity of the ſubject: heat producing dryneſs, and by that means hardneſs in clay; and cold doing the like in wax.

The Epicurean and corpuſcular philoſophers account, for hardneſs, from the figure of the component parts, and their union together. Accordingly, ſome aſcribe it to the atoms, or particles of the body being hooked, and thus mutually catching and hanging upon one another: but this is directly bringing that for an anſwer, which was the queſtion. For how do theſe hooked parts cohere?

Again, the Carteſians will have the coheſion of hard bodies effected by reſt; that is, by nothing at all.

Sir Iſaac Newton ſhews, that the primary particles of all bodies, whether ſolid or fluid, are hard, perfectly hard; and are not capable of being broken or divided by any power in nature.

Theſe particles he maintains to be connected together by an attractive power; and according to the circumſtances of this attraction, the body is either hard or ſoft, or even fluid.

If the particles be ſo diſpoſed or fitted for each other, as to touch in large ſurfaces, ſuch body will be hard; and the more ſo, as thoſe ſurfaces are the larger. If, on the contrary, they only touch in ſmall ſurfaces, the body, by the weakneſs of the attraction, will remain ſoft. See Cohesion.

Fluidity has been found by the experiments of ſome modern chemiſts and philoſophers, to conſiſt in the motion of the particles of a body upon one another in conſequence of the action of a fluid, conſidered as univerſal and denominated elementary fire; and hence it has been concluded, that hardneſs conſiſts in the abſence or deficiency of that element, called "latent heat." This is principally obſerved in the metals, and hence reſults their ductility; which property, as well as fluidity, depends altogether on a certain quantity of latent heat abſorbed, or acting within the ſubſtances themſelves; for all metals are rendered hard by hammering, and ſoft by being again kept for ſome time in the fire. The former operation renders them hot as well as hard; probably, ſays Dr. Black, becauſe the particles of metal are thus forced nearer one another, and thoſe of fire ſqueezed out from among them. By keeping them for ſome time in the fire, that element again inſinuates itſelf among the particles, and cauſes the ſame arrangement as they had before, and thus their ductility returns. By a ſecond hammering this property is again deſtroyed, returning on a repetition of the heating or "annealing." Hardneſs, it is ſaid, appears to diminiſh the coheſion of bodies in ſome degree. Though their fragility does not correſpond with their hardneſs. Glaſs is hard, but very brittle; whereas flint, though harder than glaſs, is much leſs brittle. With reſpect to metals, however, the caſe is different; for ſteel, the hardeſt of the metals, is the moſt brittle, but lead, the ſofteſt, is not the moſt ductile. Nor is hardneſs connected with the ſpecific gravity of bodies; for a diamond, the hardeſt ſubſtance in nature, is little more than half as heavy as the lighteſt metal. All bodies are hardened by cold; but ſome become hard by heat as well as by cold. Thus, water becomes hard by cold, when it is frozen; but it becomes much harder when its ſteam is paſſed over red-hot iron, and it enters the ſubſtance of the metal, by an union with which it becomes almoſt as hard as glaſs.

We ſhall here ſubjoin ſome obſervations reſpecting the hardneſs of different ſubſtances. The metals may be claſſed, according to Cavallo (Philoſophy, vol. ii) with reſpect to hardneſs, in the following order, beginning with the hardeſt and ending with the ſofteſt; iron, platina, copper, ſilver, gold, tin, and lead. The order of the ſemi-metals is as follows; manganeſe, nickel, biſmuth, tungſten, zinc, antimony, and arſenic. Steel may be rendered harder than any other metallic ſubſtance. Thus, if a piece of ſteel be heated red-hot, and in this ſtate be plunged in oil, it will become ſo hard, that a file will hardly ſcratch it; and it will be rendered ſtill harder, if, inſtead of oil, the red-hot ſteel be plunged in water; but if cold mercury be uſed inſtead of either oil or water, then the ſteel will be rendered ſo hard as to ſcratch glaſs nearly as well as a diamond. The hardneſs of other natural ſolids, beſides the metals, differs conſiderably, according to the ſtate of purity and various other circumſtances. An uſeful gradation of the principal natural ſolids, with reſpect to hardneſs, is exhibited in the following table, extracted from M. Magellan's edition of Cronſtedt's Mineralogy, which was taken from Quiſt's tables, from Bergman, and from Kirwan. The firſt column ſhews the hardneſs, and the ſecond the ſpecific gravity.

Diamond from Ormus	20	3.7
Pink diamond	19	3.4
Blueiſh diamond	19	3.3
Yellowiſh diamond	19	3.3
Cubic diamond	18	3.2
Ruby	17	4.2
Pale ruby from Brazil	16	3.5
Ruby ſpinell	13	3.4
Deep blue ſapphire	16	3.8
Do. paler	17	3.8
Topaz	15	4.2
Whitiſh do.	14	3.5
Bohemian do.	11	2.8
Emerald	12	2.8
Garnet	12	4.4
Agate	12	2.6
Onyx	12	2.6
Sardonyx	12	2.6
Ouid. amethyſt	11	2.7
Cryſtal	11	2.6
Cornelian	11	2.7
Gum jaſper	11	2.7
Reddiſh yellow do.	9	2.6
Schoerl	10	3.6
Tourmaline	10	3.0
Quartz	10	2.7
Opal	10	2.6
Chryſolite	10	3.7
Zeolite	8	2.1
Fluor	7	3.5
Calcareous ſpar	6	2.7
Gypſum	5	2.3
Chalk	3	2.7

N. B This table was conſtituted by obſerving the order in which different ſubſtances are adapted to cut or make any impreſſion upon one another.

HARDOI, in *Geography*, a town of Hindooſtan, in Oude; 28 miles S.S.W. of Lucknow.

HARDOUIN, John, in *Biography*, was born at Quimper-Corentin in the year 1646. He was educated among the Jeſuits, and ſoon diſtinguiſhed himſelf by an extraordinary ardour for ſtudy, which he manifeſted in almoſt every branch of literary purſuit. In 1684 he publiſhed "Diſſertations on Ancient Medals of Towns and People," in which he diſplayed a turn for ſingular and paradoxical opinions. In the following year he publiſhed, for the uſe of the dauphin, an edition of Pliny the naturaliſt, of which he gave a ſecond edition in 1723, in ſeveral folio volumes. His moſt famous work was entitled "Chronologia ex Nummis Antiquis reſtituta," in which he attempts to prove that all the works attributed to the ancients, with ſome few exceptions, are ſuppoſititious, and the fabrication of the monks in the 13th century. This hypotheſis excited the indignation of the learned of every denomination and country, and drew upon the author the cenſures of his own ſociety. He retracted the opinions which, it is believed, he adopted by a mere love of ſingularity; for it is reported of him, that when urged by a friend with the ſcandal he had given by ſome of his abſurdities, he replied, "Do you think that I riſe every day of my life at four in the morning to repeat only what other people ſaid before me." Notwithſtanding this work he had a high reputation for learning among the clergy, and was by them employed, with an annual ſtipend, to prepare a new edition of the "Councils," which appeared from the Louvre preſs in 12 vols. folio. Parliament, however, ſtopped the circulation of the work till it had been examined and altered. He died at Paris in 1729, "having," according to Huet, "laboured 40 years to ruin his reputation without being able to effect it." He was author of many other works, in all which his paradoxical ſpirit was evident. Even in "A Commentary on the New Teſtament," there appears a mixture of profound erudition and viſionary paradox proper to this writer. Moreri.

HARDS, or Hurds, of flax or hemp, denote the coarſer parts ſeparated in the dreſſing of it, from the tear, or fine ſtuff.

Hards, in *Mining*, is applied to the harder kinds of veinſtuff, or rider, found in mineral veins.

Hards, in *Rural Economy*, a name often applied to coarſe tow, ſuch as is employed in ſtuffing horſe collars, &c.

HARDWIC. See Herdewic.

HARDWICK, in *Geography*, a townſhip of Caledonia county, in Vermont, containing 260 inhabitants.—Alſo, a townſhip of Worceſter county, Maſſachuſetts; 25 miles N.W. of Worceſter, containing 1727 inhabitants.—Alſo, a townſhip in Suſſex county, New Jerſey; 10 miles N.W. of Newton.—Alſo, a ſmall town and port of entry of Georgia, at the mouth of Ogeeche river, and about 18 miles S. by W. of Savannah.

Hardwick's *Iſland*, an iſland in Johnſtone's ſtrait, on the W. coaſt of North America, about 12 miles long from E. to W., and two broad. N. lat. 50° 26′. E. long. 134° 15′.

HARDY, a county of Virginia, about 60 miles long and 40 broad, containing 6004 free inhabitants, and 623 ſlaves. Its chief town is Moorfield.

Hardy's *Iſland, Sir Charles*, an iſland in the Southern Pacific ocean, ſo called by Capt. Carteret, who diſcovered it in 1767. This iſland is of conſiderable extent, flat, green, and of a pleaſant appearance: none of its inhabitants were ſeen, but it appeared by many fires that were ſeen in the night to be well peopled. It lies in S. lat. 4° 50′, and bears W. 15 leagues from the northernmoſt of a cluſter of nine iſlands, called Ohang *Java*, which ſee.

Hardy's *Iſles, Sir Charles*, a group of high iſlands which lie at a diſtance of nine leagues from *Cape* Grenville, (which ſee,) in S. lat. 11° 58′. W. long. 217° 38′.

Hardy-*Shrew*, a name given by the people in ſome parts of England to the mus araneus, called more uſually the *ſhrew* or the *ſhrew-mouſe*. See Sorex *Araneus*.

HARDYSTONE, in *Geography*, a townſhip in Suſſex county, New Jerſey, containing, in 1790, 2393 inhabitants.

HARE, Francis, in *Biography*, a learned Engliſh prelate, was educated at Eton ſchool in the elementary parts of learning, whence he was entered at King's college, Cambridge, of which foundation he was admitted a fellow. Here he was entruſted with the tuition of the marquis of Blandford, whoſe father, the illuſtrious duke of Marlborough, appointed him chaplain-general of the army. When of a proper ſtanding he took his degree of doctor of divinity. While he attended the duties of his chaplaincy in Flanders, he contracted a ſtrong intimacy with doctor Bentley, who inſcribed to him the firſt edition of his "Remarks on a late Diſcourſe on Free Thinking, &c." Dr. Hare, during the period between 1706 and 1712, was often employed in vindicating the political meaſures of the Whig adminiſtration, and the conduct of the war in oppoſition to the Tory party. After this Dr. Hare was promoted to the deanery of Worceſter, and united with Dr. Sherlock and others in the famous Bangorian controverſy. The part which he took drew upon him a ſevere caſtigation from biſhop Hoadley, in a treatiſe entitled "The D—n of W—r ſtill the ſame, &c." In the year 1727 he was advanced to the ſee of St. Aſaph; from this he was tranſlated to the biſhopric of Chicheſter in 1731, which he held, in conjunction with the deanery of St. Paul's, till his death in 1740. The moſt celebrated of Dr. Hare's productions was a treatiſe, entitled "The Difficulties and Diſcouragements which attend the Study of the Scriptures in the way of private Judgment, repreſented in a Letter to a Clergyman," which has been regarded as one of the fineſt pieces of irony in the Engliſh language: the great object of the tract was, "that ſince ſuch a ſtudy of the ſcriptures is men's indiſpenſable duty, it concerns all Chriſtian ſocieties to remove, as much as poſſible, thoſe diſcouragements." Dr. Hare was author of various other works, and of ſome ſingle ſermons. He gave an edition of Terence to the public, and publiſhed "The Book of Pſalms in Hebrew, put into the original Poetical Metre." The works of the biſhop were collected in four vols. 8vo., in the year 1746. Gent. Mag. Gen. Biog.

Hare, in *Aſtronomy*. See Lepus.

Hare, in *Zoology*. See Lepus.

What is moſt particular in the hare is, that the hinder legs are much longer than the fore ones, and are furniſhed with extremely ſtrong muſcles; by which means the creature, naturally defenceleſs, is furniſhed with a power of running very ſwiftly from its purſuers, and of aſcending ſteep places; and on this account the hare always makes towards the riſing ground when ſtarted. The head is roundiſh, the eyes prominent, and the upper lip ſplit; its ears are very long; and it is ſaid to ſleep with its eyes open, for fear of danger; it lies hid all day, but in the night goes out in ſearch of food, and returns to its form by the ſame way, by which it had left it.

The colour of the hare approaches near to that of the ground; and in northern countries this, as well as other animals, changes colour, and becomes white at the beginning of winter, ſo that they are leſs conſpicuous in the ſnow: we have accidental inſtances of white hares. The food of this animal is entirely vegetable; and it is particularly fond of pinks, parſley, and birch. The hare never pairs; but in the rutting ſeaſon, which begins in February, the male purſues and diſcovers the female, by the ſagacity of its noſe. The female breeds often in the year; goes with young a month, and brings uſually two, and ſometimes three or four, at a time. Hares are very ſubject to fleas; and Linnæus tells us, that the Delecarlians make a ſort of cloth of the fur, called filt, which preſerves the wearer from their attacks. The fur of hares is a very conſiderable article in the hat manufacture, and many thouſands of the ſkins are annually imported for that uſe from Ruſſia and Siberia.

The ſportſmen diſtinguiſh four ſorts of this animal: the one lives in the mountains; the ſecond kind in open fields; a third kind in marſhy grounds; and the fourth is a rambler, having no particular fixed ſpot of reſidence. It is eaſy to ſee that theſe are no diſtinctions in the eye of the naturaliſt; but they have their ſeveral properties, according to theſe differences of place, which are of conſequence to the ſportſmen. Thus the mountain hares are the ſwifteſt of all, and the marſh hares the ſloweſt; the field hares have a middle degree of ſwiftneſs between theſe; and the rambling hares are the moſt difficult of all others to hunt, for they are not only conſiderably ſwift, but they generally know all the coverts and thickets, and have the art to make a thouſand doublings and eſcapes that the others would not think of. See *Hare*-HUNTING.

Hares and rabbits are very miſchievous to new-planted orchards, by peeling off the barks of the tender and young trees for their food. They do alſo the ſame ſort of miſchief to nurſeries; for the prevention of which ſome bind ropes about the trees up to ſuch a height as they are able to reach; ſome daub them with tar; but though this keeps off the hares, it is itſelf miſchievous to the trees; but this hurtful property of it is in ſome degree taken off by mixing any kind of fat or greaſe with it, and incorporating them well over the fire. This mixture is to be rubbed over the lower part of the trees in November, and will preſerve them till that time the next year, without any danger from theſe animals. It is only in the hard weather in the winter ſeaſon, when other food is ſcarce, that theſe creatures feed on the barks of trees.

People who have the care of warrens, pretend to an odd way of making hares fat when they get them there. This is the ſtopping up their ears with wax, and rendering them deaf. The hare is ſo timorous a creature, that ſhe is continually liſtening after every noiſe, and will run a long way on the leaſt ſuſpicion of danger; ſo that ſhe always eats in terror, and runs herſelf out of fleſh continually. Theſe are both prevented by her feeding in a ſafe place, and that without apprehenſion; and they ſay ſhe will always readily be fattened in this way.

However delicions the hare may be eſteemed now, our anceſtors thought it a crime to taſte it, as we learn from Cæſar, Com. lib. v. in which they agreed with the Jews. Among the Romans it was reckoned a great delicacy. Thus Martial, xiii. 92.

"Inter quadrupedes gloria prima lepus."

And Horace, in the ſecond ſatire of his fourth book, extols the wing of the fruitful hare:

"Fæcundi leporis ſapiens ſectabitur armos."

Though the hare lives on vegetables and water only, yet the habitual exerciſe of this animal exalts its ſalts, and renders it ſomewhat alkaleſcent; and this tendency is much increaſed, if it is killed immediately after being heated by ſtrong exerciſe.

HARE, *Java.* See CAVIA *Aguti.*

HARE, *Sea.* See LERNIA.

HARE'*s Ear*, in *Botany*. See BUPLEURUM *falcatum*.

HARE'*s Ear, Baſtard.* See PHYLLIS.

HARE'*s Foot, Trefoil.* See TREFOIL.

HARE'*s Lettuce.* See SONCHUS.

HARE'*s Strong.* See PEUCEDANUM.

HARE, in *Geography*, an iſland in the North ſea, near the coaſt of Norway, 20 miles in circumference. N. lat. 62° 20'. E. long. 6° 33'.

HARE *Bay*, a bay on the E. coaſt of Newfoundland. N. lat 51° 20'. W. long. 55° 40'.

HARE *Indians*, Indians of the N.W. part of America, ſituated on Mackenzie's river. N. lat. 66° 50', and between 127° and 130° W. long.

HARE-*Lip*, (Labia leporina,) in *Surgery*, is a particular deformity of the lip, which part has a preternatural fiſſure in it, the roof of the mouth itſelf being alſo ſometimes imperfect.

The hare-lip is generally a defect of original formation, and is therefore obſerved in children of tender years. The deformity, indeed, is ſometimes the conſequence of a wound; but this caſe is by no means frequent. The upper lip is that which is uſually affected, it being only in ſome uncommon caſes that a fiſſure is met with in the lower one. The edge of the congenital hare-lip is healthy, ſoft, red, covered with a delicate cuticle, and, in every reſpect, ſimilar to the ſurface of the lips. It is only when the fiſſure is the effect of a wound or ſore, that its edges are ſometimes uneven, hard, and callous. The lip is ſometimes divided only in one place, ſometimes in two. When the two fiſſures are ſomewhat diſtant aſunder, the intervening piece of the lip may be of ſuch breadth and length, that it will be of uſe to ſave it in the operation. However, this ſort of caſe is not common, and the two fiſſures are generally ſo near together that they appear rather like one, at the upper angle of which the intervening piece of the lip is ſituated, ſeeming like a ſmall knob of fleſh.

Sometimes, the preternatural fiſſure only extends to the middle of the lip; but, on other occaſions, it reaches to the noſe, and even quite into one of the noſtrils. In this laſt caſe, the fiſſure is not only very broad, but the noſtril is alſo ſtretched to one ſide, and, conſequently, the noſe appears much wider on one ſide than the other. Beſides the cleft in the lip, a fiſſure is likewiſe frequently obſerved in the upper jaw and palate bones, and is often ſo large as to convert, as it were, the inſide of the mouth and noſe into one common cavity. Occaſionally, there is a ſlit in the gums, which, however, is generally ſituated quite on one ſide of the diviſion in the bones. In certain inſtances, a protuberance is met with on the upper jaw bone, forming a projection through the fiſſure in the lip. In grown perſons, a tooth is ſometimes ſeen protruding out of the fiſſure.

The hare-lip not only always produces more or leſs deformity, but alſo ſeveral complaints, which principally make their appearance when the patient advances in years. Perſons, who labour under this defect, cannot pronounce the letters well, eſpecially ſuch as are formed by the lips, and they likewiſe articulate words in an indiſtinct way. In ſpeaking they ſlobber, and in maſticating ſome of the victuals are apt to fall out of their mouths. The tooth behind the fiſſure is uncovered, and is either liable to project conſiderably forward, or to become carious. Such children, alſo, as have a cleft in the bones of the palate, are incapable of ſucking, and frequently they are not even able to ſwallow fluids,

fluids. Every liquid, which is introduced into the mouth, gets into the noſtril, and thence eſcapes outward. It is worthy of attention, that ſimilar congenital fiſſures are not unfrequently met with in other parts, as, for inſtance, in the cartilaginous parts of the noſe, the external ear, the eye-lids, &c. Theſe latter defects may be cured preciſely in the ſame way as the hare-lip.

The operation is the only plan by which the fiſſure may be united, and the conſequent deformity removed. In order to unite the fiſſure two things are neceſſary, namely, that its margins ſhould be converted into freſh-cut ſurfaces, and that theſe ſhould afterwards be brought into contact in ſuch a manner that they touch at all points. The operation commonly ſucceeds, even when the fiſſure is exceedingly broad and large. Although, in Richter's opinion, the fiſſure is not always, as M. Louis conceives, a mere diviſion of the parts, but is ſometimes plainly occaſioned by a conſiderable deficiency or loſs of ſubſtance, yet the lips are naturally ſo yielding, that there is always leſs trouble experienced in bringing the edges of the fiſſure into contact, than many would be inclined to ſuppoſe. The ſpaſms and contractions of the lip, which in theſe caſes are apt to take place ſoon after the operation, in general gradually ſubſide, or at leaſt undergo ſuch a diminution, that they ſcarcely ever give riſe to any deformity of conſequence. It ought to be well underſtood, however, that the breadth of the fiſſure, in the majority of inſtances, is altogether the effect of the action of the muſcles, and not of any actual loſs of ſubſtance, the edges of the diviſion being drawn away from each other by the contraction of the neighbouring muſcles.

From what has been ſaid, it muſt be manifeſt how ſuperfluous the plan is, which ſome have recommended, where the fiſſure is large, and which conſiſts of ſome preparatory proceedings, before the operation, adapted to promote the yielding of the lips, and the union of the edges of the fiſſure. For example, were we to follow the advice of ſome ſurgical writers, we ſhould draw the oppoſite ſurfaces of the hare-lip together, for ſome days before the operation, with bandages and adheſive plaſters, in order to habituate the lip to be upon the ſtretch. We ſhould likewiſe, according to the ſame ſet of adviſers, make an inciſion in the ſkin, both on the outſide and inſide of the lip, a little while before the operation, for the purpoſe of making this part yield in a greater degree. Such inciſions are not of the leaſt utility, ſince they only divide the ſkin, and it is not this, but the muſcles, which oppoſe the yielding of the lip. Beſides, the external cut will occaſion a ſcar, and, of courſe, be followed by deformity. The application of bandages and adheſive plaſters, for a few days before the operation, may perhaps have the effect of accuſtoming the child to the uneaſineſs of ſuch an apparatus, and making the little patient rather more quiet after the operation is done; or, it may habituate adults to ſpeak and eat, without moving their lips much, which will be of ſervice after the operation. However, the plan is entirely uſeleſs, when done with a view of ſtretching the lips, and facilitating the approximation of the edges of the fiſſure.

A queſtion naturally preſents itſelf, whether it is preferable to perform the operation ſoon after birth, or to defer it till the child has advanced in life? The deſire, which parents have, of freeing their offſpring, as ſoon as poſſible, from any kind of disfigurement, will generally oblige the ſurgeon to do the operation at an early period. He may the more readily make up his mind to this practice, as the ſucceſs of the operation on infants has been eſtabliſhed by repeated experience. It happens, that young children almoſt always fall into a ſleep, and, conſequently, the dreſſings are not diſturbed by any crying, or reſtleſſneſs, nor the wound torn open, circumſtances, which are to be apprehended in larger children. Experience alſo proves, that wounds in very young infants heal with particular eaſe and quickneſs. The objection, that the operation, when performed on children of very early age, is apt to bring on dangerous and even fatal conſequences, is, according to Richter, without foundation. There is no part of conſequence injured, and the inflammation which enſues is never of any importance. Nor is there more reaſon in the aſſertion, that, in children of tender years, the ſutures are apt to cut their way out, by reaſon of the tenderneſs of the lips. When the lip is properly dreſſed, this accident is little to be feared in infants which are continually quiet and aſleep. The operation is attended with more difficulty in children of from three to ten years of age, who are fearful of pain, and cannot be rendered tractable either by threats or reaſoning. When the operation is not done ſoon after birth, ſome ſurgeons believe it better not to perform it till the child has attained a certain degree of underſtanding and reflection.

When, beſides the fiſſure in the lip, there is alſo a cleft in the bones of the palate, we have ſtill more reaſon for performing the operation ſoon after birth; for it has been remarked, that the ſeparation in the bones is never cloſed before the hare-lip is cured, and that ſuch cloſure may not happen at all, if the operation is long poſtponed. (Levret, l'Art des Accouchemens, § 1321. La Faye Mem. de l'Acad. de Chir. tom. 3. edit. 8. p. 201.)

When there is alſo a fiſſure in the upper jaw-bone, and the diviſion of the lip extends into one of the noſtrils, and is exceedingly broad, it is advantageous, before the operation, to detach the edges of the cleft in the lip from the gums to the breadth of a quarter, or half an inch. Thus, not only the elongation of the lip, and the cloſure of the fiſſure are promoted, but the cutting off of the edges of ſuch fiſſure is facilitated. Sometimes, in this caſe, the border of the cleft adheres very intimately to the gums, and diviſion in the jaw-bone, in which circumſtance the foregoing ſeparation is indiſpenſably neceſſary. Should the fiſſure reach quite up into the noſe, the lip muſt be detached with a knife from the gums, as high as above the upper end of the fiſſure, ſo that the ſurgeon may be enabled, in the operation, to cut off the upper part of the edges of the fiſſure. Frequently a piece of fleſh is found ſituated in the middle of the diviſion in the lip, looking like a little excreſcence from the gums. This muſt be taken away before the operation. When, in adults, a tooth projects forwards into the fiſſure, it muſt be extracted. When there is a kind of exoſtoſis of the jaw-bone, ſuch ſwelling ought to be removed. Perhaps the object might be beſt fulfilled by means of a pair of bone-nippers, or one of Mr. Hey's ſaws.

It is now the univerſal practice to remove the edges of the fiſſure in the lip with a cutting inſtrument. With a view of doing away the neceſſity for this painful part of the operation, it has been propoſed to apply bliſtering plaſter to the fiſſure, or to ſmear it by means of a hair pencil, with a ſolution of cauſtic, or with ſulphuric acid, ſo as to make it ulcerate. However, as it is not merely the union of the fiſſure, but alſo the total prevention of all disfigurement that we wiſh to accompliſh, ſuch means are exceedingly objectionable. They only make the margin of the fiſſure ulcerate; they cannot render it even when it is irregular; conſequently no exact union, nor any favourable cicatrix, can be the reſult. Hence, the employment of a cutting-inſtrument muſt manifeſtly be attended with immenſe advantage, not to ſay any thing about the difficulty of uſing the preceding applications on young infants, or the danger of the adjacent parts, the tongue, gums, under lip, &c. being injured.

Some ſurgical writers recommend the operation to be done with ſciſſars. However, as ſciſſars always bruiſe the fibres, at the ſame time that they divide them; and as ſuch contuſion invariably renders union by the firſt intention leſs certain, we coincide with thoſe authors who give the preference to the employment of a knife. This inſtrument makes the cleareſt diviſion of the parts, the cut fibres being neither torn nor contuſed. Grown-up perſons may be prepared for the operation, if the practitioner thinks proper, by a gentle purgative. Young children, on the day of the operation, may be awakened early, and hindered from ſleeping till the buſineſs is over, by which means they become drowſy, and immediately after the operation, when the pain is greateſt, fall aſleep, ſo that there is no danger of the dreſſings being diſturbed by reſtleſſneſs and crying. In the operation, adult patients may ſit upon a chair; infants ſhould be held on the nurſe's knee. Surgeons will find it very diſadvantageous to operate on children in a recumbent poſition; for in this poſture, the blood inſinuates itſelf into the mouth, and occaſions, particularly when the infants cry, violent coughing, and ſymptoms of ſuffocation. An aſſiſtant ſhould ſtand behind the patient, and with his breaſt keep the head from being drawn backward. He ought alſo to apply his hands to the patient's cheeks, and when the ſurgeon makes the margins of the fiſſure approximate each other, he ſhould preſs the cheeks gently forwards, in order to promote what the ſurgeon is wiſhing to accompliſh. In children, the aſſiſtant, at the time when the practitioner is executing the inciſion, ſhould place his hands cloſe upon the cheeks, ſo as to keep the edges of the fiſſure from being drawn away from each other by the childrens' crying, an event which would increaſe the difficulty of the operation.

Another thing to be conſidered is, how much of each edge of the fiſſure ought to be cut off? It is always right to remove as little as poſſible, ſo as not to make the loſs of ſubſtance greater than is abſolutely neceſſary, and increaſe the difficulty of bringing the ſides of the fiſſure into contact, particularly when the ſeparation is already very wide. However, the exact deciſion of this queſtion depends upon the following circumſtances. The whole margin of the fiſſure muſt be completely converted into a bleeding ſurface at every point. When any portion continues uncut, no union will follow in ſuch ſituation, and an unhealed opening remains there in the lip. On this account, the ſurgeon is ſometimes obliged to remove a conſiderable piece of the lip when the edges of the fiſſure are uneven and angular. On the contrary, when the edges are ſtraight and regular, it frequently happens that very little need be cut off. It is alſo abſolutely neceſſary, for the purpoſe of effecting a preciſe union, and forming a favourable cicatrix, that the border of the fiſſure be removed by an even ſtraight inciſion. For this reaſon, the regularity or irregularity of the edges of the fiſſure is what muſt determine whether little or much of the lip ſhould be taken away. It is further neceſſary, in making the inciſions, to give the fiſſure the ſhape of an equal triangle, or rather that of the annexed figure Λ, the angle of the wound being above. Were one ſide of the fiſſure longer than the other, the lower corner of the longeſt ſide, after the union had taken place, would deſcend below the lower end of the ſhort ſide, ſo as to occaſion not merely a great disfigurement, but conſiderable inconvenience. The neceſſity of making the diviſion into the ſhape of a triangle with equal ſides, is another circumſtance which muſt have weight in deciding whether much or little of the lip is to be removed. When the fiſſure is of ſuch a ſhape, that, in order to give it the right form, it would be neceſſary to cut off a very conſiderable piece of the ſubſtance of the lip, the practitioner, perhaps, ought not to bind himſelf by the preceding maxims, eſpecially when the fiſſure is already very broad, and the approximation of its edges difficult. In this caſe, it might be better, after bringing the ſides of the wound into contact, to cut off the projecting corner of that ſide which is too long, and thus render the lip even.

It has been already remarked, that the edge of the congenital hare-lip, like the border of the natural lip, is commonly of a red colour, and covered with a fine cuticle. When the edge of the fiſſure is not cut off as far as it is red, a red mark is left behind in the place, occaſioning no inconſiderable disfigurement. Hence it is always requiſite to remove more or leſs of the lip, according as the red edge of the fiſſure is more or leſs broad. The lower angles of the diviſion in the lip are frequently very round and thick, reſembling very much two red knobs of fleſh. In this kind of caſe, when only a little of the edge of the fiſſure is cut away, a ſmall cleft will be left after the cure at the lower part of the wound, together with a round fleſhy prominence on each ſide, which appearances are productive of a great deal of deformity. In order to prevent this diſagreeable circumſtance, it is neceſſary, in ſuch caſes, to cut away the greateſt part, if not the whole, of the round ſwollen angles of the fiſſure. Young practitioners, who have not been much in the habit of operating, may derive ſome aſſiſtance from marking the proper direction of the inciſions with ink.

We have explained, that the beſt operators have abandoned the uſe of ſciſſars for removing the edges of the hare-lip, and always give the preference to the knife. However, if ſciſſars are ever employed, they ought to be conſtructed with long handles and ſhort blades, and it might alſo be advantageous to have the blade probe-pointed, which is introduced under the lip. We hope, at the ſame time, that we ſhall never be diſguſted with the ſight of ſciſſars being employed in this country for the accompliſhment of the operation now under conſideration.

The ſurgeon ſhould remove each edge of the fiſſure by a ſingle inciſion; for when repeated cuts are made, the wound is always irregular, and every time the knife is applied, young children become reſtleſs, and are not quiet again for a while, ſo that the operation is tediouſly protracted.

The lips being exceſſively moveable, it is obvious, that in order to execute the operation well, ſome plan muſt be adopted for keeping the part which is to be cut ſteady and fixed. Heiſter and B. Bell have given engravings of forceps calculated for holding the lip. Such an inſtrument we have ſeen uſed, and it appears to us by no means an ineligible one. It fixes the part exceedingly well, and as much of the edge of the fiſſure being left out of the blades as is judged proper, ſuch portion can be moſt eaſily cut off by one ſweep of the ſcalpel guided along the ſtraight line of the inſtrument. It is right to obſerve, however, that the blades of the forceps ought to be ſo contrived as to be parallel to each other when opened, and to graſp every point of the lip with equal preſſure when cloſed. The objection urged againſt the uſe of the inſtrument, that it is apt to pinch and bruiſe the lip, is frivolous, the neceſſary degree of preſſure for fixing the part not being in reality ſuch as will do the leaſt harm. The ſurgeon often does much more injury with his nails in endeavouring to hold the lip. We have ſeen forceps uſed in this operation with the blade, which is put under the lip, much wider than that which is external, and which is made to ſhut upon the middle of the other. By this means the lip is ſo fixed, that it cannot ſlip inward away from the knife, which, in fact, cuts upon the flat ſurface of the under blade of the forceps, while the edge of the upper blade ſerves to guide the ſtroke of the inſtrument, as well as to keep the part fixed.

It cannot be denied, indeed, that the practitioner is not conſtantly able, by obſerving any directions, to take away the edge of the fiſſure, on one ſide or the other, by a ſingle inciſion, and he is ſometimes obliged to be content with removing as little ſubſtance as poſſible. He muſt alſo take care, while he holds the lip, not to ſtretch the part too much, nor draw it into an unnatural poſition; for the wound naturally aſſumes a different ſhape, and falls into a different poſture from that which it had at the time of the inciſion, immediately the lip is looſened; and the ſurgeon muſt always have in view the bringing of the edges of the wound into exact contact. With the forceps it will be found a very eaſy matter to obſerve theſe things, though more troubleſome when the lip is held with the fingers. Laſtly, it is eſſentially neceſſary to make the upper angle of the wound quite even, and to terminate in a point. Were any irregularity, or any ſmall piece of fleſh left there, the ſides of the inciſion could not touch in ſuch ſituation, and an opening would be left. When the fiſſure extends completely into one of the noſtrils, it is, indeed, not in the ſurgeon's power to give the wound a triangular ſhape; but he muſt not neglect to cut off the edges of the cleft, on both ſides, up to the noſtrils, in ſuch a way, that the two ſides of the wound will be of equal extent.

It was the eminent ſurgeon, M. Louis, who firſt ſtrongly recommended the uſe of a knife, inſtead of ſciſſars, in this operation. (See Mémoires de l'Acad. de Chirurgie de Paris, tome 4.) He very properly objected, that ſciſſars make a contuſed wound, which is apt to inflame and ſuppurate, or which, at leaſt, is not diſpoſed to heal quickly. Conſequently, ſciſſars are not only adverſe to the main object of the operation, union by the firſt intention; but their employment is attended with an unavoidable degree of pain. The knife produces leſs pain, is of more convenient uſe, and makes a ſimple, inciſed wound, which is not diſpoſed to ſuppurate, and uſually heals up in a very ſhort time.

Beſides forceps for fixing and ſupporting the lip at the time of removing the edges of the fiſſure, there are other methods, which are, perhaps, in more common adoption among the moderns. Some practitioners are in the habit of firſt introducing under the upper lip, as high up as poſſible, a piece of thick paſteboard, an inch and a half long, from twelve to fifteen lines broad, and cut into a ſemi-lunar ſhape at its upper border. Upon this bit of paſteboard the upper lip is to be ſpread, and, at the ſame time, drawn a little downwards, by which means the part is rendered tenſe, and can be readily cut through. The right portion of the lip is to be fixed on the paſteboard, with the thumb and index finger of the operator's left hand. The left, however, muſt be fixed with the aid of an aſſiſtant. The ſurgeon is next to puſh the point of the knife through the lip, above the upper angle of the fiſſure, and, drawing the inſtrument downward, he is to cut off, with two ſtrokes, all that is to be removed on both ſides. While theſe things are being done, an aſſiſtant, ſtanding behind the patient, is to apply a hand to each of the latter's cheeks, which are to be preſſed a little forward with the point of the finger, ſo as to hinder the patient from drawing the lip backward, and ſeparating the edges of the fiſſure from each other. Some ſurgeons prefer the uſe of the forceps to that of paſteboard, as being more convenient, and ſerving not only to fix the lip and direct the knife, but having likewiſe an under broad blade, making a flat ſurface, upon which the border of the fiſſure reſts, and with the knife can be eaſily cut off.

Although all the beſt operators of the preſent day in England make uſe of a biſtoury inſtead of ſciſſars, the latter inſtrument is ſtill defended in ſome very modern works. It is acknowledged that the knife appeared to be the moſt eligible, on account of its making a ſimple inciſed wound, which is the moſt likely to heal by the firſt intention; but yet it is contended, that manifold experience ſhews, that the wound heals equally well and quickly when good ſharp ſciſſars are employed in the operation. Mr. B. Bell has expreſsly made the experiment of removing one edge of the hare-lip with the knife, and the other with a pair of ſciſſars, and he found, that there was not more inflammation afterwards on one ſide than the other. It is urged in favour of ſciſſars, that they make an inciſion more quickly than the knife, a circumſtance of importance in operating upon reſtleſs children. The advocates for ſciſſars upon this principle, explain their aſſertion, that patients complain of leſs pain when cut with this inſtrument, than when the biſtoury is uſed. They affirm, that an operator can much more eaſily cut off each edge of the fiſſure by one ſtroke of a pair of ſciſſars than by one of a knife, which muſt often be repeatedly applied before the object can be effected. They recommend uſing the beſt and ſharpeſt ſciſſars which can be procured. They further ſtate, that caſes are met with, in which the cleft extends quite up into the noſtril, and in which a piece of paſteboard cannot be inſinuated under the lip, as high as it is neceſſary to make the inciſion. Here they ſay the knife cannot be made uſe of, and it is requiſite to ſeparate the lip freely from the gums on both ſides of the fiſſure. They untruly declare that a ſcalpel is an inconvenient inſtrument for removing a cancer of the lower lip. They contend, that a knife ought not to be uſed on very young infants. They ſay, that in caſes of double hare-lip, it is difficult, and even impracticable, to cut off with a biſtoury the edges of the middle portion of the lip, which is in general exceedingly moveable.

We do not deem it neceſſary to enlarge the preſent article, by entering into a formal refutation of the foregoing obſervations. If it be admitted, that ſciſſars contuſe as well as cut, and that a ſharp knife makes a cleaner and more ſimple inciſion, the latter inſtrument ought to have the preference, as in fact it has among all our beſt operators. We have ſeen the knife uſed with perfect convenience upon infants, and likewiſe in a few caſes of double hare-lip and reputed cancers. This is enough to prove what little foundation there is for moſt of the above aſſertions.

The ſecond part of the operation, or the union of the ſides of the wound, is uſually accompliſhed by means of the twiſted ſuture, for which pins of a particular conſtruction are made. Theſe muſt be fabricated with ſharp points, ſo as to be well calculated for entering the fleſh with eaſe; and they ought to be ſuch as will not ruſt in the wound, and of courſe can be withdrawn without irritation. Silver and golden pins are not apt to ruſt; but they are not capable of having a ſtrong ſharp point given to them, and, conſequently, are difficult of introduction. Steel pins penetrate well. However, they are liable to ruſt, and therefore cannot be taken out of the parts without irritation, nay, frequently, not without the exertion of force, and a conſiderable danger of the wound being torn open again. Silver and golden pins, made with ſteel points, which can be ſcrewed off, are the beſt, as they cannot ruſt, nor prick any part, nor irritate the wound. Richter alſo ſpeaks rather favourably of ſteel needles plated with ſilver or gold. The points of the pins ought to be ſmall, and two-edged. Pins with round points cannot be puſhed into the fleſh without difficulty. The ſame may be ſaid of triangular points. Mr. B. Bell recommends the pins to be made long, ſo as to admit of being more eaſily handled. Richter thinks ſuch conſtruction objectionable, as the pins then project a conſiderable way out of the fleſh on each ſide, a thing which, on many accounts, he deems diſadvantageous.

Two pins are uſually ſufficient for the union of the wound. It is always neceſſary to apply one of them near the lower edge of the lip, otherwiſe the angles of the wound become ſeparated, and a ſmall cleft is left behind. When the hare-lip reaches into the noſtril, and the patient's upper lip is rather long, three pins are requiſite, one of which muſt be introduced cloſe to the noſtril. The pins are commonly put in about three or four lines from the margin of the wound, and brought out again at the ſame diſtance on the oppoſite ſide. When the fiſſure is long and broad, ſeeming as if it were attended with a loſs of ſubſtance, Richter adviſes us to introduce one of the pins at a ſomewhat greater diſtance from the edge of the wound, ſo as not to be apt to cut through the lip by ulceration, a circumſtance which, in this kind of caſe, is always to be apprehended, eſpecially when the patient is reſtleſs and unmanageable, and the pins are not aſſiſted with another means of uniting wounds.

The pins muſt be ſo applied as to paſs through very near the inner ſurface of the lip. When they are introduced through the middle of the ſubſtance of the part, or juſt under the ſkin, the inner edges of the wound are brought into contact, and there remains during life, upon the internal ſurface of the lip, a furrow, which is exceedingly diſagreeable to the patient. Beſides, the bleeding from the poſterior part of the fiſſure frequently does not ſtop, when the ſurgeon neglects to bring the oppoſite ſurfaces of the wound properly together. In putting in the pins, the ſides of the wound ſhould not be brought into contact, as it is much more advantageous, in this part of the operation, to ſeparate them a little from each other, by which means the practitioner is enabled to ſee that the pin goes to the proper depth, ſufficiently near the inſide of the lip. The lower pin is always to be introduced firſt, in order to bring the lower angles of the wound into accurate contact. Were the upper pin put in firſt, we ſhould frequently find, in the end, one ſide of the wound reach lower than the other, and, conſequently, one of the angles of the wound lower than its fellow.

Sometimes, on making the requiſite inciſions, the bleeding is conſiderable, but it never fails to ſtop as ſoon as the ſurfaces of the wound are brought together with the pins, and therefore it demands no particular treatment. It is only neceſſary to take care, as has been already explained, to introduce the pins almoſt as deep as the inſide of the lip, ſo as to keep the internal edges of the wound in cloſe contact with each other, otherwiſe the hemorrhage would continue inwardly into the mouth, particularly in children, who are apt to keep ſucking the wound, and, as the blood is ſwallowed, the bleeding is in danger of not being diſcovered. Experience has evinced, that ſometimes death may be occaſioned in this manner. In order to avoid this accident, ſome writers recommend enjoining the patient to ſwallow nothing after the operation, but to get rid of his ſaliva by ſpitting. However, as this plan would produce conſiderable diſturbance of the wound, we cannot aſſent to ſuch advice, eſpecially as the practitioner may always aſcertain whether there is any inward bleeding, by juſt looking into the patient's mouth. Many deem it advantageous not to bring the ſides of the wound into contact immediately the inciſions are executed; but firſt to let the bleeding go on for a little while, ſo as to diminiſh the chance of too much inflammation coming on.

As ſoon as the lower pin is applied, ſome authors direct us to wind a bit of thread round it, for the purpoſe of keeping the wound from being forced open, and the pin puſhed out when the operator is introducing the ſecond. This plan, at beſt, is unneceſſary. When the pins are both put through the lip, in the way above related, a thread is to be wound round them in the form of the figure of 8. The threads ſhould be ſtrong and waxed, in order to keep them from imbibing any fluid. They ought to be applied with ſufficient, but not immoderate tightneſs. When they are not tight enough, the lips of the wound are not effectually ſupported at every point, and the bleeding ſometimes continues till they are drawn tighter; when they are too tightly applied, they make the wound painful and inflamed. The two circular portions of fleſh, which the thread quite ſurrounds, in particular ſuffer from the exceſſive preſſure; they ſwell up like little eminences, and often project in this way a long while after the cure is accompliſhed. Occaſionally they inflame and ſlough. Hence it is always adviſable to tie the thread in a ſlip-knot, by which means it may be eaſily tightened or ſlackened as circumſtances may require.

Some ſurgeons have adopted the plan of cutting off the points of the pins after winding the thread. They do this that the lip may not be hurt by them. Others have covered the points with a piece of wax or ſpunge. Theſe latter ſubſtances ſoon ſlip off, and are of no uſe whatever. The points can hardly be cut off without doing the wound ſome kind of violence. Beſides, they are ſo far from the lip that they cannot injure it in the leaſt; but it is diſadvantageous to have pins with points projecting a good way out of the lip, as the patient is liable to put his hands againſt them, hurt himſelf, and diſturb the wound. Shortiſh pins, with points made to ſcrew off, are to be preferred.

As the fore part of the upper jaw-bone on which the lip lies, and conſequently the lip itſelf, are not ſtraight but curved, it has been apprehended that the ſtraight pins, which are employed in this operation, might draw the lip into a ſtraight unnatural poſture, thus irritate it, make it painful and inflamed, and fruſtrate the healing of the part by the firſt intention. Hence it has been propoſed to uſe ſilver or golden needles, to which is given the degree of curvature natural to the lip. However this is unneceſſary, becauſe the part of the needle, which actually lies in the ſubſtance of the lip, is ſo ſhort that it can produce no alteration in the ſhape and poſition of the lip. The plan is even objectionable; for as ſoon as the thread is wound round the curved pin, this generally turns in ſuch a way, that its concavity becomes ſituated externally, and the curvature of the lip being forced by it inwards, the part is much more deformed, than by a ſtraight needle.

The interrupted ſuture which Chopart has recommended to be uſed for the hare-lip, has no advantage whatſoever over the twiſted ſuture, the pins not irritating the wound more than the ligatures. On the contrary, the interrupted ſuture is uſually productive of the moſt irritation, becauſe, in order to keep the ſides of the wound nicely in contact, it is neceſſary to apply a greater number of ligatures than pins. The threads, which croſs each other in the interſpace between the pins, keep that part of the wound exceedingly well cloſed, even when the pins are at a conſiderable diſtance apart.

M. Louis, in the fourth volume of the Mémoires de l'Academie de Chirurgie, has altogether condemned what have been termed the *bloody ſutures* in the operation for the hare-lip, and has adviſed merely employing a uniting bandage and adheſive plaſter for bringing the wound together. He repreſents theſe means as fully effectual in all caſes. The pins of the twiſted ſuture, he obſerves, bring on inflammation and ſuppuration, in conſequence of the wound which they occaſion, and the irritation they excite as foreign bodies. Hence, ſays M. Louis, they muſt be diametrically adverſe to the great aim of the ſurgeon, which is to accompliſh union by the firſt intention. Beſides, it is an obſervation made by this eminent ſurgeon, that the moſt certain and eaſy method of bringing the ſeparated lips of the wound into contact, does not conſiſt in bringing ſome other reſiſtance againſt the power which makes the wound gape, but in preventing this latter power from operating at all. This object may be effected by the uniting bandage, which hinders the cheeks, in which ſuch power is ſituated, from drawing the lip to each ſide, at the ſame time that it ſupports the part and keeps it forward. The ſurgeon, in employing the twiſted ſuture, only oppoſes the power in queſtion by another one. The power which makes the ſides of the wound ſeparate here acts quite unreſtrained; and, when the pins reſiſt it the lip of courſe is ſtretched, and continually in an irritated ſtate, which is followed by pain and inflammation. When the power alluded to acts with force, the preſſure of the pins hurts the wound and makes it inflame; and there is a danger of their cutting their way through the fleſh and dropping out. Laſtly, it is noticed by M. Louis, that the hare-lip is commonly ſuppoſed to originate from an actual deficiency of ſubſtance in the lip, which idea makes ſurgeons fancy bandages and ſticking plaſter inſufficient for keeping the widely ſeparated edges of the wound in contact, and that pins or ligatures are indiſpenſable. But it ought to be recollected that the harelip never proceeds from a loſs of ſubſtance, but only from a preternatural diviſion of the part. It is argued, that in caſes where there is moſt difficulty in bringing the ſides of the wound together, the twiſted ſuture is leaſt applicable and effectual, ſince the pins make their way through the edges of the wound and fall out. For the ſake of corroborating the foregoing obſervations, M. Louis cites caſes where cures were effected in the happieſt way with the mere employment of a bandage, and other caſes where the attempts failed with the twiſted ſuture.

Many kinds of bandages have been propoſed for uniting the hare-lip; but to give an account of them all in this place would be falling into prolixity. Here we can only mention the principal ones. The bandage, which M. Louis was in the habit of employing, and which he preferred to all others, was an inch broad, and three ells long. He applied it firſt over the forehead, and both ends were carried behind the ears, and then to the hinder part of the neck, where they croſſed. They were next conveyed forwards over the cheeks, upon each of which a compaſs was laid, and the extremities of the roller were then carried over the lip itſelf, where one end was drawn through a ſlit in the other. They were afterwards carried behind the ears, and to the nape of the neck again. The reſt of the bandage was ſpent in circles round the head. In order to prevent the apparatus from ſlipping, a fillet was applied from the forehead acroſs the top of the head to the nape of the neck, while a ſimilar piece of tape went acroſs this firſt one from one ear to the other. Theſe croſs-bands were ſtitched to the circles of the uniting bandage. We are aſſured that the foregoing bandage always kept its proper place, and anſwered every expectation.

Some have propoſed uſing an elaſtic ſteel ſemicircle, to each end of which a little cuſhion is faſtened, which preſſes the cheeks forwards, when the inſtrument is put round the back part of the neck. To the middle of the ſteel a band is attached, which is ſmeared with adheſive plaſter from the end of the inſtrument to the ſide of the wound. In the vicinity of the wound one end has a ſlit through which the other may be drawn. The reſt may be applied in the manner of the common uniting bandage. (Louis, loco citato.) Others have the inſtrument made of whalebone, and faſten its two ends to ſome adheſive plaſter, which is laid upon the cheeks. The whalebone is then made to puſh the ſides of the face forward by means of a tape, which is faſtened to the inſtrument, and the ends of which croſs each other over the wound through a ſlit like the uniting bandage. (See Queſnay in Mémoires de l'Acad. de Chirurgie, tom. i.)

But Richter obſerves, that notwithſtanding the foregoing arguments, the above bandages, and ſeveral others, which Platner, Chopart, &c. have recommended, are ineffectual without a ſuture. We ſhould rather ſay that they are not ſo well adapted to practice as the twiſted ſuture, becauſe, in order to be ſucceſsful, they require a great deal of trouble, and, after all, are not ſo certain of anſwering as the ſuture. Richter accounts for their inefficacy on the following principles: As the congenital hare-lip is a defect of firſt formation, he cannot ſee, with M. Louis, why this deformity of the lip ſhould invariably be a mere diviſion of the parts, without any loſs of ſubſtance. He contends, that in ſome inſtances ſuch a loſs of ſubſtance is quite palpable, and that even when it does not originally exiſt, the ſurgeon muſt ſometimes produce it in the operation, as, when he converts a double fiſſure into a ſingle one, or when he removes a cancerous portion of the lip. The cleft in the bones of the palate is occaſionally ſo conſiderable that nobody can entertain a doubt of there being in that ſituation an actual loſs of ſubſtance. Richter inquires why the fiſſure in the lip ſhould not be circumſtanced in the ſame way? Were, ſays he, the object of uniting the wound the ſole one in this caſe, perhaps the bandage would often anſwer; but as our aim is alſo to effect an exact union, and avoid all disfigurement; as the parts are here ſoft, yielding, very moveable, and frequently only a little ſupported, it is eaſily diſcernible that it muſt be exceedingly difficult to accompliſh the intention with a bandage. The bandage has likewiſe the diſadvantage of concealing the wound, ſo that the ſurgeon cannot ſee that things are in a proper poſition.

Perhaps not much weight ought to be aſſigned to the objection, that the pins inflame the wound, make it ſuppurate, and are apt to cut their way out. Extenſive experience proclaims, that they have generally been employed with the happieſt effect. Richter is of opinion, that where the pins have cut their way out, the uniting bandage would alſo have failed. Pins have been moſt ſucceſsfully uſed for uniting the part, where the greateſt part of the under-lip has been cut away. By the confeſſion of its advocates, ſays Richter, the bandage has ſometimes proved ineffectual. He maintains, that it ought not to be concluded, that a ſpeedy union of the wound certainly cannot happen, becauſe a degree of inflammation and ſuppuration has come on. The part may yet heal up without any deformity being left; only a little more time will be requiſite.

The uniting bandage is ſubject to ſeveral diſadvantages, which do not attend the employment of the twiſted ſuture. In old perſons, and children without teeth, the bandage never accompliſhes an even union, as the lip in ſuch caſes receives no effectual ſupport. The bandage is ſtill leſs applicable, when there is a cleft in the upper jaw-bone as well as in the lip. Here the lip has a hollow underneath, and is preſſed inwards by the bandage into the fiſſure of the bone. This cannot happen without the edges of the wound being thrown out of their right poſition. In the double hare-lip, which muſt be operated upon at two different times, the bandage is not regularly effectual. After the operation for the firſt fiſſure, the bandage will not always ſerve to bring the lips of the wound into contact. It alſo happens, that when the edges of the wound are not cloſed as much internally as they are outwardly, the bleeding is apt to continue, and occaſion, eſpecially in infants, ſerious danger. Hence in making uſe of the bandage, we are not ſecure from the hazard of hæmorrhage; but in employing the twiſted ſuture, no riſk of this kind is encountered. Such bandages as paſs over the nape of the neck, or back of the head, eaſily ſlip out of their place, particularly in children, when they lie on their backs, and move or turn their heads to one ſide or the other. It is alſo very difficult to put on a bandage of this kind, with the proper degree of tightneſs, and conſequently, it is generally either too tight or too ſlack.

Richter refers to a caſe, in which, in conſequence of ſome trouble being experienced in bringing the edges of the wound properly together, the bandage was applied with tightneſs, ſo that the lip was preſſed in ſuch a way againſt the edge of the upper inciſor teeth, as to have a deep impreſſion made in it. When this accident was diſcovered, more than a half of the lip had been cut through. (See Richter's Obſervationum Chirurgicarum Faſciculus, 3.) With regard to the bandages which have been recommended, it is neceſſary to meaſure the dimenſions of the patient's head, and ſhould the ſurgeon make any blunder in this part of the buſineſs, the bandage will either not fit at all, or elſe very badly. In a word, ſays Richter, repeated experience proves, that the operation ſeldom fails with the twiſted ſuture, and that it frequently does ſo with a bandage, notwithſtanding the greateſt care and attention.

Adheſive plaſter alone is equally ineffectual, and, in ſome inſtances, totally uſeleſs. The ſtrips are apt to become quite looſe, when the ſaliva runs out of the mouth, after the operation has been performed upon the under lip. In adults who have ſtiff beards, the plaſter is every day puſhed off. The apparatus, propoſed by M. Valentin, (ſee Recherches Critiques ſur la Chirurgie Moderne), ſeems to be of itſelf, without the aid of other means, equally ineffectual. We need only ſay here, that it is a kind of forceps, with which the ſides of the wound are puſhed together. Richter objects to the inſtrument, that its preſſure is apt to bring on a painful ſwelling of the edges of the wound, notwithſtanding the precaution of covering the blades with ſome ſoft ſubſtance. An inconſiderable preſſure alſo will not ſuffice for keeping the ſides of the wound in contact, particularly when any difficulty is experienced in bringing them together; and in whatever manner the inſtrument is applied, there is no certainty of its fulfilling the object intended. The lip is ſaid to give way very frequently to the preſſure of the inſtrument, which, though it is at firſt ſufficiently tight, grows ſlack, and the edges of the wound become ſuppurated. In caſes in which the fiſſure extends high up into the noſtril, M. Valentin's inſtrument does not reach far enough, that is to ſay, it will not ſerve to keep the upper end of the wound cloſed, unleſs previous care be taken to detach the lip to the extent of a finger's-breadth on both ſides of the fiſſure, and upward to the noſe, from the gums and jaw-bone. Laſtly, Richter notices, that there are caſes where the fiſſure is ſo conſiderable, and ſo little of the lip is left after the neceſſary removal of a portion on each ſide, that there is ſcarcely room enough for the application of the inſtrument.

Upon the whole, the foregoing writer concludes, that bandages, adheſive plaſter, and other means of obtaining an union of the wound, propoſed by ſome of the moderns to be adopted after the operation for the hare-lip, are not ſuch as ought to be preferred, and that the ſuture is freer from objections than has been repreſented.

In a few favourable inſtances, perhaps, a bandage may by itſelf prove effectual; but Richter maintains, that it is always uncertain, and that the ſuture, in moſt caſes, ought not to be abandoned. The latter always anſwers in ſimple, eaſy caſes; and in thoſe which are attended with more difficulty, appear to be accompanied with a loſs of ſubſtance, do not admit the ſides of the wound to be brought into contact without trouble, and in which the patient is exceedingly reſtleſs and unmanageable, the ſurgeon may always aid the ſuture with other uniting means, a bandage and ſtrips of adheſive plaſter. But the bandage employed as an auxiliary to the ſuture, not only ought to preſs forward the cheeks, ſo as to keep the wound from gaping, and the pins from making their way through the fleſh; it ſhould, at the ſame time, be ſuch, as will not cover the whole of the wound, by which means the practitioner will retain the power of examining whether the edges of the diviſion are accurately in contact. The lip alſo ſhould not be preſſed by it againſt the teeth, ſo as to be rendered painful. The above-deſcribed bandages have not theſe properties. Richter thinks, that ſticking plaſter anſwers better, when applied in the following manner. Two large pieces of the plaſter are to be put upon the cheeks, and run forwards in a ſomewhat pointed way, terminating about half a finger's-breadth from the wound. To their anterior pointed ends, two or three threads are to be faſtened, which are to be tied in a ſlip-knot between the pins. In order to prevent the threads from preſſing againſt the wound, a bit of plaſter is to be put under them, or elſe a ſmall compreſs juſt under the front pointed end of the adheſive plaſters, ſo as to raiſe them up a little from the ſkin. Richter prefers the adheſive plaſter, thus uſed, to any ſort of bandage, and he conſidered it, in all caſes in which the pins require aid, by reaſon of the large ſize of the fiſſure, or the reſtleſſneſs and unmanageableneſs of the patient, as uſeful and neceſſary. In ſimple caſes, where the fiſſure is ſhort and narrow, the twiſted ſuture will anſwer every purpoſe of itſelf.

The little compreſſes, which ſome have propoſed to place under the pins on each ſide of the wound, are of no utility; they raiſe up the pins, tear and drag the wound, and either eaſily fall off, or ſlip out of their place.

In children, it is always proper, after the operation, to watch that the bleeding does not continue; for, as we have already detailed, the hæmorrhage is ſometimes kept up by ſuction of the wound, and is not readily perceived on account of the blood being ſwallowed. In order to hinder the child from being reſtleſs and crying, and thus diſturbing the dreſſings, it muſt be put to the breaſt whenever it awakes, and kept there till it falls aſleep again. Hence ſomebody muſt continually watch the little patient, it being uſual for children to begin crying when they wake and find themſelves alone. When an infant cannot be kept quiet in this manner, a little of the ſyrupus e meconio may every now and then be given to it.

Richter obſerves, that when, in conſequence of any incidental circumſtance, the dreſſings are diſturbed, and the wound made to gape, all hopes of a favourable termination of the caſe ſhould not be abandoned. He ſtates, that the wound, thus forced open again, has been often united without

out any ill conſequences, as late, and even later than the eighth day.

As ſoon as the pins become looſe, which, according to the preceding author, uſually happens about the fifth or ſixth day, they ought to be withdrawn, and ſmall ſtrips of adheſive plaſter applied alone. Were the pins to be left in too long, they might occaſion ulceration, and leave ſuch ſcars behind as would never be effaced. It is ſcarcely neceſſary to remark, that the pins ought to be taken out with great gentleneſs, and the thread which is wound then firſt removed.

Sometimes there continues at the upper angle of the wound a ſmall foramen, through which the ſaliva oozes out. This in general ſoon heals on being touched with the argentum nitratum. When a fiſſure exiſts in the upper jaw and palate bones as well as in the lip, ſome recommend the cleft in the palate to be cloſed with ſome ſuch ſubſtance as a piece of ſponge, the front ſurface of which is covered with leather, or to cover the fiſſure in the bone with a bit of ſheet-lead, put under the lip, ſo as to ſupport the part and keep the wound from becoming too much depreſſed. Such a plan indeed may be really neceſſary, when either the uniting bandage alone, or the interrupted ſuture, is employed to heal the diviſion. But when pins are uſed for this purpoſe, their extremities lie cloſely to the edges of the fiſſure, ſo as to ſupport the lip, and render the foregoing means unneceſſary. This, ſays Richter, is one advantage attending the twiſted ſuture, as both the ſponge and lead preſs upon and irritate the wound.

The double hare-lip is operated upon in various ways. When the piece of fleſh ſituated betwixt the two fiſſures is long, broad, and ſoft, a particular operation is performed for each diviſion. As ſoon as one is completely well, the ſurgeon proceeds to the cure of the other. The ſurgeon muſt never attempt to operate upon both fiſſures at the ſame time; for if this method were purſued, the middle piece of fleſh would ſuffer ſo conſiderably from the many pins paſſed through it, and from being much ſtretched, that it would inflame exceſſively, and the deſign of the operation be fruſtrated.

When the knob of fleſh between the two fiſſures is ſhort, ſmall, and uſeleſs, it muſt be cut away with two ſtrokes of the knife, which are at the ſame time to remove the external edge of each fiſſure, thus convert both diviſions into one, and make them capable of being both removed by one operation. The laſt is the moſt frequent and favourable caſe. When two diſtinct operations are requiſite, the ſcars are generally more perceptible, and the patient ſuffers more pain. The middle portion of fleſh is ſeldom of any uſe, for the lips are ſo yielding, that there is commonly no reaſon to be apprehenſive about the loſs of ſubſtance.

It is ſaid, that hare-lips have been met with which were utterly incurable. Caſes have occurred in which the fiſſure was prodigiouſly large, its upper angle exceedingly wide, little of the upper lip to be ſeen on either ſide, that little hard and uſeleſs, adherent to the gums, and quite deformed, all which circumſtances are ſaid to have made the union of the fiſſure totally impracticable.

Children with a cleft in the bones of the palate, ſometimes have the upper jaw of preternatural breadth, ſometimes of the cuſtomary one. In the firſt caſe it may be conjectured, that there is a ſimple diviſion in the bone; in the ſecond an actual loſs of ſubſtance. When the infants, thus circumſtanced, cannot ſuck, an endeavour muſt be made to cloſe the fiſſure by means of an artificial palate. A bit of ſponge anſwers this purpoſe beſt, for when of proper ſhape, ſize, and thickneſs, and it is put in dry, it uſually keeps in its proper ſituation very well. It may be covered with leather upon the ſide towards the mouth, in order that it may not imbibe too much of the fluid which the child ſucks. The cleft in the palate is occaſionally ſo conſiderable, that the ſponge cannot be retained in it by any means whatſoever. In this kind of caſe, thin plates, provided with a ſpring, have been tried, though they ſeldom anſwer in an effectual way. Many infants can ſwallow fluids tolerably well, notwithſtanding the cleft in the palate, when ſuch fluids are given to them in a recumbent poſture. The liquid only eſcapes from the noſe in an upright poſition.

As ſoon as the hare-lip is cured, nature commonly cloſes the fiſſure in the bones of the palate, without any aſſiſtance from art. It is remarked, that this deſirable event never takes place before the operation for the hare-lip has been performed, a circumſtance which is urged in favour of undertaking it at an early period. (Levret, l'Art des Accouchemens, § 1321. La Faye Mem. de l'Acad. de Chirurgie de Paris, tom. 3. edit. 8. p. 201.) Several plans have been propoſed for promoting the cloſure of the fiſſure in the palate. Some have ſuggeſted introducing a piece of ſtring into the mouth, and tying it round one of the grinding teeth of the upper jaw on each ſide. (Jourdain, Journal de Médécine, tom. 39.) Such method is quite inapplicable to infants, without any grinding teeth; it would alſo be exceedingly inconvenient; and certainly, it is more likely to pull the teeth into an oblique direction, than to make the ſides of the bony fiſſure approximate each other. Others reſt ſome hope on the effect of a bandage, which will compreſs the ſides of the face together. (Levret, Journal de Médécine, tom. 37.) However, ſuch bandage, in all probability, would make the cheeks inflame, before it could have the leaſt effect in making the fiſſure in the bones at all narrower. Richter thinks more good would reſult from ſcarifying the ſides of the cleft, though he is of opinion that the beſt method to be followed, is to leave the union of the fiſſure in the bones to nature, and, if neceſſary, to adviſe the uſe of an artificial palate, until the communication between the mouth and noſe is cloſed.

Many of the preceding obſervations are to be found in Richter's Anfangſgrunde der Wundarzneykunſt. Band 2. Kap. 7.

HAREM, the quarter of the ſeraglio allotted to the women. See SERAGLIO.

HARENGIFORMES, in *Ichthyography*, a genus of fiſhes approaching to the herring in ſhape; the principal character of which is, a ſerrated line made up of ſcales running along the bottom of the belly; to which may be added, that the ſides and belly are of a bright ſilver colour, and that the ſcales are large and looſe.

HARENGUS. See CLUPEA *Harengus*.

HAREWOOD, in *Geography*, a pariſh and market-town in the upper diviſion of the wapentake of Skyrack, in the Weſt Riding of Yorkſhire, England. The town is about eight miles from Leeds, and 204 from London. In the year 1801, it contained 142 houſes and 707 inhabitants. The country around here abounds with woods, moſt of which belong to Harewood-houſe, the noble ſeat of lord Harewood. This manſion was built in 1708, and has two handſome architectural fronts. Harewood caſtle is an intereſting ſpecimen of caſtellated architecture. Soon after the Norman conqueſt it belonged to the family of Romily, from whom it deſcended to the Meſchines's. Mr. King aſcribes the preſent building to an age from Edward I. to Edward III. The remains ſtand on the north ſide of a triple ſquare entrenchment, on the brow of a hill. The embankments are high in ſome places, and the walls of two ſquare towers, a porch, and great hall are ſtill conſiderable. (Mr. King, in Archæologia, vol. vi. has given a ground plan, and a particular deſcription of this caſtle.) In the church are five curious ancient monuments, with effigies, &c. to the memories of the Rithers's and the Bedmans, who were lords of the caſtle; alſo of the Gaſcoigns of Gawthorp. One of this family, ſir William Gaſcoigne, committed Henry V. when prince of Wales, to priſon for affronting him whilſt he ſat in the judge's chair. He was chief juſtice in the reigns of Henry IV. and V.; and a fine monument with his ſtatue in alabaſter is preſerved in Harewood church.

HARFANG, in *Ornithology*. See Strix *Nyctea*.

HARFLEUR, in *Geography*, a decayed town of France, in the department of the Seine, ſituated on the ſide of a hill, on a ſmall river near the Seine, the port of which has been ruined, ſo that the harbour is filled up and become fit only for boats, by the proſperity of Havre de Grace at the diſtance of four miles. The number of inhabitants is about 2400. N. lat. 49° 30′. E. long. 8° 27′.

HARFORD, a county of America, in Maryland, chiefly watered by Buſh river and Deer creek, on which are 16 mills. It contains 17,626 inhabitants, including 4264 ſlaves. Its chief town is Belle-Air.—Alſo, a poſt-town in the above-mentioned county, ſinking into decay, by the riſing importance of Belle-Air at the diſtance of nine miles, whither the courts of juſtice have been removed.

HARG, a ſea-port of Sweden, in the province of Upland; 30 miles N.E. of Upſal.

HARGHIAH, Cape, a cape on the S. coaſt of Arabia. N. lat. 13° 30′. E. long. 47°.

HARGIA, a town of Arabia, in the province of Hadramaut, ſituated on the coaſt; 60 miles E.N.E. of Aden.

HARJAVALDA, a town of Sweden, in the government of Abo; 15 miles S.S.E. of Biorneborg.

HARIDI, a name given to a ſerpent at Achmim, in Upper Egypt, to which the artifice of the prieſts and the credulity of the people aſcribe many wonderful performances. The appellation is derived from that of a religious Turk, called "Scheick Haridi," who more than a century ago died at Achmim, and who was venerated as a ſaint, and actually worſhipped among the Mahometans, and to whoſe honour they raiſed a monument, covered with a cupola, at the foot of the adjacent mountain. One of their prieſts perſuaded his deluded votaries, that God had made the ſoul of the ſaint to paſs into the body of a ſerpent. He had taught one of the harmleſs animals of this ſpecies that abound in the Thebais to obey his voice, and by means of the ſerpent that attended him, he pretended to cure all diſorders, and he dazzled the vulgar by his ſurpriſing tricks. Having luckily practiſed in ſome inſtances with ſucceſs, he gained great celebrity. He ſoon confined his ſerpent Haridi to the tomb, producing him only to oblige princes, and perſons able liberally to recompence him. The ſucceſſors of this prieſt adopted his art; and they added to the general perſuaſion of his virtue, that of his immortality, and by an artful contrivance exhibited a public proof of it. The knavery of the prieſts has in this inſtance been highly lucrative. The people flock from all quarters to pray at this tomb; and if the ſerpent crawls out from under the ſtone, and approaches the ſuppliant, it is a ſign that his malady will be cured. We ſhall only add, that the ignorant and credulous Egyptians believe in the ſerpent Haridi, as firmly as in the prophet. And amongſt the dupes of a few impoſtors are ſome Chriſtians, who no more doubt the virtue of the ſerpent than the Turks; but the Chriſtians maintain that this ſerpent is the dæmon Aſmodeus, who ſlew the ſeven huſbands of Tobit's wife, brought by the angel Raphael to this place, after metamorphoſing him; and that God makes uſe of him to deceive the infidels. Savary's Letters, vol. i.

HARJEDALEN, a province of Sweden, in Nordland, incorporated with the Swediſh dominions in 1645, bounded on the N. by Jemptland, on the E. by Helſingland, on the S.W. by Dalecarlia, and on the N.W. by Norway; about 100 miles long, and from 40 to 50 broad: abounding in mines and woods, and poſſeſſing excellent paſtures, which ſupply a good home trade of horned cattle. Its rivers and lakes abound with fiſh. The inhabitants derive their ſubſiſtence from grazing, hunting, and fiſhing, and from the ſale of cheeſe, which is much eſteemed. Several places among the mountains are inhabited by Lappers.

HARIOT, or Heriot, a due or ſervice, belonging to the lord at the death of his tenant: conſiſting of the beſt beaſt the tenant had at the time of his deceaſe.

Coke, on Littleton, obſerves, that *heriot* in Saxon is called *hereger*, q. d. the *lord's beaſt*; *here* ſignifying *lord*, and *gear*, *beaſt*; which others reject, urging that *here*, in Saxon, ſignifies an *army*; and *gear*, a *march*, or *expedition*; and that the Saxon *hereger*, whence we derive our *hariot*, ſignified *proviſion for war*, or a *tribute*, or *relief*, given to the lord of a manor, for his better preparation towards war. Spelman.

By the laws of Canutus, tit. De Heriotis, it appears that at the death of the great men of this nation, ſo many horſes and arms were to be paid, as they were in their reſpective life obliged to keep for the king's ſervice. The firſt eſtabliſhment, if not introduction, of compulſory hariots into England, was by the Danes. Upon the plan of this Daniſh eſtabliſhment, William the Conqueror faſhioned his plan of reliefs: when he aſcertained the preciſe relief to be taken of every tenant in chivalry, and, contrary to the feodal cuſtom and the uſage of his own duchy of Normandy, required arms and implements of war to be paid inſtead of money. (See Relief.) The Daniſh compulſive heriots, thus tranſmuted into reliefs, underwent the ſame viciſſitudes as the feodal tenures, and in ſocage eſtates frequently remain to this day in the ſhape of a double rent payable at the death of the tenant. The heriots which now continue amongſt us and retain the name, ſeem rather to be of Saxon parentage, and at firſt to have been merely diſcretionary. (Lamb. Peramb. of Kent, 492.)

Hariot is of two ſorts: *viz. Hariot cuſtom*, where hariots have been paid time out of mind by cuſtom, after the death of a tenant for life: and they are defined to be a cuſtomary tribute of goods and chattels, payable to the lord of the fee on the deceaſe of the owner of the land.

Theſe heriots are now, for the moſt part, confined to copyhold tenures, and are due by cuſtom only, which is the life of all eſtates by copy; and perhaps are the only inſtances where cuſtom has favoured the lord. For this payment was originally a voluntary donation, or gratuitous legacy of the tenant: perhaps in acknowledgment of his having been raiſed a degree above villenage, when all his goods and chattels were quite at the mercy of the lord: and cuſtom, which has on the one hand confirmed the tenant's intereſt in excluſion of the lord's will, has, on the other hand, eſtabliſhed this diſcretional piece of gratitude into a permanent duty. An heriot may alſo appertain to free land, that is held by ſervice and ſuit of court; in which caſe it is moſt commonly a copyhold enfranchiſed, whereupon the heriot is ſtill due by cuſtom. Bracton (l. 2. c. 36. § 9.) ſpeaks of heriots as frequently due on the death of both ſpecies of tenants: and he adds, "magis ſit de gratia quam de jure;" in which Fleta (l. 3. c. 18.) and Britton (c. 69.) agree; thus plainly intimating the original of this cuſtom to have been merely voluntary, as a legacy from the tenant; though now the immemorial uſage has eſtabliſhed it as of right in the lord.

This heriot is ſometimes the beſt live beaſt, or "averium," which the tenant dies poſſeſſed of, (which is particularly denominated the villein's relief in the 29th law of king William the Conqueror,) ſometimes the beſt inanimate good, under which a jewel or piece of plate may be included: but it is always a *perſonal* chattel, which, immediately on the death of the tenant who was the owner of it, being aſcertained by the option of the lord (Hob. 60.), becomes veſted in him as his property; and is no charge upon the lands, but merely on the goods and chattels. The tenant muſt be the owner of it, elſe it cannot be due; and therefore on the death of a feme-covert no heriot can be taken; for ſhe can have no ownerſhip in things perſonal. (Keilw. 84. 4 Leon. 239.)

In ſome places there is a cuſtomary compoſition in money, as 10 or 20 ſhillings in lieu of a hariot, by which the lord and tenant are both bound, if it be an indiſputably ancient cuſtom; but a new compoſition of this ſort will not bind the repreſentatives of either party. Blackſt. Com. b. 2.

Hariot *Service*, is when a tenant holds by ſuch ſervice to pay hariot at the time of his death; which ſervice is expreſſed in the deed of feoffment. This is due upon a ſpecial reſervation on a grant or leaſe of lands; and therefore amounts to little more than a mere rent. 2 Saund. 166.

For this latter the lord ſhall diſtrain as well as ſeize; and for the other he ſhall ſeize, and not diſtrain.

If the lord purchaſe part of the tenancy, hariot-ſervice is extinguiſhed; but it is not ſo of hariot-cuſtom.

HARIR, in *Geography*, a town of Nubia, on the right bank of the Nile; 25 miles E. of Dongola. N. lat. 19° 20′. E. long. 32° 34′.—Alſo, a town of Curdiſtan; nine miles E. of Erbil.

HARKO, a ſmall iſland of Sweden, in the N. part of the gulf of Bothnia. N. lat. 65° 27′. E. long. 24° 49′.

HARLE, in *Ornithology*, the name given by Buffon to the Mergus tribe.

HARLECH, or Harddlech, in *Geography*, an inconſiderable market town in the pariſh of Llanvair, and hundred of Ardudwy, North Wales, England; was formerly the principal town in this part of the principality, and had a large caſtle. This, with the houſes, are ſeated on the brow of a cliff, which overhangs a flat marſh, on the ſea-coaſt, near Cardigan bay. The exterior walls of the caſtle are nearly entire, and aſſume a ſquare form of about 20 feet each way, with round towers at the angles, and at the entrance a fortreſs is ſaid to have been built on this ſcite by Maelgwn Gwynedd, prince of North Wales, about the year 530; but Edward I. erected the preſent edifice, which was finiſhed in the year 1283. The ambitious Owen Glyndwr ſeized and took poſſeſſion of it in 1404: but Henry IV. ſent an army into Wales ſoon afterwards, and diſlodged that chieftain. In 1460 it became the place of refuge and ſecurity to Margaret of Anjou, who fled here for protection after the diſaſtrous battle of Northampton, when Henry VI. was defeated. In the ſanguinary wars between the houſes of York and Lancaſter, this fortreſs was obſtinately defended by Dafydd ap Eſan ap Einion, on the part of the latter party. An army under the command of the earl of Pembroke at length compelled him to ſurrender it in 1468. In the civil wars between king Charles I. and the parliament, this caſtle was the laſt in Wales that was held in behalf of the monarch. Since that period it has gradually been mouldering to ruins, and though its architectural forms may ſtill be traced, its interior arrangement and fittings up are nearly obliterated. Beſides the caſtle Harlech does not contain any building or object of intereſt: but the ſcenery and antiquities of the environs are grand, curious, and worthy of the traveller's particular attention and enquiry. In the year 1692 an ancient golden torquis was dug up near the caſtle, and was committed to the care of ſir Roger Moſtyn. Several Roman coins have been found in and near the town. About five miles from Harlech, near the road to Barmouth, are two cromlechs near each other, and placed in the midſt of two carnedds. In the way to Maenturog are two concentric circles, ſome upright ſtones, and other objects of druidical antiquity. A tumulus and carnedd, larger than the reſt, is diſtinguiſhed by the title of king Arthur's tomb. Among the mountains is another large cromlech called Coeton-Arthur. For further particulars reſpecting Harlech and its environs, the reader is referred to Pennant's, Bingley's, Wyndham's, Evans', and Warner's reſpective Tours in Wales.

HARLED, in *Rural Economy*, a term ſignifying mottled or ſpeckled, as applied to neat cattle. It alſo implies a wall daſhed with lime and ſand or other ſimilar materials.

HARLEIAN *Collection of Manuſcripts*, is a valuable collection begun near the end of the laſt century, by Robert Harley, eſq. afterwards earl of Oxford, and increaſed in the year 1721 to near 6000 books, 14,000 original charters, and 500 rolls. This collection was farther enlarged by his ſon, and amounted at his death, in 1741, to 8000 volumes, and above 40,000 original rolls, charters, letters patents, grants, and other deeds and inſtruments of great antiquity. By ſtat. 26 Geo. II. it was enacted, that this collection ſhould be purchaſed for the ſum of 10,000*l.*, and placed and continued in the ſame repoſitory with the Cottonian library. See *Britiſh* Museum.

HARLEM, in *Geography*. See Haerlem.

Harlem, a townſhip of America, in Kennebeck county, Maine, incorporated in 1796, containing 262 inhabitants; 213 miles N.E. by N. from Boſton.—Alſo, a diviſion of New York county, in the northern part of York iſland, which, in 1790, contained 803 inhabitants.

HARLEQUIN, in the *Italian Comedy*, a buffoon dreſſed in party-coloured cloaths, anſwering much the ſame purpoſe as a merry-andrew, or jack-pudding, in our drolls, on mountebanks, ſtages, &c. We have alſo introduced the harlequin upon our theatres; and this is one of the ſtanding characters in the modern groteſque or pantomime entertainment.

The term took its riſe from a famous Italian comedian, who came to Paris under Henry III. and who frequenting the houſe of M. de Harley, his companions uſed to call him *Harlequino*, q. d. *little Harley*; a name which has deſcended to all thoſe of the ſame rank and profeſſion.

HARLESTON, in *Geography*, a market town in the pariſh of Redenhall and hundred of Earſham, county of Norfolk, England; is ſituated on the banks of the river Waveney. The church of Redenhall conſiſts of a chancel, nave, and two aiſles; and was rebuilt at the beginning of the 14th century. The tower, which is ſquare, and crowned with battlements, having a ſmall ſpire at each angle, and a larger in the centre, was begun in the year 1460, and finiſhed in 1520. In 1616 it was rent from top to bottom by lightning, and was anchored up as it appears at preſent. In 1680 the ſpire was entirely deſtroyed by a ſimilar accident, but was rebuilt the following year. Harleſton is 99 miles diſtant from London; has a weekly market on Wedneſdays, and two annual fairs, which are well frequented; particularly one held on the feſtival of St. John the Baptiſt, and continuing ſeven days; to which immenſe droves of Scotch cattle are brought. The return to parliament, in 1810, ſtated the town to contain 273 houſes and 1459 inhabitants. Blomefield's Hiſtory and Antiquities of Norfolk.

HARLEY, Robert, in *Biography*, earl of Oxford and Mortimer, eldeſt ſon of ſir Edward Harley, was born in the year 1661. At the period of the revolution, he and his father raiſed a troop of horſe at their own expence, and after the acceſſion of William and Mary he obtained a ſeat in parliament. In 1702 he was elected ſpeaker of the houſe of commons, and in 1704 he was ſworn of queen Anne's privy council, and one of the ſecretaries of ſtate. He was alſo one of the commiſſioners for the treaty of Union, and in 1710 was appointed chancellor and under-treaſurer of the exchequer. A ſingular incident occurred at this time, which tended to raiſe Mr. Harley into popularity. A perſon, calling himſelf the marquis de Guiſcard, a Frenchman, who had been refuſed a penſion by Mr. Harley, was apprehended on the charge of a treaſonable correſpondence with France: while under examination before the council board, he made a ſudden and deſperate attempt to ſtab him in the breaſt. Fortunately the knife, lighting on the bone, broke ſhort, without effecting much injury. Guiſcard was ſecured after much reſiſtance, and died ſhortly after in priſon. On this occaſion, an act was paſſed to make any attempt on the life of a privy counſellor felony; and both houſes of parliament joined in an addreſs to the queen, expreſſing "their deep concern for the attempt againſt the life of Mr. Harley, whoſe fidelity to her majeſty and zeal for her ſervice had drawn upon him the hatred of all the abettors of popery and faction." Mr. Harley was now raiſed to the dignity of lord high treaſurer, and created earl of Oxford and earl of Mortimer, two of the nobleſt titles in the Btitiſh peerage. On the acceſſion of George I. the meaſures of the earl of Oxford were not purſued, and his enemies gaining the aſcendancy, he was impeached of high treaſon, and committed to the Tower, where he remained a cloſe priſoner two years. He now demanded a trial, and the lords and commons not agreeing in their plans for conducting the proceeding, was acquitted. He died in the month of May 1724: his political character has been variouſly repreſented; but it cannot be denied that he was an encourager of literature, and the greateſt collector in his time of curious books and MSS., his collection of which is now in the Britiſh Muſeum, and fills a large department of it. Smollet's Hiſt. of Engl.

HARLING, East, or *Market-Harling*, in *Geography*, is a market town and pariſh in the hundred of Guiltcroſs, and county of Norfolk, England.

The church, a handſome uniform building, conſiſts of a nave, two aiſles, a chancel, and a quadrangular tower, with a baluſtraded parapet wall ſurmounted by a ſmall ſpire. In a private chapel, originally connected with the manor, are various monuments for the Harling family; under an altar tomb are the remains of ſir Robert Harling, who was a diſtinguiſhed warrior in the time of king Henry V. and fell while bravely defending the city of Paris in 1435. In the windows are numerous figures and armorial bearings on ſtained glaſs. The glaſs in the chancel window formerly belonged to Harling-hall. This manſion was erected by ſir Thomas Lovell about 1500, but has been long ſince dilapidated. Harling was formerly celebrated for the manufacture and ſale of linen, yarn, and cloth; but its trade has greatly declined. A weekly market and two annual fairs are held under a charter granted by king Edward IV. The number of inhabitants, in the year 1706, was 401: but in 1801, the town was returned as containing 93 houſes, and 674 perſons. Harling is diſtant from London 93 miles. Blomefield's Hiſtory and Antiquities of Norfolk.

HARLINGEN, a ſea-port town of Holland, in the ſtate of Frieſland, on the Zuyder ſea. This place is well fortified and naturally ſtrong; the adjacent country being eaſily inundated. The city is ſquare, the ſtreets are ſtraight and clean, with canals in the middle of them. It has five gates, four towards the land, and one towards the ſea. The accumulation of ſand near the mouth of the harbour, which is large and much frequented, incommodes it, ſo that heavy veſſels are obliged to lie at a diſtance, or to diſcharge part of their load. The chief trade conſiſts in ſail-making, and alſo in importing and exporting corn, pitch, tar, fir-trees, and deals The adjacent country is fertile, and affords abundant ſupplies of corn, paſture, and other neceſſaries of life. N. lat. 53° 11′. E. long. 5° 22′.

HARLOT, a woman given to incontinency; or that makes a habit, or trade, of proſtituting her body. See Courtesan.

The word is ſuppoſed to be uſed for the diminutive *whorelet*, a *little whore*. Others derive it from *Arlotta*, miſtreſs to Robert duke of Normandy, and mother to William the Conqueror. Camden derives it from one *Arlotha*, concubine to William the Conqueror: others from the Italian *arlotta*, a *proud whore*.

HARLOW, in *Geography*, is a pariſh and village in the hundred of the ſame name, in the county of Eſſex, England. It was formerly a market town and a place of conſiderable trade, but the market having fallen into diſuſe and the trade removed, the inhabitants are now chiefly ſupported by ſpinning and agricultural employments. But ſome advantages are derived from three annual fairs; particularly one, well known by the name of Harlow-Buſh Fair, which is held Sept. 9. on a common two miles from the town, for the ſale of horſes, cattle, &c. The church was partly demoliſhed by fire in 1711, but was ſoon reſtored, and ornamented with much painted glaſs. The original ſtructure was in the cathedral form; but the tower, which roſe from the centre, has been replaced by a cupola. Harlow is 23 miles diſtant from London; and, in the year 1801, contained 265 houſes, and 1514 inhabitants. About three miles diſtant, in the pariſh of Latton, are the remains of an Auguſtine priory, founded previous to the year 1270. Morant's Hiſtory and Antiquities of Eſſex, 2 vols. fol.

HARMA, a town of Sweden, in Eaſt Bothnia; 38 miles E.N.E. of Waſa,

HARMALA, in *Botany*, ἁρμαλα, an eminent Greek name, mentioned by Dioſcorides as a ſynonym of his Πηγανον, or Wild Rue. Tournefort retained it as a generic name, Inſt. 257. t. 133. but Linnæus preferred the latter. See Peganum.

HARMANGER, in *Geography*, a town of Sweden, in Helſingland; 12 miles N. of Hudwickſwall.

HARMATIAN, or Chariot Air, compoſed by the firſt Phrygian Olympus. According to Heſychius this air had the title of 'Αρματιος νομος, from its imitating the rapid motion of a *chariot wheel*; or, from its fire and ſpirit, being proper to animate the horſes that draw the chariot, during battle.

HARMATTAN, a name given by the Fantees, a nation on the Gold Coaſt, to a ſingular wind that blows from the interior parts of Africa to the Atlantic ocean, on that part of the coaſt which lies between Cape Verd (N. lat. 15) and cape Lopez (S. lat. 1), ſometimes for a few hours, ſometimes for ſeveral days without regular periods. It is always attended with a fog or haze, ſo denſe as to render thoſe objects inviſible that are at the diſtance of a quarter of a mile: the ſun appears through it only about noon, and then of a dilute red, and very minute particles ſubſide from the miſty air, ſo as to make the graſs, and the ſkins of negroes appear whitiſh. The extreme dryneſs which attends this wind or fog, without dews, withers and quite dries the leaves of vegetables; and is ſaid by Dr. Lind at ſome ſeaſons to be malignant and fatal to mankind; probably after much preceding wet, when it may become loaded with the exhalations from putrid marſhes; at other ſeaſons it is ſaid to check epidemic diſeaſes, to cure fluxes, and to heal ulcers and cutaneous eruptions; which is probably effected by its yielding no moiſture to the mouths of the external abſorbent veſſels, by which the action of the other branches of the abſorbent ſyſtem is increaſed to ſupply the deficiency. The uſual evaporation at Whidah is 64 inches; but when the Harmattan blows, it is at the rate of 133. Phil. Tranſ. vol. lxxi. See alſo Phil. Tranſ. vol. liii. p. 63. In many circumſtances, this wind ſeems much to reſemble the dry fog which covered moſt parts of Europe for many weeks in the ſummer of 1780, which has been ſuppoſed to have had a volcanic origin, as it ſucceeded the violent eruption of mount Hecla, and its neighbourhood. From the ſubſidence of a white powder, it ſeems probable that the Harmattan has a ſimilar origin, from the unexplored mountains of Africa. Nor is it improbable that the epidemic coughs, which occaſionally traverſe immenſe tracts of country, may be the products of volcanic eruptions; nor impoſſible, (ſays Dr. Darwin) that at ſome future time contagious miaſmata may be thus emitted from ſubterraneous furnaces in ſuch abundance as to contaminate the whole atmoſphere and depopulate the earth! Darwin's Botanic Garden, vol. ii. p. 219. note.

HARMER, Thomas, in *Biography*, was born at Norwich in 1715. He received the elements of claſſical learning in the country, and diſcovering an inclination for the profeſſion of a diſſenting miniſter, was ſent to London to purſue his academical ſtudies under the tuition of the learned Mr. Eames. When he had finiſhed his ſtudies, he ſettled with a ſmall congregation at Wattsfield, in Suffolk, where he devoted a conſiderable part of his time to the perfecting of his acquaintance with the Latin, Greek and Hebrew languages, in each of which he acquired much critical ſkill. The favourite object of his purſuit was the oriental knowledge, which he applied to the illuſtration of the ſacred writings. Obſerving a ſtriking conformity between the preſent cuſtoms of the eaſtern nations, and thoſe of the ancients, as mentioned or alluded to in various paſſages of ſcripture, he conceived a deſign, at a very early period, of making extracts of ſuch paſſages in books of travels and voyages, as appeared to him to furniſh a key to many parts of holy writ. In the year 1764 he publiſhed a volume of "Obſervations on divers Paſſages of Scripture, &c." The favourable reception which this work met with, encouraged Mr. Harmer to proceed in it, and in 1776 he gave the public an enlarged edition of it, in two vols. octavo. In the preface to this impreſſion, after acknowledging the various helps he had received in the progreſs of his undertaking, he ſays, "But the greateſt advantage to this edition are thoſe additions of all the various kinds I have been mentioning, which have been furniſhed by ſome MS. papers of the late ſir John Chardin, who reſided long in the Eaſt, was a curious obſerver, and paid particular attention to ſuch matters as might ſerve to illuſtrate paſſages of Holy Writ, which led him to make many obſervations very much reſembling thoſe that were heretofore publiſhed in this work." With theſe papers he was furniſhed by Dr. Lowth, biſhop of London, who honoured him with a correſpondence on the ſubject, and probably by his example, Mr. Harmer was encouraged by perſons of the higheſt rank in the eſtabliſhed church. Animated with their approbation, he proceeded to collect two other volumes, which he publiſhed in the year 1787. Mr. Harmer, having thus rendered his work as complete as he intended, ſeemed happy and ſatisfied that his exertions could not but be of great utility to the biblical ſtudent, the divine, and the ſcholar; and in this deciſion every competent judge has agreed from that time to the preſent. Mr. Harmer died without a ſtruggle in November 1788, having paſſed the preceding day in perfect health. He was author of the "Outlines of a new Commentary on Solomon's Song, drawn by the help of Inſtructions from the Eaſt:" an "Account of the Jewiſh Doctrine of the Reſurrection of the Dead," and ſome other tracts of a leſs general nature. To the high merits of Mr. Harmer, profeſſor Symonds of Cambridge has borne a moſt ample teſtimony, part of which we ſhall tranſcribe. His reputation as a ſcholar and a divine is fully and univerſally eſtabliſhed. He may ſometimes be thought inelegant in his ſtyle, and too minute in his facts, yet theſe defects are amply compenſated by the general choice of his materials, and the clearneſs of the method with which he digeſted and arranged them. Some books come into the world ſet off with all the ornaments of language, and, with their authors, are ſoon forgotten; they reſemble thoſe meteors which, by their luminous appearance, attract our notice, and almoſt in the ſame moment vaniſh from our ſight. The credit of Mr. Harmer's writings reſts upon a foundation ſtrong and durable; he hath profeſſedly treated a ſubject of the firſt importance, which had before been touched upon only incidentally, and by ſhewing at large the wonderful conformity between the ancient and modern cuſtoms of the Eaſt, hath not only thrown a conſiderable light upon numberleſs paſſages in the bible, but hath opened new and fruitful ſources for the uſe of future expoſitors. In ſpeaking of our author in another character, he ſays, he was governed by a general principle of benevolence, and though he was commonly called the father of the diſſenters, yet his good offices were ſo far from being confined to thoſe of his own communion, that he acknowledged and encouraged merit whereſoever he found it. "I will apply to Harmer, was the uſual language of every injured perſon in his neighbourhood, and it ſeldom happened that the aggreſſor was not ſoon induced, by his perſuaſion, to repair the injury which he had done; and I do not exaggerate when I affirm that there is not, probably, a ſingle inſtance of an individual to be found, who, by a mild and ſeaſonable interference, prevented more law-ſuits than Mr. Harmer." See Symonds's Obſervations on the Expediency of reviſing the preſent Engliſh Verſion of the Goſpel.

HARMODIUS. Among the patriotic nomes or ſongs of the Athenians, there are none more frequently mentioned by ancient authors, than thoſe upon Harmodius and Ariſtogiton, who ſignalized their courage againſt Hipparchus and Hippias, the ſons and ſucceſſors of Piſiſtratus, king of Athens. Hipparchus having publicly inſulted the ſiſter of Harmodius, he, in conjunction with his friend Ariſtogiton, ſlew him at the Panathenæan games, which event was the ſignal to the natives of Athens for recovering their liberty. The following are fragments of popular ſongs in honour of Harmodius.

1ſt Fragment.

Cover'd with myrtle-wreaths I'll wear my ſword,
Like brave Harmodius, and his patriot friend
Ariſtogiton, who the laws reſtor'd,
The tyrant ſlew, and bade oppreſſion end.

2d Fragment.

Harmodius dear! thou art not dead,
Thy ſoul is to Elyſium fled;

Thy virtue there a place has won,
With Diomede, great Tydeus' ſon;
With ſwift Achilles, too, thou art join'd,
And ev'ry friend of human kind.

See Aristogiton.

HARMONIA, Αρμονια, in *Anatomy*, a ſort of juncture or articulation of the bones.

Harmonia is a ſpecies of the *ſynarthroſis*, or juncture intended for abſolute reſt.

Two bones are ſaid to be joined *per harmoniam*, by harmonia, when the juncture is in one uniform, right, or circular line; or when the bones meet with even margins; in contradiſtinction from *ſutura*, where they are indented.

The bones of the upper jaw, and moſt of the epiphyſes, are joined *per harmoniam*.

Harmonia, Lat. *Harmony*, in *Muſic*, the coincidence, or agreeable uniſon or mixture of two or more notes or ſounds.

Harmonia, in *Mythology*, the wife of Cadmus. See Cadmus.

HARMONIÆ, in *Muſic*, an interval which, according to M. Henfling, has a ratio of $\frac{125}{128}$, $= 21\ \Sigma + 2\ m$, and is the *Enharmonic* Diesis, which ſee.

HARMONICA, a term given by the ancients to that part of muſic, which conſiders the ratio or proportion of ſound to ſound. See Harmonics.

Harmonica *Regula*. (See Monochord.) That excellent organiſt and worthy man, the late Mr. Keeble, coadjutor with Roſeingrave, as organiſt of St. George's, Hanover ſquare, bewildered himſelf many years in the ſtudy of the harmonica.

He does not ſeem, however, to have diſcovered with all his long and intenſe ſtudy, what others have clearly demonſtrated; that by *harmony* the ancients mean preciſely what the moderns imply by *melody*. The late Mr. Maſon, who being a good muſician, *alla moderna*, and, probably, much better acquainted with Greek literature than Mr. Keeble, has defined the harmony of the ancients in the following manner.

Muſical Definitions.

Harmony of the Ancients.

The ſucceſſion of ſimple ſounds, according to their ſcale, with reſpect to acuteneſs or gravity.

Melody.

The ſucceſſion of theſe harmonical ſounds, according to the laws of rhythm or metre; or, in other words, according to time, meaſure, and cadence.

Harmony of the Moderns.

The ſucceſſion of combined ſounds or chords, according to the laws of counterpoint.

Melody,

What the ancients meant by harmony; rhythm and metre being excluded.

Air,

What the ancients underſtood by melody.

"According to theſe definitions, it appears that harmony, as we call it, was unknown to the ancients; that they uſed that term as we uſe ſimple melody, when we ſpeak of it as a thing diſtinguiſhed from modulated air; and that their term melody was applied to what we call air or ſong. If this be true, much of the difficulty in underſtanding ancient muſical writers will vaniſh.

"If an ancient Tibicen uſed an improper tone or ſemi-tone, or tranſgreſſed the rule of the mode or key in which he was playing, he committed an error in harmony, yet his melody might have been perfect with reſpect to the laws of rhythm and meaſure. We ſhould rather ſay of a modern muſician, in the ſame inſtance, that "he ſung or played wrong notes, or was out of tune, yet kept his time." Whoever made this diſtinction, would have been allowed by the ancients to poſſeſs a good harmonical ear, though the moderns would call it an ear for melody or intonation. We put this familiar inſtance only to make the difference of the definitions more clear."

We ſhould call an inſtrument out of tune inharmonious, though the intervals are nearly right.

By harmony and harmonics, the Greeks implied nothing more than that proportion of ſound to ſound which mathematicians term ratio, or, in common language, muſical tones that ſucceed each other agreeably. As ancient harmony was the ſucceſſion of ſingle ſounds, modern harmony is the ſucceſſion of chords.

Whether the diatonic ſcale was originally the work of nature or art, we ſhall not here attempt to convince our readers: but in Europe, it is now what every infant hears in the nurſery, and afterwards in the church and the ſtreet, ſo conſtantly, that a pſalm-tune or ballad, ſung in ſuch ſtrange ſcales or genera as Mr. Keeble recommends to our ſtudy and revival, would give an uneaſy ſenſation to the moſt ignorant clown in a country village, to whom nature has given a diſcriminating ear. By a great parade of Greek terms and ratios, Mr. Keeble has rendered what good writers had made tolerably plain and intelligible to common ſenſe and common readers, obſcure, repulſive, and unintelligible. All theſe are modern ideas, and indeed the whole book is built on modern principles, with ancient names and technica, all things are taken for granted, and nothing proved by citations from ancient authors.

By the harmonica, the ſubject of the late Mr. Keeble's book, is meant nothing more than the ratio of muſical ſounds, *a la Grec*, as Dr. Smith's harmonics is that of the moderns. Mr. Keeble, among all his boaſts of diſcoveries in ancient muſic, which had eluded all the inquiries and calculations of the greateſt philoſophers and mathematicians, has revealed nothing uſeful to modern muſic, or luminous concerning the ancient. The ſection of the harmonical canon, or diviſion of the monochord, according to Euclid, has ſo often been treated by modern theoriſts, from Galileo's time to the preſent, without improving compoſition or aſſiſting the practical ſtudent upon any inſtrument. As a matter of ſpeculation, and from an ambition of paſſing for men of ſcience, few muſicians write on the elements of their art without a parade of ratios, which they copy out of other books, without being able to judge of their accuracy, or to explain them to their readers. Even the profound Dr. Pepuſch was obliged to get Demoivre and G. Lewis Scot to calculate for him, who laughed at his pretenſions to mathematical knowledge, when he delivered his paper on the genera of the Greeks to the Royal Society. See Vibrations, Sons Harmoniques, Pythagorus, and Euclid.

HARMONIC Elements, or *Concordant Elements*, are the minor third, (3d,) whoſe ratio is $\frac{5}{6}$, $= 161\ \Sigma + 3f + 14\ m$ the major third (IIId) whoſe ratio is $\frac{4}{5}$, $= 197\ \Sigma + 4f + 17\ m$, and the minor fourth (4th), whoſe ratio is $\frac{3}{4}$, $= 254\ \Sigma + 5f + 22\ m$; ſince each one of theſe ſingly is harmonious or concord, and every addition of them in pairs is the ſame as $3d + \mathrm{III} = \mathrm{V}$, the fifth; $3d + 4th = 6th$, the minor ſixth; and $\mathrm{III} + 4th = \mathrm{VI}$, the major ſixth; while the ſum of theſe three elements, or $3d + \mathrm{III} + 4th = \mathrm{VIII}$, the octave, is ſo perfect a concord, that it may be added any number of times to itſelf, or to each of the ſix other concords above named, and ſtill produce concords: and what confirms the character of theſe as the concordant elements is, that there are no other accords of two ſounds which are agreeable to the ear than thoſe produced as above, as will be plain from col 2. of the table in our article CONCORD.

HARMONIC *Genus.* The ancients often gave this title to the genus commonly ſtyled the *Enharmonic Genus.* See ENHARMONIC.

HARMONIC *Sliders*, are a contrivance by Dr. Thomas Young, lecturer at the Royal Inſtitution, and deſcribed in its "Journal," (as alſo in Nicholſon's Journal, 8vo. iv. p. 101), for explaining his ideas of the coaleſcence of ſounds, and the combinations of motion which take place in various caſes of the junction of undulations, as of the tides of the ocean, &c. Theſe harmonic ſliders conſiſt of a great number of ſhort rods of wood, of the ſame breadth and thickneſs, but of different lengths, ſliding eaſily ſide by ſide in a long mortice, in a piece of wood, having a thumb-ſcrew at its end for clamping or fixing all the ſliders faſt, on occaſion: the lengths of the ſeveral ſliders in each of the ſeveral mortice frames, are adapted to the ordinates of ſeveral regular undulating curves, like the figure of ſines almoſt. A number of ſolid pieces of wood are wrought on the top into planes, having ſimilar undulating curves: and by placing the ſliders on theſe curves, and looſening the thumb-ſcrew, ſo that every ſlider may reſt on the curve below, the tops of theſe ſliders form a new curve, exhibiting the ſum of the ordinates of the curves to which the ſliders are cut, and the wood on which they reſt, above the plane of its bottom.

By making the fixed ſurface terminate in a ſeries of ſimilar curves, that bear to thoſe of the ſliding ſurface, the ratio of two muſical ſounds, and ſuch ratio but ſmall: "the phenomenon of the *beating* of an imperfect uniſon in muſic may be imitated, where the joint undulation becomes alternately redoubled and evaneſcent." A figure is given, in which "the proportion is that of 17 to 18, and the curvilinear outline repreſents the progreſs of the joint ſound, from the greateſt degree of intenſity to the leaſt." The ratio here given $\frac{17}{18}$ is equal in Mr. Farey's Notation to $50.46033\,\Sigma + f + 4m$, being but a trifle leſs than the half-tone of the equal temperament ſcale, and therefore as ill adapted to repreſent an imperfect *uniſon*, as the figure alluded to is to convey an idea of a beating uniſon, or, indeed, that of any other conſonance; and we are ſomewhat ſurpriſed, that Mr. John Gough, who ſo ably and ſucceſsfully combated the doctor's theory, of which this is a branch, in this and the preceding volume of Mr. Nicholſon's Journal, did not animadvert on the very extraordinary aſſumptions made in this account of the harmonical ſliders.

HARMONICAL, belonging to harmony, as harmonical diviſions of the monochord, harmonical proportion, harmonical canon, &c.

HARMONICAL *Arithmetic*, is ſo much of the theory and doctrine of numbers as relates to making the compariſons, reductions, &c. of muſical intervals, which are expreſſed by numbers, in order to our finding their mutual relations, compoſitions, and reſolutions.

HARMONICAL *Compoſition*, in its general ſenſe, includes the compoſition both of harmony and melody; *i. e.* of muſic, or ſongs, both in a ſingle part, and in ſeveral parts.

In its more proper and limited ſenſe, harmonical compoſition is reſtrained to that of harmony. In which ſenſe it may be defined, the art of diſpoſing and concerting ſeveral ſingle parts together, in ſuch manner as to make one agreeable whole.

The art of harmony has been long known under the name of *counterpoint.*

At the time when parts were firſt introduced, muſic being then very ſimple, there were no different notes of time; and the parts were in every note made concord.

This they afterwards made *ſimple*, or *plain counterpoint*, to diſtinguiſh it from another kind, then introduced, wherein notes of different value were introduced, and diſcords brought in between the parts.

This they called *figurative counterpoint.*

HARMONICAL *Curve*, a curve, the nature of which will be underſtood from its conſtruction. Let C (*Plate* IX. *Analyſis*, *fig.* 4.) be the common centre of any two circles D F, E G, and C D E, C F G, any two ſemidiameters, and of either of the included arcs, as D F, let F H be the ſine, in which, produced both ways, let the lines H I and H K be ſeverally equal to the other arc E G; then, while the ſemidiameter C F G moves round the centre C, and carries with it the line I F H K, parallel to itſelf, and conſtantly equal to twice the arc E G, the extremities I K will deſcribe a curve, whoſe vertex is D and axis D C, and whoſe baſe A C B is equal to the ſemicircumference of the circle E G.

Cor. 1.—Drawing F L (*fig.* 5.) perpendicular to the baſe A C L, a line K P, perpendicular to the curve at K, will be parallel to E L.

For drawing K N perpendicular to the baſe, let the radius C F G go forwards a little into the place C*fg*, and carry the line K H F I into the place *khfi*, cutting K N in O and F L in *r*. Then ſince $HK = EG$ by the definition, and alſo $hk = Eg$, their difference O*k* is $= Gg$. Now by the ſimilar triangles C L F and F *r f*, C F *f* and C G *g*, O K *k* and N P K, we have $CL : CF :: Fr : Ff$, and $CF : CG :: Ff : Gg$, and *ex æquo* $CL : CG$ or $CE :: (Fr : Gg :: OK : Ok ::)\ NP : NK$; conſequently the right-angled triangles C L E, N P K are equiangular, and the perpendicular K P M is parallel to the line E L.

Cor. 2.—At any point K the radius of curvature $KM : LE :: LE^2 : KN \times CE$. For drawing *fl* parallel to F L, another line *k*M, perpendicular to the curve at *k*, will be parallel to E*l* (by Cor. 1.); conſequently, if the arc K*k* be infinitely diminiſhed, either of the coinciding perpendiculars K M, *k*M will be the radius of the curvature at K. In the line E *l* take $Es = EL$, and joining L*s*, the triangles L E *s* and K M *k*, C E L or C E *l* and *s* L *l*, are ultimately equiangular. Now K N or $FL : LC :: fr : rF$ or K O, and $LC : LE :: PN : PK :: KO : Kk$; and, *ex æquo*, $KN : LE :: fr : Kk$. But $CE : LE :: sL : Ll$ or *fr*, therefore, *componendo*, $KN \times CE : LE^2 :: (sL : Kk ::)\ LE : KM$.

Cor. 3.—Hence if the ratio of the circles C E G, C D F be very great, the curvature at any point K will be extremely ſmall, and its radius $KM : CE :: CE : KN$ very nearly; becauſe the lines L E and C E will be very nearly equal.

Cor. 4.—Upon the ſame ſuppoſition the very ſmall curvatures at any points D, K are very nearly in the ratio of their diſtances D C, K N from the baſe A B. For when C E, and conſequently A B is given, the curvature at K, being reciprocally as its radius K M, is directly as K N (by Cor. 3.).

Cor. 5.—While the greater circle (*fig.* 6.) remains, let the leſſer be diminiſhed, and the curve A K D B will be changed into another A κ δ B of the ſame ſpecies, and every ordinate to the common baſe will be diminiſhed in the ſame ratio, that is, N K : N κ :: C D : C δ. For while any arc E G (*fig.* 5.) equal to H K or C N is given in magnitude, let the other radius C D or C F be diminiſhed, and becauſe the triangle C F H retains its ſpecies, the line C H or N K is diminiſhed in the ſame ratio with C F or C D.

Cor 6.—When the axes C D, C δ (*fig.* 6.) of two curves are very ſmall in compariſon to their common baſe A B, the curvatures at the tops of any two coincident ordinates N K, N κ are in the ratio of the ordinates. For if κ μ be the radius of curvature at κ, by Cor. 3. we have K M × K N = C E = κ μ × κ N; whence κ N : K N :: K M : κ μ, that is, as the curvature at κ to the curvature at K.

C.r. 7.—Hence, ſuppoſing the curve A K D B to have the elaſticity and tenſion of a muſical chord (ſee Chord), it will vibrate to and fro in curves very nearly of the ſame ſpecies with the given curve A K D B, provided none of the vibrations be too large.

For let the firſt effort of the tenſion reduce that curve into ſome other, as A κ δ B, in the firſt moment of time; and ſince the ordinates D C, K N are in proportion as the curvatures at D and K by Cor. 4, and thoſe curvatures as the accelerating forces at D and K, acting in the directions D C, K M or K N very nearly, and theſe forces as the velocities generated by them in that time, and the velocities as the naſcent ſpaces D δ, K κ; we have, *alternando*, D C : D δ :: K N : K κ, and, *dividendo*, D C : δ C :: K N : κ N. Conſequently by Cor. 5, the curve A κ δ B is very nearly of the ſame ſpecies with A K D B. And in the next moment it will be changed into another of the ſame ſpecies, and ſo on till every point of the chord be reduced to the baſe A B at the ſame inſtant. And by the motion here acquired it will be carried towards the oppoſite ſide of the baſe, till by the oppoſition of the tenſion it ſhall loſe all its motion by the ſame degrees, and in the ſame curves, by which it was acquired; and thus the chord will continually vibrate in curves of the ſame ſpecies as the firſt, neglecting the ſmall differeece in the directions K N, K M, and the reſiſtance of the air.

Cor. 8.—The ſmall vibrations of a given muſical chord are iſochronous. For if the chord at the limit of its vibrations aſſumes the form of the harmonical curve, it will vibrate to and fro in curves of that ſpecies by Cor. 7, and its ſeveral particles being accelerated by forces conſtantly proportional to their diſtances from the baſe A B, will deſcribe thoſe unequal diſtances in equal times, like a pendulum moving in a cycloid. See Chord.

If the chord at the limit of its vibration aſſumes any other form, it will cut an harmonical curve, equal in length to it, in one or more points, as A, K, L, B, (*fig.* 7.); and the intercepted parts of the chord will be more or leſs incurvated towards A B, than the correſponding parts of the curve, according as they fall without or within them; and will accordingly be accelerated by greater or ſmaller forces than thoſe of the correſponding parts of the curve: therefore, ſuppoſing the chord and curve to differ in nothing but their curvatures, the difference of the curvatures of the correſponding parts will be continually diminiſhed by the difference of their forces, till the parts coincide either before, or when they arrive at the baſe A B. And thus the time of the ſeveral vibrations of the chord will be the ſame as thoſe of the curve; and therefore equal to one another.

Cor. 9.—The figure, contained under the harmonical curve and its baſe, is of the ſame ſpecies as the figure of ſines. (See Sine.) For ſuppoſing the circle D F Q (*fig.* 5) to grow bigger, till it becomes equal to E G R, the figure A K D B will become a figure of ſines. Becauſe any ordinate K N to the abſciſs A N, or arc G R, being conſtantly equal to F L, will then be equal to the ſine of the arc G R; and thus every ordinate, as K N, is increaſed in the given ratio of C F to C G, or C D to C E. And, on the contrary, the ſeveral ordinates in the ſaid figure of ſines, diminiſhed in that conſtant ratio of C E to C D, are the ordinates in the figure A K D B of the harmonical curve. Hence it appears, that, as the ordinates are diminiſhed in a conſtant proportion, their increments and fluxions are diminiſhed in the ſame proportion, the fluxion of the baſe remaining conſtant.

Cor. 10.—The radius of curvature at the vertex of the harmonical curve, is to that of the figure of ſines, on the ſame baſe, as the greateſt ordinate of the figure of ſines to that of the harmonical curve. For taking any equal evaneſcent portions of the vertical tangents, the radii will be inverſely as the ſagittæ, which are ſimilar portions of the correſponding ordinates; and are therefore to each other in the ratio of thoſe ordinates.

Cor. 11.—The figure, of which the ordinates are the ſums of the correſponding ordinates of any two harmonical curves, on equal baſes, but croſſing the abſciſs at different points, is alſo an harmonical curve. The abſciſs of the one curve being x, that of the other will be $a + x$, and the ordinates will be b . (ſin. x) and c . (ſin. $a + x$); now ſin. $a + x$ = (coſ. x) . (ſin. a) + (coſ. a) . (ſin. x), and the joint ordinate will be ($b + c$.) (coſ. a) . (ſin. x) + c . (ſin. a) . (coſ. x); if, therefore, d be the angle, of which the tangent is $\frac{c\,.\,(\text{ſin.}\,a)}{b + c\,.\,(\text{coſ.}\,a)}$, its ſine and coſine will be in the ratio of c . (ſin. a) to $b + c$ (coſ. a), and (coſ. d) . (ſin. x) + (ſin. d) . (coſ. x), will be to the ordinate in the conſtant ratio of ſin. d to c . (ſin. a); but (coſ. d) . (ſin. x) + (ſin. d) . (coſ. x) is the ſine of $d + x$: conſequently the newly formed figure is an harmonical curve.

The ſame may be ſhewn geometrically, by placing two circles, having their diameters equal to the greateſt ordinates of the ſeparate curves, ſo as to interſect each other in an angle equal to twice the angular diſtance of the origin of the curves (ſee *fig.* 8): then a right line revolving round their interſection with an equable velocity, will have ſegments cut off by each circle, equal to the correſponding ordinate; and the ſum or difference of the ſegments will be the joint ordinates; and if a circle be deſcribed through the point of interſection, touching the common chord of the two circles, and having its radius equal to the diſtance of their centres, this circle will always cut off in the revolving line a portion equal to the ordinate. For if A B be made parallel to C D, and E B to F G, ∠ A B E = C G F = C H F; but E I B is a right angle as well as H C F, and E I : I B :: F C : C H :: A E : C H, ſince A F is equal to twice the diſtance of the centres, which biſect A H and F H, and therefore to C E, and F C = A E, or E I : A E :: I B : C H; but E I : A E :: I D : A C, therefore I B : C H :: I D : A C, and the triangles A C H, D I B are ſimilar, and ∠ D B I = C H A = D K A, and A D is a parallelogram, conſequently K D = A B = C G.

If the circle C G be ſuppoſed to revolve round C, the interſection H will always ſhew the angular diſtance of the point in which the curve croſſes the axis; and the diſtance of the centres will be equal to the greateſt ordinate. If, therefore, the circles are equal, the greateſt ordinate will alſo vary as the chord of an arc increaſing equally, or as the ordinate of the harmonical curve. Smith's Harmonics. Sect. XI. Young's Natural Philoſophy, &c. vol. ii. p. 25, &c.

HARMONICAL *Interval*. See INTERVAL.

HARMONICAL *Proportion*. See *Harmonical* PROPORTION.

HARMONICAL *Series*, is a ſeries of many numbers in continual harmonical proportion.

If there be four or more numbers, whereof every three immediate terms are harmonical, the whole makes an harmonical ſeries, of continual harmonical proportionals; as, 30 : 20 : 15 : 12 : 10.

Or if every four immediately next each other are harmonical, it is alſo a continual harmonical ſeries, but of another ſpecies ; as, 3, 4, 6, 9, 18, 36, &c.

HARMONICAL *Sounds*, or *Sons Harmoniques*. See SON and SOUND.

HARMONICS. All the concomitant or acceſſary *ſounds*, which, on the principle of reſonance, accompany every ſingle ſound, and render it perceptible, are thus called. And thus all the aliquot parts of a ſtring produce harmonics. This ſubſtantive is maſculine when *ſound* is underſtood ; and feminine when the word chord, or ſtring, is in queſtion.

HARMONICS, *Experiments in*. See NOTE FLUTEE. The effects of different tunings, beats of uniſons and octaves on the violin, all the ſtrings ſtruck at once on the guitar, and monochord tuned and divided harmonically, ſeem a uniſon, like a ſingle key on the full organ.

The term Harmonics generally implies the theory of ſound; the diviſion of the monochord into harmonic intervals, by menſuration, or ratios, including concords, diſcords, and temperament.

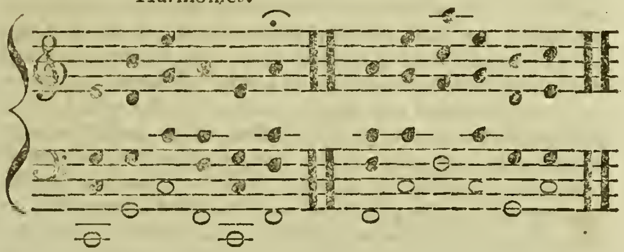
But the harmonics of which we have now to ſpeak, are the ſounds generated by a ſingle grave tone, either of a great bell, or ſtring of an inſtrument. Small bells and ſtrings have doubtleſs their harmonics ; but they are too acute for our perception and appreciation.

It is now well known, that any ſingle deep muſical tone, ſuch as the 3d or 4th ſtring of a violoncello, ſoon after it is cauſed to ſound, produces, beſides the tone of the whole ſtring, its octave, 12th, 15th, 17th, 19th, and faintly, the 21ſt, which, by contraction, for the convenience of our hands on keyed-inſtruments, we form into a common chord, or 3d, 5th, and 8th, the moſt pleaſing combination of muſical ſounds in our ſyſtem of harmony. By nice obſervation it was diſcovered in the 17th century, by Galileo, that a ſtring, when cauſed to vibrate by a quill, a hammer, or a bow, divided itſelf into all the above proportions, by a kind of magic knots or bridges : that half the ſtring produced the octave of the whole ; the 3d part of the ſtring, the 5th of the octave ; the 4th part, the double octave of the whole ; the 5th part, the 17th, or major 3d to the double octave ; the 6th part, the double octave of the 5th, or minor 3d to the 17th, or major 3d ; the 7th part of the ſtring, when we hear it ſound, is the flat 7th to the double octave of the whole ſtring. Mathematicians expreſs theſe proportions by ratios, thus : acute, $\frac{1}{1}$, $\frac{2}{1}$, $\frac{3}{2}$, $\frac{4}{3}$, $\frac{5}{4}$, $\frac{6}{5}$: grave, $\frac{1}{1}$, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, $\frac{5}{6}$.

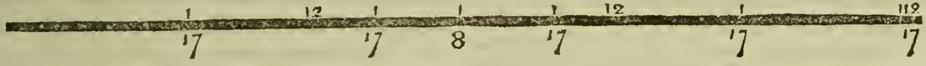
And by theſe figures are expreſſed, not only the ſeveral diviſions of the ſtring, or monochord into harmonical proportions, but the proportional number of vibrations which each of theſe ſeveral conſonances makes, compared with the reſt.

If we produce a deep tone from a great bell, or the 4th ſtring of a violoncello, we hear, beſides the principal ſound and its octave, two other very acute ſounds, one of which is the 12th above the principal, or octave of the 5th, and the other the major 17th, or double octave of the ſharp 3d. The principal ſound is called the generator, and the two other ſounds which it engenders, its harmonics, including the octave. See GENERATOR.

Harmonics.



Another, and perhaps a clearer way of ſhewing how a ſtring divides itſelf into its *harmonics*, is by repreſenting the whole ſtring, and indicating the proportions which produce them.

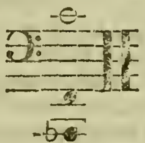
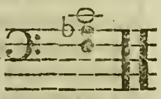


Divide a ſtring into half, and it will produce two octaves of the whole.

Divide it into three parts, and it will produce three 12ths of the whole, or three 5ths of the octave.

Divide it into four parts, and each will be a double octave, or 15th of the whole.

Divide it into five parts, and each will be a *tierce* to the 15th, or a major 17th to the whole.

Rameau, who has built his ſyſtem of *la Baſſe Fondamentale* upon theſe harmonics, has no other natural foundation for the *minor mode* than reverſing the ſounds produced above a given generator, and ſeeking below it what indications he could find in nature for a chord with a flat 3d ; and he diſcovered that the 12th and 17th major below a given ſound, below C for inſtance, though they did not ſound, like the harmonics above a grave tone, vibrated very viſibly, and divided themſelves by a kind of undulation, one into three, and the other into five equal parts ; whence he drew this concluſion, that theſe vibrating *ſilent* ſtrings pointed out the chord minor of F, thus :  which ſounds approximated, would form the following chord 

Though d'Alembert ſeemed ſatisfied with this origin of the minor mode, when he publiſhed the firſt edition of his " Elements," mathematicians were offended at the author, Rameau, qualifying a tract in explanation of his ſyſtem, " Demonſtration du Principe de l'Harmonie," and the great geometrician, Daniel Bernouilli, attacked d'Alembert himſelf, in the Memoires de l'Academie de Berlin, in 1753, on the ſubject. See BASSE FONDAMENTALE. See alſo the next articles.

HARMONICS, *Acute,* are the ſhrill, high, or very acute ſounds which, like the grave harmonics of two ſounds deſcribed below, are obſerved to accompany a ſingle deep or grave note, in moſt inſtances; particularly in bells, ſome of which give their harmonics, particularly the XIIth, almoſt as ſtrong as the fundamental; and by attending more carefully to the thing, if one of the beſt ſounding ſtrings of the baſe of a piano-forte be ſtruck, we can hear the XIIth very plainly, as the ſound is dying away, and the XVIIth is the laſt ſound that dies away on the ears. Daniel Bernouilli ſeems to have been the firſt perſon who diſcovered the cauſe of the acute harmonics, to which he was led, from contemplating and extending the application of the harmonic curve diſcovered by Dr. Taylor, *viz.* that a muſical ſtring, or the elaſtic column of air in a pipe, at the ſame time that its whole length is vibrating to the fundamental, is capable and diſpoſed to have its two halves, each forming ſubordinate vibrations to the octave, its three aliquot parts, each to vibrate to the main twelfth, its quarters to the double octave, its five aliquot parts each to the major ſeventeenth, &c.: but for want of a proper apparatus, Bernouilli was unable to produce theſe acute harmonics experimentally. The late Dr. Robinſon, being poſſeſſed of a curious wheel monochord, made by the ingenious Mr. Watt about the year 1765, which inſtrument we have already mentioned in our article CONCORD, in experimenting upon it, ſome years afterwards, found that when the ſtring was kept in a ſtate of ſimple vibration, by a very uniform and gentle motion of the wheel, if its middle point was then gently touched with a quill, this point immediately ſtopped, but the ſtring continued to vibrate in two parts, ſounding the octave. And this it continued to do, however ſtrong the vibrations were rendered afterwards, by increaſing the preſſure and velocity of the wheel. The ſame thing happened if the ſtring was gently touched at one third. It inſtantly divided itſelf into three parts, with two nodes, and ſounded the twelfth. In the ſame manner, the double octave and ſeventeenth, and all other harmonics were produced and maintained. But the pretticſt experiment was, to put ſomething ſoft, ſuch as a lock of cotton, in the way of the wide vibrations of the chord, at one-third and two-thirds of its length, ſo as to diſturb them when they became wide. When this was done, the ſtring inſtantly put on the appearance of a figure of 8, performing at once the full vibrations competent to its whole length, and the three ſubordinate vibrations correſponding to one-third of its length, and ſounding the fundamental and the XIIth, with equal ſtrength. In this manner, all the different accompaniments were produced at pleaſure, and could be continued, even with ſtrong ſounds. And it was amuſing to obſerve, when the wheel was ſtrongly preſſed to the ſtring, and the motion violent, the nodes would form themſelves on various parts of the ſtring, running from one part to another. This was always accompanied with all the jarring ſounds which correſponded to them. When the ſtring was making very gentle, ſimple vibrations, and the wheel hardly touching it, if a violoncello was made to ſound the XIIth very ſtrongly in its neighbourhood, the ſtring inſtantly divided itſelf, and vibrated in uniſon, frequently retaining its ſimple vibration and fundamental tone. We recommend this experiment to every perſon who wiſhes to make himſelf well acquainted with the mechaniſm of muſical ſounds. He will ſee, in a moſt ſenſible and convincing manner, how a ſingle ſtring of the Æolian harp gives us all the changes of harmony, ſliding from one ſound to another, according as it is affected in its different parts by an irregular breeze of wind."

Mr. John Hawkins, the inventor of the FINGER-KEYED *Viol,* ſee that article, and whoſe experiment on the concert-pitch is related in that article, during the continuance of his mechanical exhibition ſhewed to his viſitors, a delightful and ocular exhibition of the acute harmonics of a ſtring, as Dr. Robinſon had produced them to the ear, as above quoted. Mr. H.'s apparatus conſiſted merely of a braſs wire 15 or 16 feet long, ſpirally curled through its whole length, (as is done by the baſe ſtrings in his patent piano-fortes, for rendering the inſtrument portable), and ſtretched over two bridges near its two ends, againſt the wainſcot of the room, on which was a ſcale, dividing the ſpace between the bridges into aliquot parts, as $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, &c. through its whole length. The ſtring, thus prepared, was laid hold of by the thumb and finger in the middle, and drawn about two inches out of its quieſcent poſition, and let go, then the tip of the finger, or the feather of a quill being dexterouſly applied, to check the extreme vibrations oppoſite to any one of the aliquot diviſions, the ſtring immediately began to vibrate in ſo many ſeparate parts, without deſtroying the total vibration, which ſtill continued, and ſupported its ſubordinate vibrations for a minute or more, in a manner highly gratifying to the eye, as the vibrations were ſlow enough to be readily counted and compared with each other.

HARMONICS, *Grave,* are deep, low, or very grave ſounds, which, like the acute of a ſingle ſtring above deſcribed, are obſerved to accompany the accordance of two ſounding ſtrings, or pipes, &c. Theſe have two different origins, *viz.* in perfect conſonances, or ſuch wherein the exact ratio of the length of the ſounding ſtring, or numbers of vibrations in a given time can be expreſſed in ſmall numbers; the coincidence of theſe vibrations or pulſes of the ſound occaſion periodical reinforcements of the ſound, which, when they occur oftener than twelve times in a ſecond, affect the ear as independent grave ſounds. In the other caſe of imperfect conſonances, or tempered concords, where the ratios are ſurd, or the numbers expreſſing them very large, the ſmall cycles of pulſes, occaſion, by the periods of their greateſt imperfections, the phenomena called BEATS (ſee that article): if ſuch beats are quicker than twelve in a ſecond, they occaſion a like ſenſation of GRAVE *Harmonic,* which have been fully treated of under that article.

Mr. Holden, in his "Eſſay," p. 300, denominates the grave harmonics, dependents of the conſonance whence they reſult.

HARMONICUS, CANON. See MONOCHORD.

HARMONIDES, in *Biography,* a young flute-player, and ſcholar of Timotheus, who, at the Olympic games, if Lucian may be credited, who relates with the appearance of great gravity, at his firſt public performance, in order to aſtoniſh his hearers, began his ſolo with ſo violent a blaſt, that he breathed his laſt breath into his flute, and died upon the ſpot.

This account is ſo extraordinary, that it ſeems to require the teſtimony of the author's own words: εναπεπνευσε τῳ, αυλῳ, *breathed his laſt breath into the flute;* and εν τῃ σκηνῃ απεθανε, he died *upon the ſtage.*

HARMONIE DIRECTE, *Fr.* in *Muſic,* is that harmony in which the baſe is fundamental, and in which the upper parts preſerve a regular order with the baſe. *Harmonie renverſée,* or inverted harmony, is that in which one of the treble parts is made the baſe, which happens in the chord of the 6th and $^6_4$. See DIRECT and INVERTED.

HARMONIST, a muſician learned in harmony. He is a good *harmoniſt*. "Durante," ſays Rouſſeau, "was the greateſt *maſter of harmony* in Italy, that is, in the whole world;" but there are ſome who do not ſubſcribe implicitly to this aſſertion: and regard Leo and Jomelli to be equally profound, and much more *pleaſing harmoniſts*, than Durante: whoſe almoſt only works that are highly prized in Italy, and which have been heard of elſewhere, are his *duets*, formed from the cantatas of his maſter Aleſſandro Scarlatti, which are claſſical and ſtandard ſtudies for the greateſt ſingers.

HARMONOMETRE, an inſtrument calculated to meaſure the relative harmonies. If we could obſerve and follow with the eye and the ear the undulations, the *magic* knots, as d'Alembert calls them, and all the diviſions of a ſtring during its vibration, we ſhould have a natural and very accurate harmonometre; but our ſenſes being too groſs for ſuch nice obſervations, their deficiencies are ſupplied by a monochord, which we divide at our pleaſure, by moveable bridges, that conſtitute the beſt harmonometre hitherto found. See MONOCHORD.

HARMONY. The late citizen of Geneva, Rouſſeau, having treated the ſubject of this article, in his Muſical Dictionary, more amply and intelligently than any other author in the French language, we ſhall try to transfuſe into our tongue the chief of his ingenious remarks.

"The ſenſe which the Greeks gave to the word harmony in their muſic, is the more difficult to determine, from its being originally a proper name (Harmonia, wife of Cadmus), and having no roots whence it may be decompounded, in order to extract an etymology. (See the ancient treatiſes which remain.) Harmony ſeems to imply the agreeable ſucceſſion of ſounds, with reſpect to acute and grave, in oppoſition to *rhythm* and *metre*, which concern time and meaſure. This leaves the word harmony ſo vague and indeterminate, that it is impoſſible to fix its precise meaning, but by a particular ſtudy of all the ſeveral parts of the art into which ancient muſic was divided," theſe were *ſounds*, *intervals*, *ſyſtems*, *genera*, *modes*, *mutations*, and *melopoëia*, or the compoſition of *melody*, which only comprehend what was denominated harmonics, or the ſcience of muſic, ſtrictly ſo called; but to theſe were added five other requiſites, no leſs eſſential for a muſician to know, than the preceding ſeven: and theſe were *rhythm*, or the regulation of cadences in all kinds of movement; *metre*, or the meaſure of verſes; *organic*, or the inſtrumental art; *hypocritic*, or *geſture*; and even to theſe diviſions, Ariſtides Quintilianus, and ſome others, add *odicum*, or the art of ſinging," and "ſtill (adds Rouſſeau) harmony will be very difficult to diſtinguiſh from melody.

"We ſee by a paſſage from Nichomachus, and by others, that ſometimes the name of harmony was given to conſonance in the octave, and to concerts of voices and inſtruments formed of uniſons and octaves, which were generally termed *antiphons*.

"Harmony, according to the moderns, is a ſucceſſion of chords agreeable to the rules of modulation. This harmony for a long time had no other principles than laws almoſt arbitrary, founded on the judgment of practiſed ears, which determined what were good or bad ſucceſſions of concords, but which, at length, were reduced to calculation. However, Père Merſenne, and M. Sauveur, having diſcovered that every ſound, though ſeemingly ſingle, was accompanied by two other more feeble ſounds, which formed, with the principal, the perfect chord major, M. Rameau, upon the baſis of this experiment, has built an harmonical ſyſtem, with which he has filled many obſcure books, and theſe M. d'Alembert at length took the trouble to explain to the public."

Here we muſt ſtop to correct a miſtake of this lively writer: it was neither Père Merſenne, nor M. Sauveur, who diſcovered the *ſons harmoniques*, or harmonics of the 12th and major 17th, which accompany every muſical ſound, but Galileo Galilei. See his article, and *Baſſe* FONDAMENTALE.

And M. d'Alembert in the 2d edit. of his "Elements of Muſic, on the Principles of Rameau," diſputes his origin of the minor mode, and denies that any part of his ſyſtem will admit of demonſtration.

"Tartini, ſetting off from another experiment, more novel, more delicate, and not leſs certain, arrived at ſimilar concluſions, by a very different road. Rameau made the baſe produce the treble; Tartini made the treble generate the baſe. The latter derives *harmony* from melody, the former the contrary. To determine from which of theſe two ſchools the beſt works are likely to proceed, we have only to conſider which ought to be ſubordinate to the other, the melody or the accompaniment." See SYSTEM, HARMONICS, FUNDAMENTAL BASE, TERZA SUONA, COUNTERPOINT, and COMPOSITION.

Of all the paradoxes of this eloquent and powerful writer, none will ſurpriſe muſicians more than the following, with which he cloſes the preſent article in his Muſical Dictionary.

"When we reflect, that of all the inhabitants of the earth, who have muſic, the Europeans alone are fond of harmony, and delighted with different parts, moving at the ſame time; when we remember how many ages the world has endured, without any one nation that has cultivated the fine arts, in any of the other three quarters of the globe, diſcovering this harmony; that no animal, no bird, no being in nature, produces any other conſonance than uniſon, nor other muſic than melody; that the oriental languages, ſo ſonorous, ſo muſical; that the ears of the Greeks, ſo acute, delicate, and exerciſed with ſo much art, have never guided this voluptuous and impaſſioned people towards our harmony; that without it their muſic has produced ſuch prodigious effects; that with it, thoſe of our muſic are ſo feeble; and, laſtly, that it ſhould be reſerved for people of the north, whoſe organs are groſs and obtuſe, to be more touched with the clangor and noiſe of warring ſounds, than with the ſweet accents, and melody of inflections, to make this great diſcovery, and to eſtabliſh it as a principle in all the rules of the art; when, I ſay, we reflect on all theſe circumſtances, it is very difficult to avoid ſuſpecting, that all our harmony is but a Gothic and barbarous invention, which would never have occurred to us, if we had been more ſenſible to the true beauties of the art, and to muſic truly natural.

"Rameau, however, pretends, that harmony is the ſource of the greateſt beauties in muſic; but this ſentiment is confuted by facts and reaſon. By facts, from all the great effects of muſic having ceaſed, and that it has loſt its force and energy, ſince the invention of counter-point; to which I muſt add, that the beauties of what is called fine harmony, are thoſe of learning, and often of pedantry, which only tranſport perſons deep in the myſteries of the ſcience; whereas the true beauties of muſic being thoſe of nature, are, and ought to be, equally felt by all men, learned and ignorant. By reaſon, ſince harmony furniſhes no principle of imitation, by which muſic awakening images, or expreſſing ſentiments, can mount up to the drama, which is the moſt noble, and the only energetic part of the art: all that depended on ſimple, natural ſounds, being much circumſcribed in the pleaſure they afford, and having very little power over the human heart."

We ſhall leave the excluſive admirers of melody and harmony to fight it out, and declare that we never wiſh to hear melody without harmony, or harmony without melody. Whenever theſe two ſiſters quarrel, and ſet up different intereſts, they mutually injure each other, and diſpleaſe their beſt friends.

Iſidore's definition of harmony is a proof that, with the ancients, it only implied *melody*. "Prima diviſio muſicæ quæ harmonica dicitur, id eſt, modulatio vocis—non vocum."

HARMONY, *figurative*, in oppoſition to the harmony of common chords, or note againſt note, otherwiſe called *plain counterpoint*. It had its title of *figurative* after the invention of the time-table, when different figures or notes were uſed from thoſe of canto-fermo, commonly called Gregorian. See GREGORIAN and FIGURATIVE.

HARMONY, *Perfect*, of *Maxwell*, is a ſyſtem of muſical ſounds, 44 within the octave, invented by Mr. Maxwell of Broomholme in Scotland, the application of which, to the violin and other bowed inſtruments, is fully explained in his "Eſſay on Tune," printed at Edinburgh in 1781, and wherein ſome hints are given towards its application to the organ, of which, unfortunately, no muſical mechanic has yet availed himſelf, and effected, on this noble inſtrument, the grand *deſideratum* of inſtrumental muſic, whereby a correct concert of voices, or perfect inſtruments, wherein every concord throughout the piece ſhall be perfect, and without temperament, or beats, may be certainly and correctly imitated. See MAXWELL's *Scale of Intervals*.

HARMONY, *Equal*, of Dr. *Smith*, comprehends ſyſtems of muſical intervals, inveſtigated by this author in his "Harmonies;" the principles of which are, that every concord therein ſhall be equally, and the moſt harmonious, that the unalterable nature of the ſcale will admit, according to the compaſs or extent of it; thus, for the compaſs of one octave, Dr. Smith calculates (p. 153. 2d edit.) that the major thirds muſt all be flattened $\frac{1}{9}$'th of a major comma, or 1.3455 Σ: for the compaſs of two octaves, the IIIds muſt be flattened $\frac{1}{8}c$, = 1.3670 Σ: for the compaſs of three octaves, the temperament muſt be III $-\frac{1}{9}c$, or 1 2231 Σ: and for the compaſs of four octaves (p. 140, note.) III $-\frac{1}{11}c$, or more nearly, the temperament is 1.0865 Σ. For ſeveral reaſons, Dr. Smith preferred the ſyſtem of equal harmony in three octaves, and ſhews (p. 156.) that the ſame approaches indefinitely near to a commenſurate ſyſtem of 50 equal parts in the octave, without, however, any where mentioning, that this is the ſyſtem of Mr. Henſling (Hiſt. de l'Acad. 1711, 16mo. p. 406.), as obſerved by Mr. Farey, in the Philoſophical Magazine, vol. 36. p. 49; by whoſe theorems, p. 41, or corollaries, p. 374, of the ſame volume, all the temperaments in either of the above ſyſtems can readily be calculated, and the ſeveral wolves alſo, which will ariſe in applying the ſame to the common inſtrument with only 12 notes in the octave, or even to Dr. Smith's own improved harpſichord, whenever modulation is made, ſo far as to require double flats, or double ſharps; but which can now be uſed, even on the organ, as well as the piano-forte, without any wolves, as far as two double ſharps and one double flat; on the patent inſtruments of M. Loeſchman of Newman-ſtreet, whoſe organs in particular far exceed any thing hitherto effected in muſical inſtruments. The above ſyſtems, by Dr. Smith, are all for equalizing the harmony of the ſeveral *concords*, with reſpect to each other: a different object is aimed at by ſome theoriſts and tuners, *viz.* making all the twelve ſeveral keys equally harmonious, with reſpect to each other, and conſequently equally tempered, which is the EQUAL *temperament*, or ISOTONIC *ſyſtem*, (which ſee,) but this ought not to be called equal harmony, as Mr. Emerſon, and ſome other writers, have done.

HARMONY, *Temperaments of*, are applied to the temperaments of the intervals, in common keyed inſtruments, or imperfect inſtruments, where the ſame temperaments neceſſarily apply alſo to the *melody*, or leaps from one note to another: but in a paper by Mr. Farey, in the Philoſophical Magazine, vol. 27. p. 206 and 314, it is ſhewn, that good performers on perfect inſtruments, and correct ſingers, make no temperaments in the harmony, but throw the ſame entirely into the melody or leaps, ſo as to produce every chord or conſonance of notes heard together *perfect* throughout their performance, at leaſt, they can do ſo, if ſkilful and ſufficiently careful; and it is truly aſſerted, that they never attemper their harmony by deſign, as a tuner of imperfect inſtruments is forced to do, and hence the vaſt importance of the inſtruments for yielding perfect harmony, on the theory and conſtruction of which Mr. Maxwell has ſo ably exerted himſelf; ſee his "Eſſay on Tune."

HARMONY is ſometimes alſo uſed, in a laxer ſenſe, to denote an agreement, ſuitableneſs, union, conformity, &c. In muſic we ſometimes apply it to a ſingle voice, when ſonorous, clear, and ſoft; or to a ſingle inſtrument, when it yields a very agreeable ſound. Thus we ſay, the harmony of her voice, of his lute, &c.

In *Matters of Learning*, we uſe harmony for a certain agreement between the ſeveral parts of the diſcourſe, which renders the reading thereof agreeable. In this ſenſe we ſay, harmonious periods, &c.

In *Architecture*, harmony denotes an agreeable relation between the parts of a building. See SYMMETRY.

In *Painting*, they ſpeak of a harmony, both in the ordonnance and compoſition, and in the colours of a picture. In the ordonnance it ſignifies the union or connection between the figures, with reſpect to the ſubject of the piece. In the colouring it denotes the union or agreeable mixture of different colours. (See COLOURING.) M. De la Chambre derives the harmony of colours from the ſame proportions as the harmony of ſounds. This he inſiſts on at large, in his treatiſe of the Colours of the Rainbow. On this principle, he lays down green as the moſt agreeable of colours, correſponding to the octave in muſic; red, to a fifth; yellow, to a fourth, &c. See HARMONY, in *Painting*.

The term *harmony* is frequently uſed metaphorically for various things which have no connection with ſound or practical muſic; as the harmony of colours in painting; the harmony of numbers in poetry; harmony in the ſeveral offices, departments, and orders of a ſtate; harmony in a family.

HARMONY, or *Evangelical Harmony*, is alſo a title of divers books, compoſed to ſhew the uniformity and agreement of the accounts given by the four evangeliſts, by reducing them to the order of time in which the events recorded really happened.

The firſt attempt of this kind is attributed to Tatian or Theophilus of Antioch, under the title of Diateſſaron, or *of the four*, in the ſecond century. After his example, divers other harmonies have been compoſed by Ammonius of Alexandria, about the year 220, Euſebius of Cæſarea, about 315, Oſiander, Janſenius biſhop of Ghent, Mr. Toinard, Mr. Whiſton, Lamy, Le Clerc, Doddridge, Macknight, Pilkington, Prieſtley, Newcome, &c. Theſe ſeveral harmonizers have entertained very different opinions with regard to the period of our Lord's public miniſtry, which have neceſſarily occaſioned a correſponding diverſity in the diſpoſition

tion of their reſpective harmonies. Dr. Prieſtley, in a work of this kind, publiſhed in 1777, has adopted the opinion propoſed by Mr. Mann, in his Diſſertations on the Times of the Birth and Death of Chriſt, and ſtrenuouſly maintained, that he preached no longer than one year, or one year and a few months. This opinion is, undoubtedly, very ancient: it was the opinion of Origen, and alſo of Clemens Alexandrinus: Irenæus and Tertullian aſcribe the ſame opinion to the Valentinians. See Origen. De Princip. lib. iv. § 5. apud Oper. tom. i. p. 160. ed. Benedict. Clem. Alex. Strom. lib. i. p. 340. ed. Sylb. vel. apud Oper. tom. i. p. 407. ed. Oxon. Iren. lib. i. cap. 3. num. 3. Tertull. lib. Adverſus Judæos, cap. 18.

However it has been objected by others, and particularly by biſhop Newcome, in his Harmony of the Goſpels, publiſhed in 1778, that this period of one year is much too ſhort for the ſeveral journies of our Saviour in Galilee, and the tranſactions connected with them; and he has offered ſeveral arguments to prove the more common opinion, firſt advanced by Euſebius, *viz.* that our Lord's miniſtry continued three years and a half, and included in that ſpace of time four paſſovers. Sir Iſaac Newton is of opinion, that our Lord's miniſtry included five paſſovers; the firſt of which happened A. D. 30; the ſecond A. D. 31; the third A. D. 32; the fourth A. D. 33; the fifth on Friday, April 23, A. D. 34; anſwering to the 4747th year of the Julian period. See his Obſervations on Prophecy, book i. chap. xi. p. 144.—168.

Harmony *of the ſpheres*, or *celeſtial harmony*, is a ſort of muſic much ſpoken of by many of the philoſophers and fathers; ſuppoſed to be produced by the regular ſweetly-tuned motions of the ſtars and planets.

Plato, Philo Judæus, St. Auguſtine, St. Ambroſe, St. Iſidore, Boethius, and many others, are ſtrongly poſſeſſed with the opinion of this harmony, which they attribute to the various proportionate impreſſions of the heavenly globes upon one another, which, acting under proper intervals, form a harmony. It is impoſſible, according to them, that ſuch ſpacious bodies, moving with ſo much rapidity, ſhould be ſilent; on the contrary, the atmoſphere, continually impelled by them, muſt yield a ſet of ſounds proportionate to the impulſions it receives: conſequently, as they do not all run the ſame circuit, nor with one and the ſame velocity, the different tones ariſing from the diverſity of motions, directed by the hand of the Almighty, muſt form an admirable ſymphony or concert. St. Irenæus, St. Baſil, and St. Epiphanius, &c., have appeared againſt the notion.

Pythagoras is ſuppoſed to have had a view to the gravitation of celeſtial bodies, in what he taught concerning the harmony of the ſpheres.

A muſical chord gives the ſame notes as one double in length, when the tenſion or force with which the latter is ſtretched is quadruple; and the gravity of a planet is quadruple of the gravity of a planet at a double diſtance. In general, that any muſical chord may become uniſon to a leſſer chord of the ſame kind, its tenſion muſt be increaſed in the ſame proportion as the ſquare of its length is greater; and that the gravity of a planet may become equal to the gravity of another planet nearer the ſun, it muſt be increaſed in proportion as the ſquare of its diſtance from the ſun is greater. If, therefore, we ſhould ſuppoſe muſical chords to extend from the ſun to each planet, that all theſe chords might become uniſon, it would be requiſite to increaſe or diminiſh their tenſions in the ſame proportions as would be ſufficient to render the gravities of the planets equal; and from the ſimilitude of thoſe proportions, the celebrated doctrine of the harmony of the ſpheres is ſuppoſed to have been derived. Plin. lib. ii. cap. 22. Macrob. in Somn. Scip. lib. ii. cap. 1. Plutarch de Animal. Procreatione, è Timæo. See Maclaurin's View of Newton's Diſcov. book i. chap. ii. p. 32. ed. 4to. See Gravity.

Harmony, *pre-eſtabliſhed*, a celebrated ſyſtem of M. Leibnitz, by means whereof he accounts for the union or communication between the ſoul and body.

The philoſophers had univerſally held, that the ſoul and body act really and phyſically on each other. Des Cartes firſt appeared, and ſhewed that the heterogeneity of their nature did not allow of ſuch real union; and that they could only have an apparent one, whereof God is the mediator.

M. Leibnitz, unſatisfied with either of theſe hypotheſes, eſtabliſhes a third. A ſoul or ſpirit, he obſerves, is to have a certain ſeries of thoughts, deſires, and wills: a body, which is only a machine, is to have a certain ſeries of motions, to be determined by the combination of its mechanical diſpoſition with the impreſſions of external objects.

If, now, there be found a ſoul and body ſo framed, that the whole ſeries of wills of the ſoul, and the whole ſeries of motions of the body, exactly correſpond; and at the ſame time, for inſtance, when the ſoul deſires to go to any place, the two feet move mechanically that way; this ſoul and body will have a relation to one another, not by any actual union between them, but by the conſtant and perpetual correſpondence of the ſeveral actions of both. Now, God puts together this ſoul and body, which had ſuch a correſpondence antecedent to their union; ſuch a pre-eſtabliſhed harmony. And the ſame is to be underſtood of all the other ſouls and bodies that have been, or ever will be joined.

In effect, the laws of motion in the body, ſucceeding in the order of efficient cauſes, do alſo agree and correſpond with the ideas of the ſoul; ſo that the body is determined to act at the time when the ſoul wills. So that upon this hypotheſis, the volitions of the mind are followed inſtantly by the deſired motions of the body, not in conſequence of thoſe volitions in the leaſt, but of the nice and well-adjuſted machinery of the body; and the impreſſions produced in the ſenſory have no effect on the mind, but the correſponding idea ariſes, at that preciſe time, in conſequence of a chain of cauſes of a different kind; and, therefore, all that men do or ſay, is no more than the effect of exquiſite machinery.

The ſame principle he extends farther, and makes a pre-eſtabliſhed harmony between the kingdoms of nature and grace; to account for the apparent communication between them, and make phyſical and moral evil correſpond.

Such is the ſyſtem of pre-eſtabliſhed harmony. The author's way of ſtating and enforcing it, may be ſeen in his Eſſais de Theodicée.

This hypotheſis was firſt publiſhed in the Journal des Sçavans of Paris, in 1695, and ſtrenuouſly defended by Wolfius, who, on this account, was baniſhed by Frederick, king of Pruſſia; it is oppoſed by Bayle, in the article Borarius of his Dictionary, and ſince his time by Newton, Clark, Stahl, &c. See Leibnitzian *philoſophy*.

Harmony, in *Geography*, a townſhip of America, in Kennebeck county, near Cornville; incorporated in 1803.—Alſo, a village in Luzerne county, Pennſylvania, between which and Stockport on Delaware river, diſtant 18 miles E.S E. there is a portage; about 140 miles N. by W. of Philadelphia. N. lat. 41° 53'.

Harmony, in *Painting*. The analogy which exiſts between the impreſſions received by the mind through the different agency of hearing and of ſight, either producing agreeable or affecting ſenſations, or being of moral utility, neceſſarily cauſes a correſpondence in the words which deſcribe thoſe impreſſions. Hence the word *harmony*, which, in muſic, ſignifies a perfect accordance between the various parts of a compoſition, and alſo of ſound in the inſtruments by which it is performed, is adopted in the art of painting, wherein it has a ſignification of a correſpondent nature, being applied to the united effects of the parts viewed as a whole, and to the lines, colours, and expreſſions with which it is wrought.

As in one art the various tones of different inſtruments, though ſo extremely unlike ſpecifically, are brought by tuning to one key, and thereby made to produce one whole harmonious ſound, or rather mixture of ſounds, to the ear; ſo in the other, different and violently oppoſing lines and colours, which are its inſtruments of expreſſion, may, by contraſt, arrangement, and the admixture of intermediate degrees of each, be made to unite in one agreeable effect to the eye; or, in the painter's language, become *harmonious* in their union, a word ſignifying, in both arts, an agreeable impreſſion on the mind ariſing from an ingeniouſly regulated combination of parts, naturally diverſified, and ſome even oppoſite to each other in their peculiar qualities.

Mengs, in his practical leſſons on painting, ſays, that an "union of various colours is improperly called harmony, becauſe that appertains to thoſe things alone that have time, quantity, extenſion, or any other dimenſion that can produce a correſpondence of one thing with another;" and argues abſtruſely on "the neceſſity of numbering the degrees of the angles of refraction which the rays of light form in a priſm, which would be an immenſe ſtudy alienate from painting, and be entirely uſeleſs to painters."

His commentator, the chevalier Azara, has judiciouſly oppoſed this opinion, and clearly is right when he ſtates that he "believes there is a true harmony in colouring. A ray of light (he ſays) can cauſe upon our optic nerve a ſtrong or a weak ſenſation, and another ray can at the ſame time produce a different ſenſation which temperates and moderates the firſt; ſo that either of theſe two ſenſations will be ſometimes in itſelf alone diſagreeable, by vibrating our organs more or leſs than is neceſſary; yet they will have a good effect together, the one correcting the exceſs and defects of the other." Similar to this is the baſis of harmony in ſounds; and if, as the chevalier obſerves, rays of light may produce different, and conſequently inharmonious effects upon our viſual organs, how infinitely greater will be thoſe diverſities when colours are ſuperadded in their own natural intenſity, and under the influence of different degrees of light? Who can for a moment conceive that the operation of a violent red, in a ſtrong light, will not affect the eye in a manner totally different from a faint blue, in a leſs degree of illumination? or that theſe two oppoſite colours may not, the quality of one being weakened, and that of the other ſtrengthened, and both placed in an equal degree of light, be ſo regulated as to correſpond in their degree of intenſity of action on the eye? This very power, therefore, of regulating the effect of each colour by degrees, either by the admiſſion of light or dark, by giving each its full force, or weakening it by the admixture of different colours, proves the adoption of the word to be judicious and proper, even upon Mengs' own propoſition, becauſe there muſt be, in this caſe, a ſcale of regulation to act upon; but he is right in ſaying, it would require too tedious a ſtudy to reduce it to rule, and ſtill more to apply it to practice.

From the ſame art, and through the ſame agency whence this word *harmony* is borrowed, painting has alſo adopted another, without which it is impoſſible to explain the principles of the former in this art, *viz. tone*.

In muſic, this word denotes the peculiarity of the ſound in an inſtrument or voice. In painting, it ſignifies the peculiar governing hue which a picture or colour poſſeſſes. In the former, we ſpeak of a high or a low, a ſweet or a ſhrill-toned inſtrument, &c. In the latter the ſame appellations, or nearly ſo, are employed, with the exception of thoſe terms which preciſely belong to hearing, and the application of thoſe which appertain to viſion only; ſuch as the names of colours, as grey, brown, &c. If a picture have a great portion of light colours, and thoſe are wrought with a ſprightly free touch, it will come under the denomination of a light, or bright-toned one. If, on the other hand, the larger maſs of colours is deep and dark, and the lights not very brilliant and ſparkling, it is ſaid to be of a deep or low tone. The meaning of the other terms, indicating colours, is obvious.

The adoption of this latter word, *tone*, in painting, is completely arbitrary, its ſenſe, which is ſimply ſound, having no analogy to any part of painting, which addreſſes itſelf to the underſtanding ſolely through the medium of the eye. It has probably grown into uſe with harmony (which, as we have ſhewn, is correctly applied in both arts), and without any other ground of ſupport than an intuitive comprehenſion of its meaning when ſo uſed, which moſt men feel, without conſidering wherefore.

The principle upon which *harmony in painting* depends, ſeems to be, that all the hues of a picture ſhould have a correſpondent degree of intenſity, or, in the technical phraſe, be of the ſame tone, however they may vary in their degrees of light and dark; juſt as in a piece of muſic, which is intended to be played in one key, though the notes are high and low, yet none ſhould be introduced that do not belong to that key.

If it be intended that a picture ſhould have a ſolemn effect (ſee EFFECT), the tone ſhould be deep, that is, dark hues ſhould prevail, and no extremely vivid colour, as pure red or blue, ſhould be admitted; but that kind of effect ſhould be ſpread over the whole which occurs in nature at twilight, when every object loſes ſomewhat of its daylight-brilliancy of colour, and receives a deadened, darkened aſpect, the privation of light diminiſhing its luſtre, and reducing its appearance to a greyer tone. If, in this caſe, a bright red or white, &c. ſhould be introduced as bright as if ſeen by daylight, the harmony would be deſtroyed; and the reaſon is apparent, *viz.* two cauſes, ſo diſtinct as light and darkneſs, cannot operate to produce the ſame effect. When, in reverſe of this, gaiety and bright daylight are the ruling principle in the effect intended, clear bright colours muſt be introduced, care being taken that they are of one degree of brilliancy in the illumination, according to the arrangement of chiaro-ſcuro.

Something ſimilar to the introduction of the half-tone in muſic to produce harmony, is the value of half-tone or half-teint in painting (ſee HALF-TEINT); but with this diverſity, that in the latter art it conſtitutes the far greater part of a compoſition, as relative to colour; whereas in the former, it is more rarely introduced. In painting, half-tones are conſtantly required to unite the primary colours, or local colours, as they are termed: and every round object in paſſing to darkneſs on its ſhaded ſide, by degrees loſes the purity of its colour, as its quantity of light decreaſes; and throws off its rays of reflection in different direction from its front parts; becoming thereby gradually in the ſituation twilight would produce upon it. Even in the very front of an object, if it have a rough ſurface particularly, ſmall degrees of variation of colour will be obſervable, cauſed by the ſhadows produced by its ſuperficial irregularity. Hence a flat broad maſs of one even colour, will always have an unpleaſant effect in a painting, becauſe an untrue one; ſmall portions of broken tones muſt mix even in the higheſt lights, to render it a delicate,

cate, beautiful, and juſt imitation of the harmony and richneſs which always reigns in nature.

Richneſs, in the harmony of a picture, very much depends on the arrangement of the colours. The rainbow is a proof, and the beſt exemplar of this. Its beauty has been always recognized, and has been juſtly extolled by poets, and inefficiently attempted to be imitated by painters. In it not only each primary colour, the red, the blue, and the yellow, have equal degrees of intenſity and conſequent harmony, but the extreme ſubtlety and ſoftneſs of their mutual approximations, by gradually blending their hues, produce the utmoſt delight which colours are capable of affording.

Not a little of this delight is owing entirely to the arrangement of the colours. Let us ſuppoſe, that inſtead of the warm hues of the red and yellow being in the centre, the blue had been tranſpoſed to that ſituation, and not diſtributed towards the boundary of the bow! would it have been ſo agreeable to the eye? In that caſe the greater part of the maſs of colour would have been of a cold hue; for the blue, ſpreading both ways, and producing green on the one ſide, and purple on the other, while the glowing teints of red and yellow were confined to the edges, and no orange colour at all produced; all the preſent rich vividity of its effect would be loſt, and it would neceſſarily have preſented a far leſs pleaſing object to the view. This remark, however, rather belongs to the ſyſtem of colouring than to that of harmony ſtrictly ſpeaking, for the harmony might be equal in either caſe, though the effect be far leſs agreeable. Something of this is nevertheleſs requiſite to produce harmony in widely extended compoſitions in painting. It ſeems neceſſary, then, that colours ſhould have their repetitions ſpread through the whole ſurface, upon the ſame principle as they are arranged in the rainbow, or they will not unite agreeably, nor form a perfect whole.

As well as in the colouring of a picture, there ſhould alſo be an harmonious concord in the lines; which ſhould unite together in an agreeable manner, without violent contraſts, except where they may be neceſſary for the better expreſſion of the ſubject. And the work ſhould altogether, and in every part, have one character of deſign, as far as is agreeable to the nature of the different objects introduced. If one part of a figure for inſtance be drawn with ſquare forms and angular lines, and in certain proportions; no other parts ſhould have flowing lines, or be of different proportions, each of theſe being the means of repreſenting different ſpecific characters, and two characters can never be found in nature in the ſame figure. Thus one hand ſhould be made viſible through the whole picture, and no unequal or diverſified power appear in it; even in making various and oppoſite expreſſions.

The expreſſions themſelves ſhould tend to one point, to inculcate one moral; there ought in this reſpect to be an harmony, an uniſon, among them; they ſhould all co-operate to produce one total, and never lead the mind of the obſerver aſtray from the ſubject of the picture.

The moſt important point to attend to, in the production of harmony in painting, is the ſhade teint, or that hue of colour of which the ſhadows are compoſed; more particularly in its union with the lights, that is, in the production of half-teint. Shadow, in the eye of the painter, is not blackneſs, but a colour poſſeſſing richneſs and warmth; whoſe appropriate hue varies according to the nature of the ſubject and circumſtances of the compoſition. It has been ſhewn, that the far greater part of the ſurface of all rounded bodies preſents half-teint to the eye. If the ſhade colour be well choſen, this half-teint will be effected by its mixture with the local colours of the lighter parts of the picture; and if it be regularly employed through the whole, harmony will neceſſarily be produced. Much attention is however requiſite, not to let this hue enter too far, or in too great a degree, into the body of the colouring; otherwiſe monotony will be the conſequence, which is the very bathos of harmony.

The ſimpleſt ſhade colour that can be employed is umber unburnt; but its want of depth of tone makes it inadequate to produce great force of effect; and the half teint which it makes in mixture with the local colour, requires, as it approaches the light, an intermixture of grey to give it clearneſs; eſpecially in preparations or dead-colouring, in order to prevent the glazings employed for finiſhing, rendering the work too dull and brown. It appears to have been the colour moſt in uſe by Titian and Vandyke for the baſis of their ſhadows, as may be collected by examining their works, which are always ſtrengthened by glazing at the laſt. It is alſo, when judiciouſly employed with ſlight intermixtures of other colours (according to circumſtances) an excellent tone of colour for a general glazing; that is, giving one harmonious teint over the whole; but care muſt be had in the uſe of it, for time and the dirt which will accumulate upon the ſurface of a picture, will in a few years increaſe its depth by ſuperadding another tone of a ſimilar nature.

Titian, Giorgione, and Correggio are the great original exemplars of harmony of colouring, though the mode in which it was produced by the latter, differed exceedingly from that of the two former. A careful examination of their works, to which may be added thoſe of Vandyke and ſir Joſ. Reynolds, is the beſt mode of obtaining a juſt underſtanding of it, and of becoming enabled to put it in practice.

HARMOS, from ἀρω, *apto*, *I fit*, a word, uſed by the old medicinal writers, for the fleſh growing between the teeth.

HARMOSTES, or HARMOSTA, in *Antiquity*, a ſort of magiſtrate among the Spartans, whereof there were ſeveral, whoſe buſineſs was to look to the building of citadels, and repairing the forts and fortifications of the cities.

The word is ἁρμοςης, formed of ἁρμοω, *apto*, *concinno*, *I adapt*, *concert*, &c.

HARMOSYNIANS, ἁρμοσυνοι, were magiſtrates among the Spartans, who, after the death of Lycurgus, were appointed to enforce the obſervance of that law of the Spartan legiſlator, which required married women to wear a veil when they appeared in the ſtreets, whereby they were diſtinguiſhed from ſingle females, who were allowed to appear abroad with their faces uncovered.

HARMOTOME, in *Mineralogy*, a name given by the celebrated French cryſtallographer to a mineral which was, and is ſtill, more commonly called *croſs-ſtone*, (kreutz-ſtein in German,) on account of the form its cryſtals are frequently ſeen to affect. It is likewiſe known by the names of *andreolite* and *andreaſbergolite*, given to it by Lametherie, from the place where it was firſt diſcovered. We adopt Haüy's name, partly becauſe it does not, like that of "croſs-ſtone," ſubject this ſubſtance to be confounded with what is now called grenatite, ſtaurotide, or ſtaurolite, (indeed, the laſt of theſe names is given by Kirwan to the croſs-ſtone,) partly becauſe the mineral is not excluſively found at Andreaſberg; and, above all, becauſe we would adopt any name rather than omit this very intereſting mineral, which has not been mentioned in this work under either of the above appellations. Bergmann, and after him Romé de Liſle, applied to the croſs-ſtone the name of *cruciform white hyacinth*, conſidering it as a variety of what is now called zircon, from which, however, it is perfectly diſtinct, not only by the cleavage of the cryſtals, its ſpecific gravity, &c. but particularly, as later analyſes have ſhewn, by its chemical compoſition.

The colour of the harmotome is greyiſh-white, approaching to ſmoke-grey, ſometimes yellowiſh and milk-white: the greater its tranſparency, the more it approaches to colourleſs. It occurs always cryſtallized.

The *primitive form* of the cryſtals is, according to Haüy, a rectangular octahedron, compoſed of iſoſceles triangles, and diviſible in the direction of planes that may be ſuppoſed to paſs through the edges which meet at the ſummit, and through the centre of the octahedron. Mr. Von Buch, in a memoir on this ſubject, read before the Linnæan Society of Leipzig, as early as the year 1793, conſidered the nucleus of the croſs-ſtone to be a rhomboid, two of whoſe angles he computed to be between 92° and 110, the two others between 70° and 88°. This opinion, founded on the direction of the ſtriæ obſervable on the acuminating planes of the cryſtals, has ſince been objected to, partly on account of its inſufficiency to explain the different modifications of the ſecondary cryſtals, and partly becauſe theſe cryſtals are not diviſible in the direction of the ſtriæ of the ſurfaces. But the latter of theſe objections would be applicable alſo to the cryſtals of other ſubſtances, ſuch as the ſtriated octahedrons of oxyd of tin, &c. which are equally indiviſible in the direction of the laminæ indicated by the ſtriæ. It happens but too frequently, in caſes where the cleavage is not perceptible, that the cryſtallographer, in determining the primitive form, muſt have recourſe to gratuitous aſſumption: indeed, in the mineral under conſideration, we might, perhaps, derive the ſecondary forms, with equal facility, from the rectangular priſm, as from the octahedron; in which caſe, the mode of viewing the ſecondary cryſtals would, of courſe, be diametrically oppoſite to the other. In adopting the rectangular octahedron for the nucleus, we ſhall follow Haüy and Hauſmann in the deſcription of the ſecondary cryſtals hitherto noticed.

I. *Simple Cryſtallization.*

1. The dodecahedron, with rhomboidal planes. The angles of the eight planes, ſuppoſed to be parallel to thoſe of the nuclus, are, according to Hauſmann, of 72° 5′ 54″, and 107° 54′ 6″: the four ſecondary rhomboidal planes have angles of 73° 44′ 8″, and 106° 15′ 52″. Sometimes two of the latter planes become very ſmall, and even diſappear when the cryſtal adopts the form of a rhomboidal ſolid bevilled at the edges.

This modification is formed by the ſuper-poſition of laminæ on all the planes of the octahedron, and by the decrement of a ſingle row of molecules on its four lateral ſolid angles. If many rows of molecules are ſuper-impoſed on one another, and the cryſtal is lengthened according to the ſame laws of decrement, this form paſſes into that of

2. The rectangular four-ſided priſm, acuminated at both ends by four planes ſet on the lateral edges. (*Harmotome dodécaèdre*, Haüy, pl. 59. fig. 195.) The four lateral planes are hexagons with two angles of 106° 15′ 52″, and four others of 126° 52′ 4″. The edges formed by the eight planes of acumination, being the primitive planes, form, like thoſe in the preceding modification, angles of 121° 57′ 56″. Often two adjacent acuminating planes enlarge at the expence of the two others, which ſometimes even diſappear.

3. The rectangular four-ſided priſm, terminated at each end by ſix planes, four of which are placed on the lateral edges (being the former modification), and two on two oppoſite lateral planes. (*Harmotome partiel*, Haüy, pl. 59. fig. 196.) The two latter planes (if the octahedron is the primitive cryſtal,) are to be conſidered as truncations of two oppoſite terminal edges of the preceding modifications: and they originate by a ſimple decrement of the molecules at both ſides; the four lateral planes, hexagonal before, become octagons with four angles of 126° 52′ 4″, and four others of 143° 7′ 32″. The proportion of the ſides of theſe and the rhomboidal planes depends on the magnitude of the truncating planes. Theſe meet with the lateral planes under an angle of 123° 41′ 24″; and with the rhomboidal terminal planes under one of 150° 58′ 58″.

If theſe truncating planes encreaſe to ſuch a degree as to make the rhomboidal terminal planes diſappear, the cryſtal repreſent

4. The rectangular four-ſided priſm bevilled at two extremities. (Buch Kreutzſt. fig. 11.) Two of the lateral planes are rectangular; the two others hexagons, with the two angles of 112° 37′ 12″, and four others of 126° 52′ 4″. The height of the priſm is often conſiderably diminiſhed in proportion to the other dimenſions; ſometimes to ſuch a degree, that the two rectangular lateral planes diſappear entirely, in which caſe this variety paſſes into the

5. Oblique four-ſided priſm, whoſe ſides are analogous to the bevilling planes of var. N° 4, and the ends to the two ſix-ſided lateral planes of the preceding modification. Hence, it has two of its lateral edges of 112° 37′ 12″, and two others of 67° 22′ 48″.

II. *Twin-Cryſtals.*

Theſe being much more common than the ſimple cryſtals, (thoſe of the Hartz are ſeldom found ſimple,) the harmotome has obtained the name croſs-ſtone by thoſe who firſt obſerved this mineral. Theſe compoſed cryſtals are by no means individuals, but they actually conſiſt of two different cryſtals, one of which is traverſed by the other. This is a macle of a peculiar kind.

Theſe twin cryſtals are not always of the ſame form; the more common are thoſe compoſed of two of the dodecahedral cryſtals No. 2, that are wider in one direction than in the other, and croſſing each other longitudinally, under a right angle, ſo that they have a common axis. (*Harmotome cruciforme*, Haüy, plate 49, fig. 197.) Alſo Var. Nos. 1, 3, and 4 occur combined in this manner.

Beſides theſe ſymmetrical twin cryſtals, there occur others, compoſed in a ſimilar manner, but of two different varieties, ſuch as of N° 1, combined with Nos. 2, 3, 4, and 5, (in which the var. N° 1 is always of poſterior origin to the others); or of var. N° 2, with var. Nos. 3, 4, and 5, and of var. N° 3, with var. Nos. 4 and 5; as likewiſe of var. N° 4, with var. N° 5, in which combination the priſm N° 4, is of prior origin, and halves of N° 5 are placed on its broader ſides.

In the priſnatic twin cryſtals, one of the halves of the ſecondary priſms is ſometimes wanting, oftener they are perfect on both ſides, and commonly placed exactly in the middle of the broader planes of the primary priſm; and rarely the two halves on one or both broader planes are interrupted towards their middle.

The ſize of the cryſtals varies from nearly an inch, to ſcarcely the fourteenth part of an inch: the largeſt and thickeſt are thoſe of Strontian; very minute cryſtals are found on the Hartz. They are always grouped together.

Surface ſmooth; but in thoſe of the Hartz, the magnifying glaſs generally diſcovers, on the narrower planes of the rectangular four-ſided priſms, pinnated ſtriæ: namely, on each a longitudinal ſtria, with lateral ſtriæ directed downwards in the upper, and upwards in the lower half of the plane; the broader planes are obſoletely and tranſverſely ſtriated. The acuminating planes are tranſverſely ſtriated, and (in the cryſtal from the Hartz) parallelly with the narrower planes of the priſm.

Externally the harmotome is ſhining, ſometimes ſplendent; its luſtre is between pearly and vitreous. Internally it is generally leſs ſhining.

Its fracture is uneven, or imperfectly conchoidal; the fragments are indeterminately angular, and rather ſharp edged.

It is generally tranſlucent only, eſpecially when of a yellowiſh or greyiſh-white, and ſmoke-grey colour; ſometimes, however, it is ſeen perfectly tranſparent and colourleſs. In ſome caſes, the degrees of tranſparency are different in different parts of the cryſtal.

It is moderately hard; ſcratches glaſs: the Scottiſh variety appear to be rather harder than that of the Hartz. It is brittle, and eaſily frangible. The ſpecific gravity of the white variety, according to Heyer, 2.353; according to Weſtrumb, 2.355; grey variety, 2.361, Weſtrumb; 2.333, Hauy.

Harmotome is ſaid by Reuſs to manifeſt the double refraction. When put on burning coals it emits, according to Hauy, a yellowiſh-green phoſphoreſcent light, which we could not obſerve.

Before the blow-pipe, this ſubſtance crumbles into minute particles, which, on urging the flame, are partly converted into ſmall glaſſy globules, but no ebullition appears to take place. With oxygen gas, the whole is fuſed into a whitiſh tranſlucid globule. With borax and mineral alkali, it melts under ebullition into a veſicular ſlag. The croſs ſtone is partly diſſolved in acids, but does not form a gelatine with them, like the zeolites. Other chemical characters mentioned in the books of mineralogy appear to be erroneous.

The analyſes given of this mineral by Heyer, Weſtrumb, Klaproth, and Teſſaërt, are very ſimilar in their reſults.

	Crucif. var. from Andreaſberg.	Dodec. var. from Oberſtein.
Silica	49	47 5
Barytes	18	16.0
Alumine	16	19.5
Water	15	13.5
Loſs	2	3.5
	100 Klaproth.	100.0 Teſſaërt.

The croſs-ſtone, or harmotome, has been hitherto found at Andreaſberg, on the Hartz; at Oberſtein, in the palatinate, and at Strontian, in Scotland. At Andreaſberg, particularly in the mines Abendröthe and Samſon, where it generally adopts the cruciform appearance, it always occurs aggregated (in druſes) in the middle of the vein, whence it may be conſidered as the neweſt of the minerals that compoſe thoſe veins. The principal accompanying minerals are calcareous ſpar and galena, ſparry iron-ſtone, quartz, brown blende, iron and copper pyrites, grey copper ore, and red ſilver. Mr. Von Buch did never find this mineral in company with barytes.

The variety found at Oberſtein, in the Palatinate, which is almoſt always the harmotome dodecaèdre of Hauy, is found in agate nodules, or cryſtallized rock cryſtal, or amethyſt: it is often yellowiſh and ferruginous. That of Strontian, in Argyleſhire, which is generally found in cryſtals, of the above varieties, Nos. 2 and 3, occur with calcareous ſpar, in a vein of lead, traverſing granite.

We underſtand, that a fine group of cryſtals of cruciform harmotome, *from Iceland*, is preſerved in the Imperial Cabinet of Vienna.

HARNAD, in *Geography*, a town of Hungary; 12 miles E.N.E. of Erlau.

Harnad *Nemeti*, a town of Hungary; 16 miles W. of Tokay.

HARNAS, a ſmall iſland on the W. ſide of the gulf of Bothnia. N. lat. 60° 40′. E. long. 17° 12′.

HARNESS, a complete armour, or the whole equipage and accoutrements of a cavalier heavily armed; as caſque, cuiraſs, &c.

The word is formed of the French *harnois*, which ſome derive from the Greek *ἀρνακις*, *a lamb's ſkin*, becauſe they anciently covered themſelves therewith. Du-Cange obſerves, that the word *harneſium* is uſed in the corrupt Latin in the ſame ſenſe, and that it comes from the High Dutch *harnas* or *harniſch*. Others derive it from the Italian *arneſe*; others from the Celtic *harnes*, *a cuiraſs*.

Under king Richard II. it was expreſsly forbidden all men to ride in harneſs with launcegays. (Vide ſtat. 7 Ric. II. cap. 13.) In the ſtatute 2 Hen. IV. cap. 14. harneſs ſeems to include all kinds of furniture for offence as well as defence, both of men and horſe; as ſwords, buckles for belts, girdles, &c.

Harness, in *Rural Economy*, a term ſignifying the traces, trappings, and furniture of the team horſe, or other animal that is employed in draught.

Harness-*galls*, in *Farriery*, hard lumps or ſwellings produced in the breaſts of horſes or other animals, by the preſſure and galling of the gears or trappings, particularly when they are wrought in rainy weather. In order to avoid this, the parts of the harneſs that reſt upon the animals ſhould be kept conſtantly well ſtuffed; and where there has happened any undue preſſure, the part ſhould be immediately bathed with cold vinegar-grounds, or a ſaturnine waſh. It is likewiſe a good practice to have the greaſe, ſweat, and dirt firſt well waſhed from the parts by means of ſoap and water.

Harness-*room*, a ſmall place contrived for the purpoſe of keeping the harneſs in. In order that it may be preſerved free from mouldineſs, it ſhould be perfectly dry, and placed as near to the ſtable as can be conveniently done.

HARNIT, or Arne, in *Geography*, a ſmall iſland in the Engliſh channel, about two miles from Guernſey, and one from Sark.

HARO, a walled town of Spain, in Old Caſtile, at the influx of the rivulet Tiron into the Ebro, in a fertile country, abounding in grain and fruits; containing 700 families, three pariſhes, and a convent; 12 miles N.E. of Burgos.

HARO, Harou, or *Harol*, in the *Norman Cuſtoms*.

Clamour de Haro is a cry or formula of invoking the aſſiſtance of juſtice againſt the violence of ſome offender, who, upon hearing of the word haro, is obliged to deſiſt, on pain of being ſeverely puniſhed for his outrage, and to go with the party before the judge.

The word is commonly derived of *ha* and *roul*, as being ſuppoſed an invocation of the ſovereign power, to aſſiſt the weak againſt the ſtrong, on occaſion of Raoul firſt duke of Normandy, about the year 912, who rendered himſelf venerable to his ſubjects by the ſeverity of his juſtice; ſo that they called on him, even after his death, when they ſuffered any oppreſſion. Some derive it from Harola, king of Denmark, who, in the year 826, was made grand conſervator of juſtice at Mentz; others from the Daniſh *aa rau, q. d.* help me, a cry raiſed by the Normans in flying from a king of Denmark, named Roux, who made himſelf duke of Normandy.

The letters of the French chancery have uſually this clauſe, *Non obſtant clameur de haro*, &c.

The haro had anciently ſuch vaſt power, that a poor man of the city of Caen, named Aſſelin, in virtue hereof, arreſted the corpſe of William the Conqueror, in the middle of the funeral proceſſion, till ſuch time as his ſon Henry had paid the value of the land in queſtion, which was that whereon the chapel was built where he was interred.

HAROE, in *Geography*, a ſmall iſland in the North ſea, near the coaſt of Norway. N. lat. 62° 52′.

HAROERFREST, a ſmall iſland in the North ſea, near the coaſt of Norway. N. lat. 70° 30′.

HAROLD I., in *Biography*, had the crown of England bequeathed to him by his father Canute in the year 1035. His countrymen, the Danes, maintained him in the ſucceſſion, though a ſtrong party, headed by earl Godwin, declared for Hardicanute. Harold gained over his moſt powerful enemy, Godwin, by promiſing to marry his daughter, and they united in contriving the murder of prince Alfred, ſon of Ethelred II. Queen Emma, his mother, was driven by this bloody action to take refuge in Flanders, and Harold took poſſeſſion of the whole kingdom without any ſerious reſiſtance. This, ſays the hiſtorian, is the only memorable action performed during a reign of four years by this prince, who gave ſo bad a ſpecimen of his character, and whoſe bodily accompliſhments alone are known to us by his appellation of Harefoot, which he acquired from his agility in running and walking. He died on the 14th of April 1039. Hume's Hiſt. vol. i.

Harold II., king of England, ſecond ſon of the famous Godwin, earl of Kent and Weſſex, was, in the elevation of that family under Edward the Confeſſor, made duke of Eaſt Anglia. After the death of his father in 1052, Harold ſucceeded him in his government and great offices; and, by his addreſs and inſinuating manners, gained the good will of Edward, and acquired many partizans among the nobility, ſo that, at the death of the king, his acceſſion to the crown was attended with little oppoſition, notwithſtanding the ſuperior claims of Edgar Atheling the legal heir, or the bequeſt of Edward in favour of William duke of Normandy. Scarcely, however, was he ſeated on the throne, when William ſent an embaſſy requiring Harold to reſign the crown to him, and on his refuſal, began to make preparations for an invaſion. In reply to this meſſage Harold ſaid, "That he had obtained the crown by the unanimous ſuffrages of the people, and ſhould prove himſelf totally unworthy of their favour, did he not ſtrenuouſly maintain thoſe national liberties, with whoſe protection they had entruſted him; and that the duke, if he made any attempt by force of arms, ſhould experience the power of an united nation conducted by a prince, who, ſenſible of the obligations impoſed on him, by his royal dignity, was determined that the ſame moment ſhould put a period to his life and government." William, in aid of his own exertions, inſtigated Torti, who had withdrawn in diſguſt to Flanders, to infeſt the northern coaſt of England in conjunction with the king of Norway. The united fleet of theſe chiefs ſailed up the Humber, and landed a numerous body of men, who were oppoſed by the earls of Northumberland and Mercia. An action enſued, but victory declared in favour of the invaders. Harold now collected an army, with which he gave the enemy battle at Stamford, and totally routed them. He got poſſeſſion of the Norwegian fleet, but generouſly permitted prince Olave with twenty ſhips to return to his own country. Scarcely were the rejoicings for this victory at an end, when the king received advice of the landing of the duke of Normandy with a powerful hoſt at Pevenſey in Suſſex. Thither Harold haſtened with all the troops he could muſter, and brought on, contrary to the advice of his officers, a general engagement at Haſtings, in which he was ſlain with an arrow, while combating with the greateſt bravery at the head of his men. Thus was gained by William duke of Normandy the great and deciſive victory of Haſtings, after a battle that was fought from morning till night, and which ſeemed worthy, by the heroic valour diſplayed by both armies, and by both commanders, to decide the fate of a mighty kingdom. The dead body of the king was brought to William, who generouſly reſtored it to his mother without ranſom; to himſelf the crown of England fell as the reward of his valour. Hume's Hiſt. vol. i. See Hastings.

HARON-ADAH, in *Geography*, a town of Perſia, in Irak; 30 miles W. of Kirmanſheh.

HARONIA, a town of the Arabian Irak; 45 N. of Bagdad.

HAROUE', a town of France, in the department of the Meurthe, and chief place of a canton, in the diſtrict of Lunéville; 13 miles S.W. of Lunéville. The place contains 640, and the canton 10,554 inhabitants, on a territory of 190 kiliometres, in 30 communes.

HAROUN, or Aaron, Al Rashid, in *Biography*, caliph of the Saracens, the ſecond ſon of the caliph Mahadi, commander of the faithful, acquired great military renown as the leader of an expedition ſent by his father againſt the Greek empreſs Irene, in which he laid waſte ſeveral of the Aſiatic provinces of the empire, ſpread an alarm to Conſtantinople itſelf, and compelled the empreſs to purchaſe peace by a tribute. Five years after this expedition Haroun aſcended the throne of his father and elder brother, and became the moſt powerful and vigorous monarch of his race, illuſtrious in the Weſt, as the ally of Charlemagne, and familiar to moſt of our youthful readers, as the perpetual hero of the Arabian tales. The title of Al Raſhid, "The Juſt," was conferred on him as an illuſtrious example of that virtue, but his juſtice was ſullied by occaſional acts of violence and caprice. One of his beſt qualities was his love and encouragement of learning and ſcience, by which his court became the reſort of the moſt eminent literary characters of his time. He cauſed tranſlations to be made of many of the Greek and Latin authors into the Arabic, and he firſt rendered the works of the immortal Homer known to the Eaſtern poets. He paid great deference to the opinions of the doctors of his religion, and it is recorded that one Malec, the founder of an orthodox Mahometan ſect, having been ſent for by the caliph in order to inſtruct his ſons, and returning an anſwer, "that knowledge would not wait upon any perſon, but was itſelf to be waited upon," Haroun admitted the juſtice of the remark, and directed that his children ſhould attend him at the public ſchool. Haroun is ſaid to have invaded the Greek empire eight times. On the depoſition of Irene, the unnatural mother of Conſtantine, her ſucceſſor Nicephorus, in 802, refuſed to pay the uſual tribute to the caliph, and intimated, by a preſent of ſwords, delivered with an epiſtle, that he was ready to truſt his cauſe to the deciſion of arms. The caliph ordered the ſwords to be fixed together in the ground, and drawing his ſcymetar, cut them all aſunder with a ſtroke. He then dictated the following characteriſtic epiſtle: "In the name of the merciful God:" (moſt profane and wicked abuſe of holy language!) "Haroun al Raſhid, commander of the Faithful, to Nicephorus the Roman dog: I have read thy letter, O thou ſon of an unbelieving mother. Thou ſhalt not hear, thou ſhalt behold my reply." It was indeed written in characters of blood and fire on the plains of Phrygia. In ſeveral campaigns Nicephorus was defeated in perſon by Haroun, great part of Aſia Minor was over-run by the arms of the Saracens, and Heraclea, a city on the Black ſea, was totally deſtroyed. Nicephorus was at length obliged to ſubmit to terms, and to admit even of an augmentation of tribute. In the courſe of theſe tranſactions, the ruin of the family of Barmacides gave a ſtriking example of the deſpotic rigour with which Haroun executed his purpoſes. The ſtory is too intereſting to be wholly omitted, and is as follows: "Yahia, the head of this family, had ſuperintended the caliph's education, and aſſiſted in his government. Of his four ſons, the eldeſt was a ſucceſsful general; Jaafar, the ſecond, was the caliph's vizier, and declared favourite, and diſtinguiſhed himſelf by his proficiency in polite literature; the two youngeſt were introduced into dignified ſtations. They were all educated in opulence, and had imbibed ſentiments worthy of their fortune. Their generoſity and munificence rendered them the darlings of all ranks of the people. Jaafar was ſo much the favourite of his maſter, that he could not endure to be without his company, and being equally attached to his own ſiſter Abbaſa, he thought fit to break through the Eaſtern formality of excluding unmarried females from the view of the other ſex. A mutual paſſion was the conſequence, which the caliph ſo far indulged as to permit a marriage between his ſiſter and the vizier, but with the cruel reſtriction of their abſtaining from the privileges of ſuch an union. Paſſion broke through this unjuſt prohibition: the conſequences, which were ſoon viſible, brought down the monarch's vengeance upon the head of Jaafar and his family. Jaafar was publicly executed; his venerable father impriſoned and probably aſſaſſinated, and the property of the whole race confiſcated. A decree was even made, forbidding, on pain of death, all mention of the names or actions of the Barmacides; but a grateful old man, who ventured openly to diſobey it, obtained his pardon and a remuneration from the caliph." Haroun was, as has been obſerved, the richeſt and moſt potent ſovereign of his time; he is ſaid to have ſent a ſplendid embaſſy to Charlemagne, which, among other preſents, brought a magnificent tent, a water-clock, an elephant and the keys of the holy ſepulchre at Jeruſalem, denoting permiſſion for European pilgrims to viſit it. The principal reſidence of this caliph was a favourite palace at Racca on the Euphrates. After his return from an expedition to quiet ſome commotions in Perſia, he was ſeized with great dejection of ſpirits, and an apprehenſion of death. From this he never quite recovered, and he died in a ſtate of deſpondence, in the year 808, at the age of forty-ſeven. The laſt command which he ever gave, was that of cutting to pieces, in his own preſence, the brother of a rebel who had taken up arms againſt his government. Nevertheleſs he is extolled for humanity; the tender mercies of ſuch men are truly cruel; Haroun was however capable of occaſionally exerciſing juſt and generous ſentiments. He could liſten to the complaint of a poor widow who had been pillaged by his troops, and who dared, in a paſſage of the Koran, to threaten the inattentive deſpot with the judgment of God and poſterity. The monarch pitying her misfortunes ordered full reſtitution to be made to her. Gibbon, vols. ix. x. Univer. Hiſt.

HAROWLY, in *Geography*, a town of Hindooſtan in the ſoubah of Delhi; 24 miles N.W. of Coel.

HARP, a muſical inſtrument of the ſtring kind, being of a triangular ſigure, and placed upright between the legs of the perſon who plays upon it.

Papias, and Du-Cange after him, will have the harp to have taken its name from the *Arpi*, a people of Italy, who were ſuppoſed the firſt that invented it; and from whom they ſay it was borrowed by other nations. Menage, &c. derives the word from the Latin *harpa*, and that from the German *herp*, or *harp*. Others bring it from the Latin *carpo*, becauſe touched or thrummed with the fingers. Dr. Hickes derives it from *harpa*, or *hearpa*, which ſignify the ſame thing; the firſt in the language of the Cimbri, the ſecond in that of the Anglo-Saxons. The Engliſh prieſt who wrote the life of St. Dunſtan, and who lived with him in the 10th century, ſays, cap. ii. n. 12. "Sumpſit ſecum ex more citharam ſuam, quam paterna lingua hearpam vocamus;" which intimates the word to be Anglo-Saxon.

There is ſome diverſity in the ſtructure of harps. That called the triple harp has ninety-ſeven ſtrings or chords, in three rows, extending from double C in the baſe, to double G in alt, which make five octaves: the middle row is for the ſemitones, and the two outſide rows are perfect uniſons. On the baſe ſide, which is played with the right hand, there are 36 ſtrings; on the treble ſide, 26; and in the middle-row, 35 ſtrings. There are two rows of pins or ſcrews on the right ſide, ſerving to keep the ſtrings tight in their holes, which are faſtened at the other end to three rows of pins on the upper ſide.

The harp, within the laſt forty years, has been in ſome degree improved, by the addition of eight ſtrings to the uniſon, *viz.* from E to double F in alt.

This inſtrument is ſtruck with the finger and thumb of both hands. Its muſic is much like that of the ſpinet, all its ſtrings going from ſemitone to ſemitone; whence ſome call it an *inverted ſpinet*.

It is capable of a much greater degree of perfection than the lute. The editor of the laſt folio edition of Chambers's Cyclopædia is indebted to Mr. Evans, a very celebrated performer on this inſtrument, for the above account of the ſtructure and compaſs of the Welſh harp. King David is uſually painted with a harp in his hands; but we have no teſtimony in all antiquity, that the Hebrew harp, which they call *chinnor*, was any thing like our's. On a Hebrew medal of Simon Maccabæus, we ſee two ſorts of muſical inſtruments; but they are both of them very different from our harp, and only conſiſt of three or four ſtrings. All authors agree that our harp is very different from the lyre, cithara, or barbiton, uſed among the Romans.

Fortunatus, lib. vii. carm. 8. witneſſes, that it was an inſtrument of the barbarians.

> "Romanuſque lyra, plaudat tibi barbarus harpa,
> Græcus Achilliacha, crotta Britanna canat."

The *crotta* is the *crwth* Latinized, in all probability an original Britiſh or Welſh inſtrument, as it is never mentioned in any claſſical author.

The harp is perhaps the moſt ancient inſtrument of which we know the uſe.

The Theban harp is an inſtrument, of which a beautiful drawing, by Mr. Bruce, and a deſcription, are inſerted in Burney's Hiſtory of Muſic, concerning the authenticity of which there were many doubts, and which were by no means removed by a pleaſantry of lord North, who ſaid "it was not a harp, it was a lyre;" yet in ſpite of ſcepticiſm and ſcoffers, the truth of Mr. Bruce's narrative has been brought into credit by ſir W. Jones, and lately fully aſcertained by the French invaders of Egypt, and by individual travellers of undoubted veracity.

We ſhall therefore inſert the account of this inſtrument, and of the ſituation in which it was found, in the traveller Bruce's own words.

"Behind the ruins of the Egyptain Thebes, and a very little to the N.W. of it, there is a great number of mountains hollowed into monſtrous caverns, the ſepulchres, according to tradition, of the firſt kings of Thebes. The moſt conſiderable of theſe mountains, thus hollowed, contains a large ſarcophagus of granite, of which the lid only is broken.

" In the entrance of the paſſage which leads, ſloping gently down into the chamber where is the ſarcophagus, there are two pannels, one on each ſide: on that of the right is the figure of the *ſcarabæus Thebaïcus*, ſuppoſed to have been the hieroglyphic of immortality. On the left, is the crocodile, fixed upon the apis with his teeth, and plunging him into the waves. Theſe are both moulded in baſſo relievo, in the ſtucco itſelf. This is a ſufficient indication of the grotto, to any one who may wiſh to examine it again. At the end of the paſſage, on the left hand, is the picture of a man playing upon the harp, painted in freſco, and quite entire.

" He is clad in a habit made like a ſhirt, ſuch as the women ſtill wear in Abyſſinia, and the men in Nubia. This ſeems to be white linen or muſlin, with narrow ſtripes of red. It reaches down to his ankles; his feet are without ſandals, and bare; his neck and arms are alſo bare; his looſe, wide ſleeves are gathered above his elbows; his head is cloſe ſhaved; he ſeems a corpulent man, of about 50 years of age, in colour rather of the darkeſt for an Egyptian.

" To gueſs by the detail of the figure, the painter ſhould have had about the ſame degree of merit with a good ſign-painter in Europe; yet he has repreſented the action of the muſician in a manner never to be miſtaken. His left hand ſeems employed in the upper part of the inſtrument among the notes in *alto*, as if in an *arpeggio*. While ſtooping forwards, he ſeems with his right hand to be beginning with the loweſt ſtring, and promiſing to aſcend with the moſt rapid execution. This action, ſo obviouſly rendered by an indifferent artiſt, ſhews that it was a common one in his time, or, in other words, that great hands were then frequent, and conſequently that muſic was well underſtood and diligently followed.

" If we allow the performer's ſtature to be about five feet ten inches, then we may compute the harp, in its extreme length, to be ſomething leſs than ſix feet and a half. It ſeems to ſupport itſelf in equilibrio on its foot, or baſe, and needs only the player's guidance to keep it ſteady. It has thirteen ſtrings. The length of theſe, and the force and liberty with which they are treated, ſhew that they are made in a very different manner from thoſe of the lyre.

" The inſtrument wants the fore-piece, or ſtay of the frame, oppoſite to the longeſt ſtring, which certainly muſt have improved the tone, and that deficiency muſt have rendered it very ſubject to go out of tune. The back part is the ſounding-board, compoſed of four thin pieces of wood, joined together in form of a cone, that is, growing wider towards the bottom; ſo that, as the length of the ſtring increaſes, the ſquare of the correſpondent ſpace, in the ſounding board, in which the tone is to undulate, always increaſes in proportion.

" Beſides that, the whole principles upon which the harp is conſtructed are rational and ingenious, the ornamental parts are likewiſe executed in the very beſt manner; the bottom and ſides of the frame ſeem to be vaneered, or inlaid, probably with ivory, tortoiſe ſhell, and mother-of-pearl, the ordinary produce of the neighbouring ſeas and deſerts. It would be even now impoſſible to finiſh an inſtrument with more taſte and elegance.

" Beſides the elegance of its outward form, we muſt obſerve, likewiſe, how near it approached to a perfect inſtrument; for it wanted only two ſtrings of having two complete octaves in compaſs. Whether theſe were intentionally omitted or not, we cannot now determine, as we have no idea of the muſic or taſte of that time; but if the harp be painted in the proportions in which it was made, it might be demonſtrated that it could ſcarce bear more than the thirteen ſtrings with which it was furniſhed. Indeed the croſs bar would break with the tenſion of the four longeſt, if they were made of the ſize and conſiſtence, and tuned to the pitch that our's are at preſent.

" I look upon this inſtrument, then, as the Theban harp, before and at the time of Seſoſtris, who adorned Thebes, and probably cauſed it to be painted there, as well as the other figures in the ſepulchre of his father, as a monument of the ſuperiority which Egypt had in muſic at that time, over all the barbarous nations that he had ſeen or conquered.

" Aſtronomy, and, we may imagine, the other arts, made a rapid progreſs at this period in Upper Egypt, and continued to do ſo for 50 years after, between which time, and the Perſian conqueſt, ſome cataſtrophe muſt have happened that reduced them to the loweſt ebb, which hiſtorians have miſtaken for their firſt original.

" We know about the time of Seſoſtris, if, as ſir Iſaac Newton ſuppoſes, this prince and Seſac were the ſame, that in Paleſtine the harp had only ten ſtrings; but as David, while he played upon it, both danced and ſung before the ark, it is plain that the inſtrument upon which he played could have been but of ſmall volume, we may ſuppoſe little exceeding in weight a guitar; though the origin of this harp was probably Egyptian, and from the days of Moſes it had been degenerating in ſize, that it might be more portable in the many peregrinations of the Iſraelites.

" The harp, that approaches the neareſt to this in antiquity, is repreſented upon a baſſo-relievo at Ptolemais, in the Cyrenaicum, a city built by Ptolemy Philadelphus, and it is there twice repreſented.

" It has fifteen ſtrings, or two complete octaves; but the adding theſe two notes has occaſioned likewiſe the addition of a fore-piece to ſuſtain the croſs-bar above, ſo that its form is triangular; the extremity of the baſe is rounded into a ram's head, which ſeems to allude to its Theban original; and I ſhould imagine that this inſtrument is likewiſe Egyptian, as no harp with ſuch a number of ſtrings has ever been ſeen that I know of, in Grecian ſculpture." Hiſt. of Muſic, vol. i. p. 214.

Concerning the form of the harp of David we are utterly ignorant, though diſſertations have been written upon it, and Don Calmet has ventured to give it a form; but all we know of it is, that it was called *chinnor* in Hebrew, and the royal prophet himſelf frequently calls it the ten-ſtringed harp in the Pſalms.

The Welſh harp ſeems of very high antiquity in our iſland under the Druidical government. Before the invaſion of Julius Cæſar the Britons had muſic; and the bards, like the Levites among the Hebrews, were the ſacred muſicians; and we have the authority of venerable Bede for ſocial and domeſtic ſinging to the harp in the Saxon language, upon this iſland, at the beginning of the eighth century; though he himſelf wrote in Latin, the only language of the church and the learned then, and for many ages afterwards.

The above account of Welſh muſic was written and publiſhed in 1782, previous to the appearance of the "Muſical Relics of the Welſh Bards, by Mr. Edward Jones, Welſh Bard to His Royal Highneſs the Prince of Wales, in 1784," which is curious and entertaining; and being written by a native of Wales, and an eminent performer on the harp, we ſhall extract from this work Mr. Edward Jones's account of the muſical inſtruments of his country.

" The muſical inſtruments, anciently uſed in Wales, are as different from thoſe of other nations as their muſic and poetry.

"Theſe inſtruments are five in number, the *telyn*, or harp; the *crwth;* the *pibgorn*, or pipe; the *tabwrdd*, or tabret; and the *corn buelin*, cornet or bugle-horn.

"Notwithſtanding we find that the *telyn*, or Welſh harp, was always peculiar to our bards; though, probably, there was no difference betwixt the harp, when in its ancient primitive form, and the Grecian lyre; for Diodorus Siculus records that the Celtic bards played on inſtruments like lyres: οργάνων ταῖς λύραις ὁμοίων.

"In the time of the Welſh princes an hereditary harp was preſerved with great care and veneration in the houſehold of every prince and lord, to be beſtowed ſucceſſively on the bards of the family, and theſe were as indiſpenſible among the poſſeſſions of a gentleman as a coat of arms.

"The triple, or modern Welſh harp, has three rows of ſtrings; the two outſide rows are uniſon; the middle row the flats and ſharps. Its compaſs extends to five octaves. Some of its preſent appendages were probably the addition of the latter centuries. This celebrated inſtrument has been recently improved by the invention of pedals, which change it without freſh tuning into all the different keys, and have rendered it much leſs complicated and inconvenient by reducing it to a ſingle row of ſtrings."

This may, probably, not only improve the inſtruments in the principality, but the ſtyle of muſic and taſte of the country, which ſeem to have been totally confined to national tunes and vulgar variations. Mr. Jones himſelf, who, during many years, was the chief bard, and beſt performer on the *telyn*, an ancient Welſh harp, has quitted that inſtrument for the pedal harp, on account of the ſuperior facility with which all kinds of muſic for keyed inſtruments can be executed with as little difficulty as on a piano-forte; and it is, we ſuppoſe, in alluſion to the pedal harp, that Mr. Jones ſays, "in expreſſion and variety the harp has no rival, which every one will acknowledge who knows how the heart is ſoothed by its delicate and ſofter ſounds, as well as animated by its powerful and brilliant tones."

The triple harp ſeems to imply that there have been in Wales three ſeveral kinds of harps; the *ſingle harp*, with only one ſtring to each note; the *double harp*, with two; and the *triple harp*, with three ſtrings.

The harp was a favourite inſtrument with our Saxon anceſtors. All our hiſtorians relate the romantic ſtory of Alfred reconnoitring the Daniſh camp in the diſguiſe of a harper. Anlaff, and other Daniſh chiefs, played Athelſtan the ſame trick in the Saxon camp.

The harp of David, as well as that of Alfred, muſt have been of a different ſize and conſtruction from the triple Welſh harp to be portable; particularly that of David, when he danced before the ark.

Euſebius, indeed, calls it a lyre, and informs us that he carried it with him wherever he went, to conſole him in his affliction, and to ſing to it the praiſes of God.

Millico, when in this country, in 1774, accompanied himſelf in ſinging his elegant canzonets on a ſmall harp, which he flung over his ſhoulder like a guitar, with which, though of very different form, and open like a lyre, was equally portable.

The modern Iriſh harp is a ſingle inſtrument, ſtrung with metal ſtrings of braſs wire, nine in number, and calculated for mere melody, or a treble part. Carolan's tunes had no baſe to them originally, as we have been informed by the late Keane Fitzgerald, a native of Ireland, and a good judge of muſic, who had often ſeen and heard old Carolan perform. It was only after his deceaſe, in 1738, that his tunes were collected and ſet for the harpſichord, violin, and German flute, with a baſe, Dublin, folio, by his ſon, who publiſhed them in London by ſubſcription, in 1747.

Galilei, the father of the great mathematician Galileo, ſays that the Italians, who were in poſſeſſion of the harp before the time of Dante, had it from Ireland.

According to Mr. Walker, in his "Hiſtorical Account of the Iriſh Bards," the Iriſh have four different ſpecies of harp: 1ſt. The *Clar-ſch*, or *clar-ſeach*, commonly denominated the Iriſh harp.

2d. *Keirnine*, a ſpecies of dulcimer, (not a ſacbut, a double curtle, or baſſoon, which are wind inſtruments.)

3d. The *Cionu cruit*, of ten ſtrings, a kind of guitar.

4th. The *Greamthine cruit*, the *crwth* of the Welſh.

Whether the Welſh had their muſic from Ireland, according to Giraldus Cambrenſis, or the Iriſh had theirs from the Cambro-Britons, we ſhall not attempt to determine, but ſhall leave St. David and St. Patrick, and their champions Jones and Walker, patriotically to diſpute the point.

In the late laborious Mr. Strutt's "Saxon Antiquities," vol. I. we have repreſentations of antique harps, one with nine ſtrings, and another with eleven, copied from illuminated MSS. in the Britiſh Muſeum; and a lyre of four ſtrings of the middle ages, "beaten with a ſmall inſtrument for that purpoſe:" meaning a *plectrum*.

The early muſical inſtruments of all countries, like thoſe of Greece and Rome, are of ſmall compaſs.

> "Tibia non, et nunc, orichalco juncta tubæque
> Æmula; ſed tenuis, ſimplexque foramine vacuo
> Aſpirare."

In all our inquiries we can obtain no ſatisfactory account of the time when, and on what occaſion, the harp was aſſumed in the arms of Ireland. The learned Mr. O'Halleran ſays it was by order of Henry II., and Mr. Ledwich by that of Henry VIII. (Walker's Iriſh Bards); but neither of theſe gentlemen aſſigns a reaſon for it, or gives any authority for his aſſertions.

In days of chivalry, the harp paſſed for the moſt noble and majeſtic of inſtruments, and on this account the romancers place it in the hands of their greateſt heroes, as the ancient Greek bards did the lyre.

This inſtrument was in ſuch general favour, that an old poet has made it the ſubject of a poem called "Le Dict de la Harpe," "The Ditty, or Poem, upon the Harp," and praiſes it as an inſtrument too good to be profaned in taverns or places of debauchery, ſaying that it ſhould be uſed by knights, eſquires, clerkes, perſons of rank, and ladies with plump and beautiful hands; and that its courteous and gentle ſounds ſhould be heard only by the elegant and good.

It had twenty-five ſtrings, to each of which the poet gives an allegorical name: calling one *liberality*, another *wealth*, a third *politeneſs*, a fourth *youth*, &c. applying all theſe qualities to his miſtreſs, and comparing her to the harp.

Harp, *Bell*, a muſical inſtrument of the ſtring kind, thus called from its being ſwung about by thoſe who play upon it like a bell. It is about three feet long; its ſtrings are of braſs or ſteel wire, fixed at one end, and ſtretched acroſs the ſound board, by ſcrews fixed at the other end. It comprehends four octaves, and the ſtrings are ſtruck with the thumbs, the right hand playing the treble, and the left the baſe; and, in order to draw the ſounds the clearer, the thumbs are armed with a little wire pin.

Harp, *Silver,* or *Prize Harp,* at the *Eiſteddfod,* or ſeſſion of the bards and minſtrels, appointed in the ninth year of queen Elizabeth, at Caerwys, in North Wales. (Pennant's Tour in North Wales 1773, printed 1778.) This was reviving an ancient cuſtom in the principality, as the Welſh hiſtorians and annaliſts inform us that Gruffidd ap Conan, prince of Wales, eſtabliſhed a congreſs or meeting of maſters of muſic about the year 1100, who underwent a public examination for degrees in their art, and for prizes, the chief of which was a ſilver harp, with nine ſtrings, worn by the victor as a badge of honour.

As one of theſe prize harps is ſtill preſerved in the curious collection of Cambro-Britiſh antiquities of the Moſtyn family, and another in Dr. Burney's collection, we ſhall give an exact repreſentation of it in one of our plates of muſical inſtruments.

Harp, *Æolus's.* See Æolus's *Harp.*

Harp, in *Mythology,* is the ſymbol of Apollo.

Harp, in the *Manege.* See Grapple.

Harp *Iſland,* in *Geography,* an iſland in the South Pacific ocean, ſo called from its figure by M. Bougainville, in 1768. It was inhabited. S. lat. 18°. W. long. 140°.

HARPAGE, in *Ornithology.* See Harpy.

HARPAGIUS, in *Antiquity.* See Arpagius.

HARPALUS, in *Biography,* a celebrated Greek aſtronomer, who flouriſhed about 480 years before the Chriſtian era, invented a new cycle which went by his name, and which was followed, till Meton, the ſon of Pauſanias, proved it to be erroneous, and publiſhed his own, or the cycle of nineteen years, which is ſtill in uſe, and known under the name of the "golden number." Moreri.

HARPATH, in *Geography,* a river of America, in Teneſſee, which, after a N.W. courſe of about 40 miles, diſcharges itſelf into Cumberland river; 19 miles N.W. of Naſhville.

HARPE, Jean François de la, in *Biography,* a celebrated dramatiſt and critic, was born at Paris, November 20th, 1739. By the death of his father while he was young, the ſon was left in extreme poverty. Exhibiting, however, genius and talents above the common order, he was patronized by M. Aſſelin, principal of the college of Harcourt, who admitted him as one of his pupils. La Harpe commenced his literary career by poems called heroides, which were at that time much in faſhion. In this ſtyle of writing there were ſeveral candidates for popular applauſe, but the public ſuffrages were divided between La Harpe and Dorat. By men of judgment and real taſte the performance of La Harpe was deemed the ſuperior. He now put in a claim for the honours of the academy, and thoſe of the theatre. He obtained the firſt by his eulogy on Charles V., and ſucceſs in this inſtance led him to increaſe his reputation by eulogies on Fenelon, Catinat, and Racine: the latter was eſteemed his *chef d'œuvre* in this kind of compoſitions. As a writer for the ſtage, we have his Warwick, Coriolanus, Philoctetes, Barmecides, Johanna of Naples, Menzicoff, and others. He wrote alſo a comedy for the inauguration of the new French theatre, entitled "Moliere at the New Theatre," which is diſtinguiſhed for its neatneſs and gaiety. The principal work of M. de la Harpe, is his "Cours de Litterature, Ancienne et Moderne," which entitles the author to a high place in the learned world. By ſome of his contemporaries he is ranked with Quintilian: in comparing him with Marmontel, it is ſaid by a good judge, "That the career of La Harpe is much more vaſt and brilliant. He not only labours to give to perſons of no great knowledge competent information on the topics of his work, but arreſts the attention of the moſt learned. In his plans, the outline of which alone announces an immenſe ſtock of ſcience and learning, he embraces all ages in which literature has flouriſhed. Every celebrated work is analyzed and diſcuſſed. The beauties of the ſeveral writers are happily diſplayed, and their faults pointed out with all the ability of the moſt lively and ſound criticiſm. That which diſtinguiſhes La Harpe from other moderns who have treated of literature is, that he always aſſumes the tone of the work he criticiſes, a merit which we find in none of the ancients except Cicero, Quintilian, and Longinus. If he ſpeaks of the Iliad, we behold him borrow all the rich colours of the father of poetry to decorate his diſcourſe. If he treats of Demoſthenes and Cicero, all the great intereſts of Athens and Rome are reproduced under his pen. If Tacitus is his theme, we are inſtantly tranſported to the age of the emperors: we enter into all the myſtery of the dark policy of Tiberius, and tremble at the ſight of Nero." The only regret on this ſubject is that the author did not live to finiſh his courſe of inſtruction. Under the tyranny of Robeſpierre La Harpe was thrown into priſon, where he long remained between the living and the dead, uncertain each hour to which he ſhould belong. He had, however, the happineſs to be forgotten in his dungeon, from which he was liberated ſhortly after the death of the monſter who placed him there. A new ſtorm aroſe, and La Harpe was driven to ſeek an aſylum in a ſpot impenetrable to all but faithful friendſhip. Being in this ſituation deprived of exerciſe, his health rapidly declined, and in February 1803 he died, in the 65th year of his age. La Harpe had, like many of his countrymen, been a freethinker, treating the Chriſtian ſyſtem with contempt, but during his impriſonment he had an opportunity of re-conſidering the ſubject, the reſult of which was, that he became a firm believer, and determined to conſecrate the remainder of his days to the ſervice of that religion which he had heretofore contemned; and at the Lyceum, and in the preſence of a numerous audience, he boldly retracted his errors.

Harpe, in *Natural Hiſtory,* the name of a kind of ſhell-fiſh of very great beauty. It is of the genus of the dolium or concha globoſa. See Lyra.

Harpe *a Pedal,* Fr., in *Muſic,* a harp with pedals to produce the half notes.

Before the invention of pedals, the whole range of ſounds in the double and treble harps on the continent, had been reduced to the diatonic ſcale, with a ſingle ſtring to each note; the ſemitones being produced by braſs rings with the left hand, at the top of the inſtrument, which were both difficult to get at and diſagreeable to hear, from the noiſe, which by a ſudden motion of the hand, they occaſioned.

It was ſome time after this expedient was put in practice, before the ſecret of producing the half notes by pedals was diſcovered.

In 1772, we firſt heard the pedal harp at Paris and Bruſſels, where the inſtrument was conſtructed of an elegant form, and beautifully ornamented. Its tone was ſweet, diſtinct, and capable of the moſt minute ſhades of piano, and the moſt touching expreſſions. Among all the muſical inſtruments in uſe, there is no one more becoming to a female figure. And by means of the pedals for the half notes, it is leſs cumbrous and unwieldy, and more eaſy of performance than our double Welſh harp.

The compaſs of theſe harps of new conſtruction was from double B ♭ in the baſe, to F in altiſſimo.

This method of producing the half-notes on the harp by pedals, which has rendered it a female inſtrument, was invented at Bruſſels about the year 1757, by M. Simon, who ſtill reſided in that city in 1772. It is an ingenious and uſeful contrivance, in more reſpects than one; for by reducing the number of ſtrings, the tone of thoſe that remain is improved: as it is well known that the leſs an inſtrument is loaded, the more freely it vibrates.

We ſhall not attempt to inſtruct our readers how to apply theſe pedals to the harp, or to explain their operation; the mechaniſm is too complicated to be taught by verbal inſtruction. To make a watch by a receipt would be the deareſt way of purchaſing it.

HARPEGEMENT, Fr. See ARPEGGIO.

HARPEGGIATO, Ital. See ARPEGGIO.

HARPERS, BRITISH. Theſe we are certain were famous long before the conqueſt, and the bounty of our firſt Norman ſovereign to his joculator or bard is recorded in Doomſday-book; (Glouceſterſcire. Berdic, Joculator Regis, habet iii. Villas et ibi v. car. nil redd. See Anſtis, Ord. Gart. ii. 304.) Nor ſhould that of Henry III. be forgotten, who, in the thirty-ſixth year of his reign, not only gave forty ſhillings and a pipe of wine to Richard, his harper, but another pipe of wine to Beatrice, the harper's wife; (Rot. Pip. an. 36 Hen. III. Et in uno dolio vini empto et dato Magiſtro Ricardo Cithariſtæ Regis, xl. ſol. per. Br. Reg. Et in uno dolio empto et dato Beatrici uxori ejuſdem Ricardi.) All our moſt ancient poems, whatever was their length, were ſung to the harp on Sundays and on public feſtivals. See Warton's Hiſt. Engl. Poetry, vol. i. p. 12. 18. and elſewhere.

HARPER'S *Ferry*, in *Geography*, a poſt-town of America, in Berkeley county, Virginia; 65 miles from Waſhington. Here is an armoury, and a manufactory of muſkets and bayonets.

HARPERSFIELD, a poſt-town of America, in Delaware county, New York; 32 miles S.E. of Cooper's town; containing 1013 inhabitants.

HARPIES, ΑΡΠΥΙΑΙ, *Harpyiæ*, in *Antiquity*, a rapacious impure ſort of monſters, of the bird kind, mentioned among the poets.

They are repreſented with wings, ears like bears, bodies like vultures, faces like women, and feet and hands hooked like the talons of birds of prey. See Virgil, Æneid. lib. iii. who gives a deſcription of them, and ſeems to claſs them with the Furies.

The ancients looked on the Harpies as a ſort of genii or demons. Some make them the daughters of Tellus and Oceanus, the *Earth* and *Ocean*; whence, ſays Servius, it is, that they inhabit an iſland, half on land and half in water. Valerius Flaccus makes them the daughters of Typhon; thus Celœno ſpeaks "Vobis Furiarum ego maxima pando." There were three Harpies, Aello, Ocypete, and Celœno, which laſt Homer calls *Podarge*. Heſiod, in his Theogony, ver. 267, only reckons two, Aello and Ocypete, and makes them the daughters of Thaumas and Electra, affirming that they had wings, and went with the rapidity of the wind. Zephyrus begat of them Balius and Xanthius, Achilles's horſes. Pherecydes relates, that the Boreades expelled them from the Ægean and Sicilian ſeas, and purſued them as far as the iſlands, which he calls Plotæ, and Homer Calynæ; and which have ſince been called the Strophades.

Voſſius, De Idolol. lib. iii. cap. 99. p. 63. thinks that what the ancients have related of the Harpies, agrees to no other birds ſo well as the bats found in the territories of Darien in South America. Theſe animals kill not only birds, but dogs and cats, and prove very troubleſome to men by their peckings. But the ancients, as the ſame Voſſius obſerves, knew nothing of theſe birds. By the Harpies, therefore, he thinks they could mean nothing elſe but the winds; and that it was on this account they were made daughters of Electra, the daughter of Oceanus. Such is the opinion of the ſcholiaſts of Apollonius, Heſiod, and Euſtathius. Their names, Aello, Ocypete, Celœno, are ſuppoſed to ſuggeſt a farther argument of this. Le Clerc (Bibliotheque Univ. tom. i. p. 248.) conjectures that the Harpies were locuſts; which, after they had laid waſte Bithynia and Paphlagonia, were driven by a north wind into the Ionian ſea, where they periſhed, and hence originated the fable, that the ſons of Boreas had put them to flight. Some have ſuppoſed that they were the daughters of Phineus, who treated the Argonauts hoſpitably, and ſhewed them the way to Colchis, and that they ruined their father by their debauchery. The abbé Banier conjectures that antiquity deſigned to figure by theſe pretended monſters, ſome turbulent and miſchievous neighbours, or ſome pirates who made frequent deſcents upon the dominions of Phineus; and that he equipped a ſhip, and having put them to flight, purſued them to the Strophades iſles, where they periſhed.

Mr. Bryant ſuppoſes that the Harpies were a college of prieſts in Bithynia, who, on account of their repeated acts of violence and cruelty, were driven out of the country: their temple was called Arpi, and the environs Arpiai, whence the Grecians formed ʽΑρπυιαι; and he obſerves farther, that Harpyia, ʽΑρπυια, was certainly of old the name of a place. Anal. of Anc. Mythol. vol. ii. p. 42.

HARPINEER, or HARPOONEER, an engineer or fiſherman, who manages and throws the harping-iron in the whale-fiſhing. See *Whale* FISHERY.

HARPING-IRON, HARPAGO, *Harpoon*, a ſort of dart or ſpear, faſtened to a line, wherewith they catch whales and other large fiſh, as ſturgeons, &c.

The harping-iron is a large javelin of forged iron, generally about twenty ounces in weight, and about two feet long, with a ſharp, cutting, triangular point, barbed like that of an arrow. At the upper end is engraven the harpineer's name, near a ring to which the line is faſtened, which they let down as ſoon as the fiſh is ſtruck, to give him room to dive, &c. See *Whale* FISHERY.

The harpoon cannot be ſtruck with certainty at any conſiderable diſtance; ſo that unleſs the harpooner is within a yard of a whale, or directly above, this inſtrument cannot be uſed with any great ſucceſs. In the year 1731, a new ſort of gun was invented for ſhooting the harpoons into the bodies of whales at a greater diſtance than they could be thrown by hand, and this was uſed for two or three ſeaſons with ſome ſucceſs: but farther experience has proved the inutility of this contrivance. It was afterwards propoſed to ſubſtitute the ancient baliſta in the room of the gun; but the ſcheme, we believe, terminated in mere ſpeculation. Phil. Tranſ. vol. xlvii. p. 429.

HARPINGS, pieces of oak from four to ſix inches deep, trimmed to the ſhape of the ſhip at the bow and after part lengthwiſe, confining the timbers together before the plank is brought on. See this article fully explained in SHIP-BUILDING.

HARPINGS, *Cat.* See CAT *Harpings.*

HARPLE, or MARPLE, in *Geography*, a townſhip of Delaware county, Pennſylvania, containing 761 inhabitants.

HARPOCRATES, in *Mythology*, the ſon of Iſis and Oſiris. This is an Ægyptian Deity, whoſe diſtinguiſhing attribute is, that he is repreſented with his fingers applied to his mouth, denoting that he is the God of ſilence. The ſtatue of this idol was fixed in the entrance of moſt of the

Egyptian temples, and he was commonly exhibited under the figure of a young man naked, crowned with an Egyptian mitre, holding in one hand a cornucopia, and in the other the flower of lotus, and ſometimes bearing a quiver. As Harpocrates was always repreſented with his finger upon his lips, the Egyptians intended by this attitude to denote, that the gods were to be adored in ſilence, or as Plutarch intimates, that they who knew theſe gods were not to ſpeak of them raſhly. There was even a law, according to Varro, which forbade any, under pain of death, to ſay that Serapis had been a mortal man; and as in the temples of Iſis there was an idol, that is, an Harpocrates putting the finger to his mouth, Varro was of opinion, that he was placed there to recommend ſilence as to that article. Harpocrates and Orus, or Horus, are ſuppoſed to have been the ſame perſon; and as the latter was among the Egyptians the ſymbol of the ſun, the latter is thought to have repreſented the ſame perſon. Accordingly he is ſometimes exhibited under the figure of a child, riſing out of the flower of the lotus, with his head encompaſſed by rays, and with a whip in his hand, to denote the riſing ſun.

HARPOCRATIANS, a ſect of heretics mentioned by Celſus, and the ſame with CARPOCRATIANS.

HARPOCRATION, in *Biography*, a rhetorician of Alexandria, flouriſhed in the fourth century. He wrote a "Lexicon of ten Greek Orators," in which he treats of magiſtrates, courts of juſtice, forms of pleading, diſtricts, men in public ſtations, &c. of Attica. There have been ſeveral modern editions of this work. Moreri.

HARPONELLY, in *Geography*, a circar of Hindooſtan, in Myſore, bounded on the N. by Sanore, on the E. by Chitteldroog, on the S. by Bednore, and on the W. by Canara; about 120 miles in length, and 60 in breadth. After the death of Tippoo, it was ſurrendered to the Mahrattas.—Alſo, the capital of the circar of the ſame name; 65 miles N.N.E. of Bednore. N. lat. 14° 40′. E. long. 75° 28′.

HARPSICHORD, in *Muſic*, a keyed inſtrument of the ſtring kind. It is in fact a horizontal harp, which inſtrument, if ſtrung with wire, and played with a quill like a mandoline, would have the ſame effect. Its tone is produced by jacks quilled with crow or raven quills. (See JACK.) A ſingle harpſichord of two uniſons and one ſet of keys, was, in effect, a double SPINET or VIRGINAL.

But a *double* harpſichord uſed to have two ſets of keys and three ſtrings, two uniſons and an octave to each note. Merlin, we believe, was the firſt who changed the octave ſtop to a third uniſon, about the year 1770, which rendered the inſtrument equally powerful, and leſs ſubject to go out of tune; the octave ſtop being ſo much affected by the leaſt change in the temperature of the air, that it almoſt inſtantly diſcovered when there was a change in the wind.

Beſides arming the tongues of the jacks with crow or raven quills, ſeveral other means were tried by which to produce a ſofter tone, and to be more durable; as the quilling a harpſichord with three ſtops was nearly a day's work: leather, ivory, and other elaſtic ſubſtances were tried, but what they gained in ſweetneſs, was loſt in ſpirit.

The beſt harpſichords of the eighteenth century, were made by Ruckers of Antwerp, and his family; Geronimo of Florence, Couſhette, Tabel, and Kirkman, and Shudi, Tabel's foremen.

However, in the beginning of the laſt century, hammer harpſichords were invented at Florence, of which there is a deſcription in the Giornale d'Italia, 1711. The invention made but a ſlow progreſs. The firſt that was brought to England was made by an Engliſh monk at Rome, Father Wood, for an Engliſh friend (the late Samuel Criſp, eſq. of Cheſington, author of Virginia, a tragedy, and) a man of learning, and of exquiſite taſte in all the fine arts.

The tone of this inſtrument was ſo ſuperior to that produced by quills, with the additional power of producing all the ſhades of *piano* and *forte* by the finger, that though the touch and mechaniſm were ſo imperfect that nothing quick could be executed upon it, yet the dead march in Saul, and other ſolemn and pathetic ſtrains, when executed with taſte and feeling by a maſter a little accuſtomed to the touch, excited equal wonder and delight to the hearers. Fulk Greville, eſq. purchaſed this inſtrument of Mr. Criſp for 100 guineas, and it remained *unique* in this country for ſeveral years, till Plenius, the maker of the lyrichord, tuned by weights, and the tone produced by wheels, made a piano-forte in imitation of that of Mr. Greville. Of this inſtrument the touch was better, but the tone very much inferior.

Backers, a harpſichord maker of the ſecond rank, conſtructed ſeveral piano-fortes, and improved the mechaniſm in ſome particulars, but the tone, with all the delicacy of Schroeter's touch, loſt the ſpirit of the harpſichord, and gained nothing in ſweetneſs.

After the arrival of John Chr. Bach in this country, and the eſtabliſhment of his concert, in conjunction with Abel, all the harpſichord makers tried their mechanical powers at piano-fortes; but the firſt attempts were always on the large ſize, till Zumpé, a German, who had long worked under Shudi, conſtructed ſmall piano-fortes of the ſhape and ſize of the virginal, of which the tone was very ſweet, and the touch, with a little uſe, equal to any degree of rapidity. Theſe, from their low price, and the convenience of their form, as well as power of expreſſion, ſuddenly grew into ſuch favour, that there was ſcarcely a houſe in the kingdom where a keyed-inſtrument had ever had admiſſion, but was ſupplied with one of Zumpé's piano-fortes, for which there was nearly as great a call in France as in England. In ſhort, he could not make them faſt enough to gratify the craving of the public. Pohlman, whoſe inſtruments were very inferior in tone, fabricated an almoſt infinite number for ſuch as Zumpé was unable to ſupply. Large piano-fortes afterwards receiving great improvement in the mechaniſm by Merlin, and in the tone by Broadwood and Stoddard, the harſh ſcratching of the quills of a harpſichord can now no longer be borne. During the laſt century, the eminent Italian performers on, and compoſers for the harpſichord, were Domenico Scarlatti, Alberti, Paradies, and Clementi. Among our great organ players, Kelway, Dr. Worgan, and Mr. C. Burney acquired great reputation by their performance on the harpſichord, as did Mrs. Wynne, Miſs Beſt, and Mrs. C. Burney. In France, Couperin, Jaig, Balbaſtre, Schobert at Straſbourg, and in Germany Emanuel Bach and innumerable others. Dr. Smith, for applying his ſyſtem of equal harmony to practice, added eight ſtrings to the common harpſichord; but the inconvenience of moving the ſliders by the hand is remedied by Dr. Loeſchman's patent piano-fortes and organs, in which the ſliders are moved by pedals, and the ſcale is alſo extended to 24 notes in the octave.

HARPY, in *Ornithology*, the trivial name of the Gmelinian FALCO *Rufus*; called alſo *Harpage*.

HARQUEBUSS, in our *Ancient Statutes*, called alſo *arquebuſe*, *haquebut*, or *hagbut*, is a hand-gun, or a fire-arm of a proper length, &c. to be borne in the arm.

The word is formed of the French *arquebuſe*; and that from the Italian *arcobuſio*, or *arco abuſo*, of *arco*, *a bow*, and *buſio*, *a hole*; on account of the touch-hole, at which the powder is put to prime it, and that it ſucceeded to the bows of the ancients. The harquebuſs is properly a fire-arm, of the ordinary length of a muſket or fowling-piece; cocked uſually with a wheel. Hanzelet deſcribes its legitimate length to be forty calibres ; and the weight of its ball one ounce ſeven eighths ; its charge of powder as much.

There is alſo a larger kind, called *harquebuſs a croc*, much of the nature of our blunderbuſſes, uſed in war for the defence of places, being uſually reſted on ſomething when diſcharged. The firſt time theſe inſtruments were ſeen, was in the imperial army of Bourbon, who drove Bonnivet out of the ſtate of Milan : they were ſo big and heavy, that there were two men to carry them. They are now little uſed except in ſome old caſtles, and by the French in ſome of their garriſons.

HAIRA, in *Geography*, a town of Perſia, in the province of Segeſtan ; 105 miles W.N.W. of Zareng.

HARRAD, a town of Arabia Felix, in the province of Yemen ; 24 miles S. of Abu-Ariſch.

HARRIER, in *Ornithology*, called alſo the hen-harrier, the Falco *cyaneus*.

Harrier, or *Leverarius*, a kind of hound, called in Latin *ſagax*, from his tracing or chaſing by foot ; being endowed with an admirable gift of ſmelling, and alſo very bold in the purſuit of his game.

There are ſeveral kinds, all differing in their ſervices ; being for the hare, fox, wolf, hart, buck, badger, otter, polecat, weaſel, or coney ; ſome, in fine, for one game, ſome for another, &c. See Dog and Hunting.

HARRINGTON, James, in *Biography*, a celebrated political writer, was born at Upton, in Northamptonſhire, in 1611. He was naturally of a ſerious and very ſtudious diſpoſition, and was diſtinguiſhed, in early life, for habits and manners different from thoſe of moſt other children. He ſtudied at Trinity college, Oxford, of which he was admitted fellow commoner in 1629. On the death of his father, he quitted the univerſity, after a reſidence of three years, and travelled into foreign countries. In the Netherlands he entered as a volunteer. He frequented ſeveral courts on the continent, and at Rome diſtinguiſhed himſelf, by refuſing, at a public ceremonial, to kiſs the pope's toe ; when blamed, in the preſence of his own king, for this want of attention to foreign cuſtoms, he replied, that having had the honour of kiſſing his majeſty's *hand*, he thought it beneath him to kiſs the *toe* of any other ſovereign. In the civil wars, he took no very active part, but his principles led him to ſide with the parliament. In 1647, he was, at the recommendation of the parliamentary commiſſioners, nominated by the king as one of the grooms of his bed-chamber, upon the diſmiſſion of ſome of his old ſervants. The great learning and genius of Harrington won ſo much upon the king, that he was accuſtomed to converſe more with him than his other attendants ; and the royal condeſcenſion and familiarity had ſuch an effect upon the mind of Harrington, that he uſed every effort to accommodate the differences between the king and parliament. His commiſeration for the depreſſed circumſtances of Charles was the cauſe of his being diſmiſſed from his office : at this circumſtance, the concern of both parties was manifeſt, and it is ſaid, that the king gave him a token of his affection before his execution. That event, which Harrington had done all in his power to avert, gave a ſevere ſhock to his feelings, and he never forbore to ſpeak of it with extreme regret, and with commiſeration of the unfortunate prince. He was too much of a republican, and underſtood too well his own principles, to be pleaſed with the conduct of Cromwell, and during the protectorate he paſſed his time in retirement, chiefly occupied in the compoſition of that work by which he is chiefly known, *viz.* " The Oceana." Cromwell cauſed the performance to be ſeized at the preſs, but, through the interceſſion of the protector's daughter, it was reſtored, and given to the public in 1656. The Oceana, ſays Mr. Hume, vol. vii. p. 347, was well adapted to that age, when the plans of imaginary republics were the daily ſubjects of debate and converſation ; and even in our time, it is juſtly admired as a work of genius and invention ; the idea, however, of a perfect and immortal commonwealth, will always be found as chimerical as that of a perfect and immortal man. The ſtyle of this author wants eaſe and fluency, but the good matter which his work contains makes compenſation. Another work of this author, was entitled " The Art of Law-giving." To propagate the principles of republicaniſm, he inſtituted a kind of debating club, called the " Rota," which met at a tavern for diſcuſſion, and frequently tried the ſenſe of the public on political queſtions, by a ballot. (See Rota.) At the reſtoration, Harrington retired to privacy, in which he ſtill buſied himſelf in political ſchemes, and was viſited by many, ſome with a view of profiting by his converſation, and others, as it afterwards appeared, in the deteſtable character of ſpies on his private thoughts. In 1661, he was arreſted, on the accuſation of ſome of thoſe wretches, and committed priſoner to the Tower, for " treaſonable practices," a convenient phraſe, which may mean any thing and nothing. His impriſonment was, however, of the ſevereſt kind, and the hardſhips which he underwent brought on a mental derangement, of which he never completely recovered. He died in the year 1677, and was buried in St. Margaret's church, Weſtminſter. He was a man of extenſive knowledge and conſiderable abilities. Of his writings, few are ever looked into by readers of the preſent day, except his " Oceana," which was a kind of political romance, exhibiting an ideal republic, formed upon a model, as he deemed it, moſt favourable to public liberty. His works were collected by Toland, and printed in one vol. fol. in the year 1700, but a more complete edition of them was printed in 1737, by Dr. Birch. Biog. Brit. Hume's Hiſt.

Harrington, *Sir* John, was born about the year 1561, at Kelſton, near Bath. His father had been impriſoned, in the time of queen Mary, for holding a correſpondence with the princeſs Elizabeth, who, when ſhe came to the throne, ſhewed her regard for his attachment to her in misfortune, by ſtanding god-mother to his ſon. The youth, when at an age fit for it, was ſent to Eton ſchool, and from thence he removed to Cambridge. He was firſt known to the public by a tranſlation of Arioſto's Orlando Furioſo, which gave him a conſiderable reputation as a poet. After his death, his " Epigrams" were publiſhed in four books : and ſome of his other writings were printed about 40 years ago, by Henry Harrington, of Queen's college, Cambridge, in connection with pieces by different perſons, under the title of Nugæ Antiquæ. In public life Mr. Harrington went out with the earl of Eſſex to Ireland in 1599, and received from him the honour of knighthood : and by king James he was made knight of the Bath. He died in 1612, and had previouſly ſketched a plan for the hiſtory of his own times. Biog. Brit.

Harrington, in *Geography*, a town of America, Waſhington county, Maine, at the head of Narraguagus bay, containing 298 inhabitants.—Alſo, a townſhip in Bergen county, New Jerſey.

HARRIORPOUR, a town of Hindooſtan, and capital of the circar of Mohurbunga, in Oriſſa ; 105 miles W.S.W. of Calcutta. N. lat. 21° 53′. E. long. 86° 13′.—Alſo, a town of Hindooſtan, in Oude ; 26 miles W. of Fyzabad. —Alſo, a town of Mocampour ; 15 miles S. of Mocampour.

HARRIOT, Thomas, in *Biography*, was born at Oxford in the year 1560, where he was educated; and at St. Mary's hall he was admitted to the degree of B. A. in the year 1579. At this period he had acquired ſo high a reputation for mathematical knowledge, that he was appointed preceptor to ſir Walter Raleigh. He was not long in this capacity, but during the time he had acquired the eſteem and confidence of his pupil ſo completely, that we find him ſent out by him with the colony under ſir Richard Grenville to Virginia, in the year 1585, as a perſon qualified to prepare the way for ſettling it. Mr. Harriot remained in that country about a year, diligently employed in ſurveying it, and in obſerving the nature of its productions, as well as the cuſtoms and manners of its inhabitants. Upon his return to England he publiſhed "A brief and true report of the new-found land of Virginia, of the commodities there found and to be raiſed," &c. 4to. This work was printed in the year 1590, and about the ſame time the author was introduced by ſir Walter to the acquaintance of Hugh Percy, earl of Northumberland, who granted him a penſion of 300*l.* per annum. When that nobleman was committed to the Tower, a handſome table was kept for Mr. Harriot, and ſome other mathematical friends with whom the earl paſſed the hours of his confinement in literary and ſcientific converſation. Sir Walter, being in the Tower at the ſame time, frequently joined their ſociety, and ſoftened the rigours of his impriſonment. Mr. Harriot died in 1621, in the ſixty-firſt year of his age. He was the ſubject of univerſal eſteem. While a young man he was ſtyled by Hakluyt, "Juvenis in diſciplinis mathematicis inſignis;" and by Camden, "Mathematicus inſignis;" he is ſpoken of in terms of no leſs reſpect by ſeveral other great and eminent men of his day. Mr. Harriot will always be remembered as the inventor of the preſent improved method of algebraical calculation. His improvements in algebra were adopted by Des Cartes, and for a conſiderable time impoſed on the French nation as his own, but the piracy was diſcovered and made known by Dr. Wallis, in his Hiſtory of Algebra. Mr. Harriot's work is entitled "Artis analyticæ praxis ad æquationes algebraicas nova expedita, et generali methodo reſolvendas, è poſthumis Thomæ Harriot." It appears from unqueſtionable evidence that Harriot was as able an aſtronomer, as he was celebrated in the analytic art. He was the firſt who obſerved the ſpots in the ſun, on which he made 197 obſervations. It is a matter of doubt whether he or Galileo firſt ſaw the ſatellites of Jupiter; he likewiſe made ſeveral obſervations upon the moon, the planet Mars, the ſolſtices, and comets. The knowledge of theſe facts was brought to light by Dr. Zach, an able aſtronomer, of Saxe Gotha, who had, in the year 1784, acceſs to the MSS. left by Harriot, and which are in the poſſeſſion of the earl of Egremont, a deſcendant of the earl of Northumberland, who was Harriot's patron.

HARRIS, Walter, in *Biography*, was born at Glouceſter about the year 1651. He took the degree of batchelor of phyſic at Oxford in October 1670; but having embraced the Roman Catholic religion in 1673, he quitted that univerſity, and received his doctor's degree from ſome univerſity in France. He returned to London in 1676, and commenced the practice of his profeſſion; and with a view to evade the operation of the order, that all Catholics ſhould quit the metropolis, in 1678, when he found his profeſſional reputation increaſing, he publicly renounced his errors, and profeſſed the Proteſtant faith. His practice was rapidly augmented, and on the acceſſion of William III. he was appointed phyſician in ordinary to that monarch. He died in 1725.

The principal work of Dr. Harris is ſaid to have been publiſhed on the ſuggeſtion of the celebrated Sydenham, and is entitled "De Morbis Acutis Infantum;" it was firſt publiſhed in 1689, and has paſſed through ſeveral editions. He left two other treatiſes, *viz.* one relative to the plague, including ſome account of inoculation as practiſed by the Turks and Chineſe, printed in 1721; and another containing ſome medical and ſurgical papers, which had been read at the college of phyſicians, 1725. Eloy. Dict. Hiſt.

Harris, John, the firſt compiler of a Dictionary of Arts and Sciences in this country, deſerves particular notice in the Cyclopædia, though no memorial of him has hitherto appeared in ſimilar publications. The inattention of his contemporaries has rendered it difficult to collect any authentic information concerning him. We have taken ſome pains in our reſearches for this purpoſe, and by favour of the late Mr. Iſaac Reed, who was no leſs communicative to his friends than induſtrious in acquiring every kind of literary intelligence, and by the aid of ſome other communications, we have been enabled to reſcue and to preſerve the ſubject of this article from oblivion. Mr. Harris was born about the year 1670, and received his education at St. John's college, in the univerſity of Cambridge, where he took the degree of batchelor of arts in 1687, and that of maſter in 1691. Having taken orders in the church, he obtained conſiderable preferments. He was firſt inſtituted into the rectory of Barming, which he reſigned for St. Mildred, Bread-ſtreet, London; he had alſo the perpetual curacy of Stroud near Rocheſter in Kent, and he was prebendary of Rocheſter cathedral. He was a fellow, ſecretary, and vice-preſident to the Royal Society. In 1698, he preached the courſe of Boyle's Lectures, which was publiſhed (ſee Collection of Boyle's Lectures, Feb. 1739. vol. i. p. 356—425); and in the next year he took the degre of doctor of divinity. Dr. Harris alſo publiſhed ſeveral ſingle ſermons, *viz.* a ſermon on the Faſt, 1701, with another on the Faſt, 1703, 4to.; a ſermon, intitled "the Modeſt Chriſtian's Duty as to indifferent things in the worſhip of God," 1705, 4to.; another on "The lawfulneſs and uſe of Public Faſting," 1706, 4to.; "The evil and miſchief of a fiery ſpirit," a ſermon publiſhed in 1710, 4to.; another on the rebellion in 1715, 8vo.; and a ſermon on the acceſſion, 1715, 4to. He alſo publiſhed a "Collection of Voyages and Travels, with a number of Engravings;" a "Treatiſe on the Theory of the Earth," in 1697; a "Treatiſe on Algebra," in 1702; a "Tranſlation of Pardie's Geometry into Engliſh," a 7th edition of which, in 12mo. was printed in 1734; "Aſtronomical Dialogues," the third edition of which appeared in 1795: but the work for which he was moſt eminently diſtinguiſhed, and which entitles him to honourable notice, was his "Lexicon Technicum," or "An Univerſal Dictionary of Arts and Sciences," in 2 volumes folio, publiſhed in 1708; from which originated all the other Dictionaries of Science and Cyclopædias that have ſince appeared. He was followed, at a conſiderable interval of time, in this department of literature, by Mr. Ephraim Chambers, whoſe Cyclopædia, with all the improvements it has received, has long maintained diſtinguiſhed reputation. We are concerned to be obliged to add, that though Dr. Harris was a man of unqueſtionable abilities and attainments, and of great literary application, he was chargeable with culpable imprudence in his conduct, and, notwithſtanding the preferments he enjoyed, he was generally in diſtreſs. He died Sept. 7, 1719, leaving unfiniſhed the "Hiſtory of Kent," which was publiſhed in folio ſoon after his death, and which, though it had engaged his attention, more or leſs, for eight years, is extremely inaccurate. Mr. Gough ſays (Britiſh Topography, vol. i. p. 445) "Dr. Harris died an abſolute pauper at

Norton court, and was buried in Norton church, at the expence of John Godfrey, eſq. who had been his very good friend and benefactor."

Harris, James, ſon of a gentleman of the ſame name, and lady Elizabeth Aſhley, ſiſter of the earl of Shafteſbury, the author of the Characteriſtics, was born at Saliſbury in 1709, where he was educated under Mr. Hill, the maſter of the grammar ſchool of that city. At the age of ſixteen he was entered as a gentleman commoner at Wadham college, Oxford, from whence he removed to Lincon's Inn, meaning to ſtudy the law as a gentleman, but without looking to it as his profeſſion. When he had attained his twenty-fourth year, by the death of his father, he came into poſſeſſion of large property, retired to his native place, and devoted himſelf to the careful peruſal of the beſt writers of antiquity. His firſt literary production was a volume containing three treatiſes on Muſic, Painting, and Happineſs, which diſplayed a great extent of reading, and a penetrating judgment, clearly ſhewing that he was well fitted to reaſon upon, and illuſtrate ſpeculative and abſtract topics. In 1751 he publiſhed his moſt celebrated work, entitled "Hermes, or a Philoſophical Enquiry concerning Univerſal Grammar." This treatiſe was received with great applauſe by the learned, and placed the author, in the general opinion, among the moſt profound and erudite dialecticians. Concerning this work the late biſhop of Lowth obſerved, that "thoſe who could enter deeply into the ſubject of univerſal grammar, will find it fully and accurately handled, with the greateſt acuteneſs of inveſtigation, perſpicuity of explanation, and elegance of method, in a treatiſe entitled "Hermes," the moſt beautiful example of analyſis that has been exhibited ſince the days of Ariſtotle." This high reputation it generally maintained till it was attacked by the acute, the ſagacious and learned J. H. Tooke, who, for more than twenty years, ſeems to have borne away the palm, by his work entitled Επεα Πτεροεντα. There are thoſe, however, who hold this work extremely cheap, and who ſtill adhere to the theory of Mr. Harris as moſt learned, moſt rational, and moſt intelligent. (See our article Grammar.) Mr. Harris was no leſs a votary of the fine arts than of ſcience. He was particularly ſenſible to the charms of muſic, and under his patronage the annual muſical feſtivals at Saliſbury greatly flouriſhed. In 1761 he obtained a ſeat in parliament for the borough of Chriſtchurch, and in the following year he was appointed to the office of one of the lords commiſſioners of the admiralty, which, in 1763, he was enabled to exchange for the place of a lord of the treaſury. In 1765 he went out of office with the adminiſtration, which he had ſupported while in power, and, in 1774, he became ſecretary and comptroller to the queen, an honour which he highly valued, and which, with his ſeat in parliament, he retained till his death. Notwithſtanding his official duties he ſpent much time in literary purſuits, and in 1775 he publiſhed his "Philoſophical Arrangements," intended to illuſtrate the logic of Ariſtotle. His concluding work was given to the world in 1780, entitled "Philological Enquiries." In the ſame year he died, at the age of ſeventy-two. Mr. Harris poſſeſſed a profound knowledge of the Greek language, which he applied to the ſtudy and explanation of the ancient philoſophy; he was admired and revered as a man of profound learning, he was beloved by his family and friends, and, as we have ſeen, was entruſted with the diſcharge of ſeveral important offices in the ſtate. He left one ſon, the preſent earl of Malmeſbury, who publiſhed a complete edition of his father's works, with an account of his life, in two vols. 4to., to which the reader is referred.

This excellent ſcholar, and moſt worthy and reſpectable character, in the early part of his life, cultivated muſic with as much aſſiduity as the learned languages and Categories of Ariſtotle. In his ingenious "Eſſay on Muſic," he illuſtrates his precepts and reflexions almoſt excluſively from Handel; but keeping pace with the times in the refinement of melody, without injuring harmony, Jomelli and Sacchini became his favourite compoſers: the firſt for rich harmony and grand and new effects; the ſecond for grace, pathos, and delicacy.

The city of Saliſbury, where Mr. Harris had eſtabliſhed muſical performances with ſuperior taſte and intelligence, will long deplore his loſs; not only as the patron and guide of that art, and for his profound learning; but for his candour, liberality, and univerſal benevolence.

Harris ſenior, and **Renatus Harris**, his ſon, two eminent organ-builders, called hither from France, ſoon after the reſtoration, to ſupply our churches with inſtruments, which, during the grand rebellion and the interregnum, had been injured, baniſhed, or deſtroyed, were excellent workmen, only inferior to father Smith, to whom Renatus, after the death of his father, in 1672, became a formidable rival.

The contention between theſe eminent artiſts, at the time of erecting the admirable organ which ſtill ſtands in the Temple-church, was carried on with ſuch ſpirit, not to ſay violence, as perhaps never happened before, or ſince, on a ſimilar occaſion.

About the latter end of the reign of Charles II., the maſter of the Temple and the benchers being determined to have as complete an organ erected in their church as poſſible, received propoſals from both theſe eminent artiſts, backed by the recommendation of ſuch an equal number of powerful friends and celebrated organiſts, that they were unable to determine among themſelves which to employ. They therefore told the candidates, if each of them would erect an organ in different parts of the church, they would retain that which, in the greateſt number of excellencies, ſhould be allowed to deſerve the preference. Smith and Harris agreeing to this propoſal, in about eight or nine months, each had, with the utmoſt exertion of his abilities, an inſtrument ready for trial. Dr. Tudway living at the time, the intimate acquaintance of both, ſays that Dr. Blow and Purcell, then in their prime, performed on father Smith's organ, on appointed days, and diſplayed its excellence; and, till the other was heard, every one believed that this muſt be choſen.

Harris employed M. Lullie, organiſt to queen Catharine, a very eminent maſter, to touch his organ, which brought it into favour; and thus they continued vying with each other for near a twelve-month.

At length, Harris challenged father Smith to make additional reed-ſtops in a given time; theſe were the vox-humana, *cromorne*, the double courtel, or double baſſoon, and ſome others.

The ſtops which were newly invented, or at leaſt new to Engliſh ears, gave great delight to the crowds who attended the trials; and the imitations were ſo exact and pleaſing on both ſides, that it was difficult to determine who had beſt ſucceeded. At length, the deciſion was left to lord chief juſtice Jefferies, afterwards king James II.'s pliant chancellor, who was of that ſociety, and he terminated the controverſy in favour of father Smith; ſo that Harris's organ was taken away without loſs of reputation, having ſo long pleaſed and puzzled better judges than Jefferies.

The Hon. Roger North, who was in London at the time of the contention at the Temple-church, ſays, in his Memoirs of Muſic, that the competition between father Smith and Harris, the two beſt artiſts in Europe, was carried on with ſuch violence by the friends of both ſides, that they "were juſt not ruined." Indeed old Roſeingrave aſſured us, that the partizans for each candidate, in the fury of their zeal, proceeded to the moſt miſchievous and unwarrantable acts of hoſtilities; and that in the night preceding the laſt trial of the reed-ſtops, the friends of Harris cut the bellows of Smith's organ in ſuch a manner, that when the time came for playing upon it, no wind could be conveyed into the wind-cheſt.

Harris's organ, after its rejection at the Temple, was part of it erected at St. Andrew's, Holborn, and part in the cathedral of Chriſt-church, Dublin.

Harris, William, was born at Saliſbury about the year 1720. He was educated for the profeſſion of a diſſenting miniſter at Mr. Grove's academy, Taunton, and firſt ſettled with a congregation at St. Loo, in Cornwall. From this place he removed to Wells, where he was ordained, and reſided ſome years. He next went to Honiton, the native place of the lady whom he married, and at Luppit, in its neighbourhood, he continued to preach till his death. He became more diſtinguiſhed as a writer than a preacher, and was firſt known in that line by an "Account of the Life of Hugh Peters," which he publiſhed in 1751, after the manner of Bayle. The facts contained in this piece are chiefly taken from Peters' dying advice to his daughter. This was followed by hiſtorical and critical accounts of the lives of James I., Charles I., Oliver Cromwell, and Charles II. printed at different times, between the years 1754 and 1766. They conſiſt of five volumes 8vo. and are written after the manner of Bayle, in order that he might have an opportunity of entering into diſquiſitions, and to indulge in reflections in the notes, which in the text would have interrupted the connection, and been inconſiſtent with the even tenor of the narrative. The characteriſtics of Mr. Harris, as a writer, were diligence in collecting materials, exact fidelity in quoting authorities, and impartiality in ſtating facts drawn from authentic ſources, original writers, and ſtate papers. He was an ardent friend to liberty; and every inſtance of perſecution, tyranny, and oppreſſion raiſed his honeſt indignation: his hiſtories were written, not for the ſake of thoſe who govern, to ſhew them how they may act moſt at their eaſe, but for the uſe of the people to point out to them that they have, inherent in themſelves, claims of rights, liberties, privileges, and equal government. Mr. Harris was patronized in his various labours by Mr. Thomas Hollis, the enlightened and zealous friend to freedom, who, without regard to expence, liberally procured for him the materials requiſite for his compoſitions. He died at Honiton in the year 1770. The degree of D.D. had been conferred upon him by the univerſity of Glaſgow in the year 1765. He was author of ſome anonymous pieces, particularly of an anſwer to "An Eſſay on Eſtabliſhments in Religion," by Mr. Rotheram, who had written, it was ſuppoſed, under the direction of archbiſhop Secker. All Mr. Harris's works have been well received, and thoſe who differ from him in principles, highly eſteem him on account of his induſtry and faithfulneſs as an hiſtorian. As a preacher, his diſcourſes were plain and practical; as a man and Chriſtian, he was diſtinguiſhed by ever expreſſing a juſt indignation of whatever was baſe and diſhonourable, by an inflexible integrity, and by a ſeries of liberal and benevolent actions; his heart was friendly, and his manners marked by frankneſs and ſimplicity. Monthly Magazine, vol. x.

Harris, in *Geography*, one of the Hebrides, or weſtern iſlands of Scotland, united to *Lewis* by a narrow iſthmus, dry at low water, and partially covered by the tide, and forming with the iſlands to the ſouthward a chain called the "Long iſland," upwards of 200 miles in length, and from three to 20 in breadth. On the E. ſide theſe iſlands, in general, are rough and mountainous, and on the W. they are, in many parts, level, ſandy, and tolerably fertile. Harris, which is the ſouthern diviſion of Lewis, lies in N. lat. 57° 40′, being 15 miles in length, and from 6 to 12 in breadth, and contains 2600 inhabitants, ſcattered along the coaſts, including thoſe of various contiguous iſlets. The eaſt ſide of this iſland is rocky and indented with bays and inlets; but on the W. are ſome tolerable farms. The face of the country is rugged and mountainous, affording paſtures to horſes, cattle, and ſheep, and abounding in freſh-water lakes and rivers, ſtored with fiſh. It contains ſeveral remarkable caves, and particularly one called Ulweal, capable of accommodating 50 perſons The channel on the ſouth coaſt is navigable for veſſels of burden under the direction of a ſkilful pilot. The northern diſtrict is an aſſemblage of conical hills, without inhabitants. Kelp is the ſtaple article for exportation from this and the neighbouring iſlands.

HARRISBURG, originally *Louiſburg*, a poſt town of America, and the capital of Dauphine county, Pennſylvania, ſituated on the N.E. banks of Suſquehanna river. It is regularly laid, and contains about 400 houſes, a ſtone-gaol, a German church, and a court-houſe. Its inhabitants amount to 1472. Immenſe quantities of lumber are annually brought hither from the country above, and it has manufactures of leather, hats, and nails; 107 miles W. of Philadelphia. N. lat. 40° 16′.

HARRISON, John, in *Biography*, the celebrated inventor and maker of the watch called the "Time-keeper," for aſcertaining the longitude at ſea, and alſo of the gridiron *Pendulum* (which ſee); was born at Foulby, near Pontefract, in Yorkſhire, in the year 1693. His father was a carpenter, and being unable to ſupply his ſon with much education, he employed him, as ſoon as he was able, in his own buſineſs, and occaſionally, as is uſual with country mechanics, in land-ſurveying, and repairing clocks and watches. An inſtance given of his attachment to machinery is, that when he was only ſix years old, his mind was diverted from the tedium and pain occaſioned by the ſmall-pox, by contemplating the movements of a watch which was placed open upon his pillow. He removed with his father in the year 1700 to Barrow in Lincolnſhire, where he was indulged by the clergyman of the place with the loan of a manuſcript copy of profeſſor Saunderſon's Lectures, which he carefully and neatly tranſcribed. In 1725 he had ſo far ſurmounted the difficulties of his ſituation, that he had conſtructed two clocks, chiefly in wood, but he had applied to them the eſcapement and compound pendulum of his own invention. Theſe pieces of workmanſhip ſurpaſſed every thing of the kind then made, ſcarcely wandering from the truth one ſecond in a month. Encouraged by this ſucceſs he came to London with his clocks, which he ſhewed to Dr. Halley, and Mr. Graham, who encouraged him to proceed in his deſign. With this advice he readily complied, and having returned home, completed his machine, which anſwered his expectations in a long trial, during much bad weather, and ſubject to the motions of a veſſel on the river Humber. In the year 1736 he viſited the metropolis again, with a machine which was ſhewn to the board of Longitude, who ſent him with it to Liſbon to make a trial of its properties. In this ſhort voyage he corrected the dead reckoning nearly a degree and half; a ſucceſs which proved the means of his receiving both public and private encouragement. From this time he went on improving his invention, and at length received the promiſed reward of 20,000*l*. He died in the year 1776, having nearly completed his eighty-third year. Mr. Harriſon's cloſe and unremitted attention to the purſuit of one object diſqualified him for entering deeply into other kinds of knowledge. On mechanics, and topics connected with this ſcience, he could converſe with preciſion and great clearneſs, but he found it very difficult to deliver his meaning in writing, which was evident in his "Deſcription concerning ſuch mechaniſm, as will afford a nice or true Menſuration of Time." This work contains alſo an account of his new muſical ſcale, or mechanical diviſion of the octave, according to the proportion which the radius and diameter have reſpectively to the circumference. Mr. Graham, whoſe name has been mentioned above, was not only the beſt watch and clock maker of his time, but a complete mechanic and aſtronomer. He made and divided with his own hand the great mural arc in the Obſervatory of Greenwich, and from this very inſtrument the beſt foreign arcs have been copied by Engliſh artiſts. He conſtructed the ſector by which Dr. Bradley made his diſcoveries of the motions in the fixed ſtars; and he ſupplied the French academicians with inſtruments when they were ſent into the north to aſcertain the figure of the earth. He was a fellow of the Royal Society, and communicated to that learned body many valuable papers.

HARRISON, in *Geography*, a townſhip of America, in Weſt Cheſter county, New York, containing 856 inhabitants.—Alſo, a county in the weſtern part of Virginia, bounded N. by Ohio county, N. E. by Monongalia, S. by Greenbriar, and S. W. by Kenhawa; about 120 miles long, and 80 broad, containing 4603 free inhabitants, and 245 ſlaves. Its chief town is Clarkſburg.—Alſo, a county in the N. E. part of the ſtate of Kentucky, N. of Bourbon; well watered, and containing 4263 inhabitants. Its chief town is Cynthiana.—Alſo, a cape on the E. coaſt of Newfoundland. N. lat. 54° 9'. W. long. 57°.

HARRISON'S *Temperament* of the muſical ſcale. In the preface to Dr. Smith's "Harmonies" we are informed, that the late Mr. Harriſon, who conſtructed the famous longitude watches, applied a temperament in adjuſting the frets on the neck of his baſe-viol, wherein the interval of the octave bore the ſame ratio to its major third, as the circumference does to the diameter of a circle; of courſe $.9041791.66$ is the logarithm of this third, $= 194.77767\ \Sigma + 4f + 17\ m$, or the temperament of it is flat, $2.22233\ \Sigma$; whence, by Mr. Farey's Corollaries, in the Philoſophical Magazine, vol. 36. p. 375, we have, $-3.30754\ \Sigma$ the flat temperament of the fifths, and $+ 1.08521\ \Sigma$ the ſharp temperament of the major ſixths; the wolves, which are very great, may be obtained from the ſame corollaries, if wanted.

HARRISTOWN, in *Geography*, in the county of Kildare, and province of Leinſter, Ireland, a *ſingle houſe*, which, previous to the union, returned two members to the Iriſh houſe of commons, under the direction of one of the Latouche family. It is 2½ miles from Kilcullen bridge.

HARROD'S CREEK, a river of Kentucky, which runs into the Ohio. N. lat. 38° 11'. W. long. 86° 2'.

HARRODSBURG, or HARRODSTOWN, a poſt-town of America, in Mercer county, Kentucky, at the head of Salt river, containing about 20 houſes; 825 miles S. W. of Philadelphia.

HARROW, in *Fortification*, is a gate made of timber, whoſe dimenſions are commonly ſix by four inches, and ſix inches diſtant from each other, well faſtened to three or four croſs bars, and ſecured with iron.

HARROW, called *Harrow-on-the-Hill*, in *Geography*, is a pariſh in the hundred of Goare, and county of Middleſex, England. The village ſtands on the higheſt hill in the county, whence originated its appellation. This hill appears to riſe out of a rich vale, and aſſumes an inſulated character; whereby the proſpects from its apex are extenſive and varied, whilſt the town on the top is ſeen from very remote diſtances to the W., S. W., and N. W. Harrow had formerly a weekly market, which is now diſuſed. It is ten miles from Tyburn-Turnpike, London, and contains 378 houſes, and 2485 inhabitants. The pariſh contains about 13,600 acres of land, of which 1600 are waſte. It comprehends the hamlets of Pinner, Roxey, Wembley, Weald, Apperton, Reaton, and Preſton. Previous to the Norman conqueſt this manor belonged to the ſee of Canterbury; and the archbiſhops had a manor-houſe here. They had another manſion in the manor of Heggeton, in the Pinner diviſion of this pariſh. The church is partly of ancient architecture, and appears to have been firſt built by Lanfranc, in the time of king William I. Parts of this building are ſuppoſed to remain, in the columns between the nave and aiſles, and the lower part of the tower. In the church are ſeveral ſepulchral monuments; one to ſir John Flambard; another to John Lyon, founder of Harrow-ſchool, who died 1592; and a third to Dr. Sumner, with a Latin epitaph written by Dr. Parr. The free-ſchool of this place now ranks among the moſt eminent public ſeminaries in the kingdom, and gives Harrow its chief celebrity. The founder drew up the ſtatutes for its government with much attention and preciſion; ſpecifying the routine of inſtruction to be purſued; mode of correction; hours of attending ſchool, and objects of diverſion, for play-hours. Theſe are "driving a top, toſſing a hand-ball, and running and ſhooting." The latter ſport has been diſcontinued above forty years. A competent number of poor ſcholars were to be educated free of expence, and the maſter allowed to take other children for his own emolument. No girls were to be admitted. The ſum of 20*l.* was allotted for two exhibitions to Caius college, Cambridge, and two more to Oxford. This ſum is now raiſed to 20*l.* for each boy. Governors of title and high reſpectability are appointed to controul and regulate the government of the eſtabliſhment; and men of conſiderable claſſical attainments have been ſelected as maſters. The number of ſcholars is generally about one hundred and fifty. Mr. Lyſons ſtates, that "the preſent rent of Mr. Lyon's eſtates amounts to 669*l.* which is expended by the governors in paying the maſters' ſalaries, and the exhibitions, educating poor children, relieving decayed houſekeepers, repairing roads, &c." In this pariſh the marquis of Abercorn has a handſome ſeat, which contains a valuable collection of pictures, by the old maſters, ſome antique buſts, &c. Lyſons's Environs of London, 4to. vol. ii. 1795.

HARROW, in *Huſbandry*, the name of a tool employed on tillage land, for the purpoſe of breaking down and reducing the lumpineſs of it, as well as the covering in the ſeed when ſown upon it. It conſiſts of a kind of wooden frame, commonly conſtructed in the form of a ſquare, and ſet with numerous teeth, or tines made of iron.

There are ſeveral different ſorts or deſcriptions of harrows made uſe of in the buſineſs of tillage huſbandry; but the moſt uſual are thoſe of the ſingle and double brake harrow, the triangular harrow, the iron harrow, &c.

It is neceſſary, in the cultivation of land, that the tools of this nature ſhould vary conſtantly in their ſizes and weight, as well as in the lengths and ſtrengths of the teeth or tines, in proportion to the nature of the ſoils on which they are to be employed, and the different purpoſes for which they are intended.

Harrows, though tools of great utility in the work of arable cultivation, have hitherto undergone but very little improvement in their conſtruction; the principal points in which they have been rendered more beneficially applicable and convenient for uſe, appear to be in the form of the frames; the poſition and manner of fixing in the tines or teeth into them; the directions of the bulls or ſolid parts; and in the method of attaching the draught to the tools.

It has been hinted by a late writer, on the authority of much experience, that there is no one harrow, whatever the nature of its conſtruction may be, that can be applicable to every deſcription of ſoil, or which can operate with equal effect and advantage on ſuch lands as are rough and ſmooth, looſe and ſolid, &c. It is neceſſary that they ſhould conſtantly be fitted to the particular nature of the ſoil, and the peculiar uſes for which they are employed. In the lighter ſorts of ground, it is obvious, that ſmaller and lighter ſorts of harrows, with ſhorter teeth, may fully anſwer the purpoſes of the cultivator, than in ſuch as are ſtrong, heavy, and tenacious, or which have been lately broken up from the ſtate of old ſward, and that of common moor heath, and other ſorts of waſte, where they ſhould have much greater weight and length of tines.

And it is frequently the practice, in caſes where the ſoil is rough and ſtubborn, as in ſome inſtances of fallowing ſtiff clayey lands, to unite two common harrows together, in order more completely to reduce and break down the lumpineſs of ſuch grounds. And in the view of effecting theſe purpoſes, eſpecially where the ſoil is ſtiff, adheſive, and much matted with weeds, it has been found advantageous not to have the harrows too thickly ſet with tines; as by this means they are not ſo liable to become choaked up, and prevented from working in a proper manner, nor in reducing the earthy materials of ſuch grounds.

In the buſineſs of harrowing much time is frequently loſt in turning at the ends of the ridges, eſpecially where double harrows are in uſe, by their hitching or riding upon each other, or turning over, in putting them right again; it has been attempted to remove ſuch inconveniencies by having the harrows conſtructed with running bulls, which are ſaid to anſwer the purpoſe very perfectly. But it has been lately ſuggeſted, that inconveniences of this nature may be obviated in a much more ready manner, and with far leſs expence, by the mere faſtening of the different harrows together by means of ſuitable hooks and eyes, or what in ſome places are denominated coupling-irons; as in this way the different harrows are ſuffered to riſe and fall at the ſame time, and thereby kept from riding over each other.

In the forming of harrows, ſome differences in the poſitions of the teeth have likewiſe been attempted, in order that they may not move in the ſame lines of direction. This has been tried in ſeveral different modes, but the moſt eaſy, ſimple, and expeditious contrivance ſeems to be that of forming the harrows in ſuch a way, as that they may be ſome inches narrower in the fore than the hind parts, and be capable, at the ſame time, of being ſet to different widths, by which, the diſtances between the tines may be regulated by ſimply augmenting or diminiſhing the ſpaces between the fore and the hind parts of the tools.

In harrows of the common kinds, this object is uſually accompliſhed, in ſome degree, by their being attached to the moving power in ſuch a way as that they may be dragged over the ſurface of the ground in a ſort of diagonal line of direction.

It may be noticed, that in the conſtruction of all the kinds of the larger deſcriptions of harrows, it is a circumſtance that ought to be conſtantly attended to, that the tines, or teeth, be put in, in ſuch a manner, as to have ſome degree of inclination forward; as by their being placed in this way, the tools are found not only to be capable of performing a great deal more work in the ſame time, but of keeping more cloſely to the ground, as well as of cutting and tearing up, in a more effectual manner, all ſuch weeds, roots, or other ſimilar matters, as are met with in the execution of the buſineſs.

It has been recommended by ſome to be an excellent method, eſpecially with all the larger ſorts of harrows, to have the tines put into the bulls by means of nuts and ſcrews, ſo that they can be readily removed when neceſſary, and at the ſame time be kept ſecure while they are at work. But another more ſimple mode of effecting the ſame intention, is that of having the heads of the tines formed in a ſquare manner, with eyes towards the tops of them, the ſquare parts being put upwards through the bulls, and ſecured above by iron wedges, ſo as to keep them perfectly faſt, and prevent their ſhaking out, and being loſt in working.

In addition to theſe different methods of forming harrows, they have likewiſe been occaſionally conſtructed with the tines of unequal lengths, the firſt row, in ſuch caſes, being a quarter, or half an inch ſhorter than that of the ſecond, and ſo on in regard to the reſt. It is ſuppoſed that harrows, formed in this way, are capable of performing more work in a given time, as well as of being much more readily cleared from weeds and other collected matters with which they are apt to be choaked up, than thoſe of other kinds.

This deſcription of harrow has been ſtated to be much in uſe in ſome parts of the county of Devon, and alſo to have been lately introduced into ſome of the midland counties with conſiderable benefit. They have been made in ſeveral different modes, as with greater and leſs numbers of bars, from three to five, ſix, or more, the tines varying in the ſame proportions.

It has, however, been found by the moſt attentive cultivators of land, that, in general, ſingle horſe-harrows are more uſeful than thoſe that require two or more horſes. In their attachment to the power by which they are drawn, the moſt uſual method is that of a ſtrong ſort of ſtaple, which is fixed to one of the corners of the harrow by means of a bolt; but a more improved and convenient mode is that of connecting the muzzle with a perpendicular pin to one of the angles of them, as in this way they are uſed with greater facility, with a view of avoiding the difficulties of turning at the ends of the ridges, and for leſſening the weight on the backs of the horſes, which have, in ſome caſes, been made an addition to the harrow. But, from the nature of the work, it would ſeem that but little advantage can be gained in this way.

Various other improvements have been made on harrows by different individuals; and the harrow and roller have been lately combined by Mr. B. Young, a farmer in the Iſle of Wight, by which it is aſſerted there is a ſaving of a man and horſe, as well as other advantages.

Common Single Harrow.—This is a tool ſo perfectly known to the farmer, that very little deſcription of it is required. It generally conſiſts of four bulls, or bars, about four inches ſquare, into each of which are inſerted four or five tines or teeth. From the nature of its conſtruction, it is lighter than moſt of the other ſorts of harrows, being capable of being wrought with facility by a ſingle horſe. It is ſhewn in *Plate Harrow, fig.* 1. And an improved harrow of the ſame kind may be ſeen at *fig.* 2. in the ſame plate.

Common Double Harrow.—This is a ſort of harrow which is uſually formed merely by uniting two ordinary ones with hooks and eyes. They have commonly each four bulls, and ſix tines in each bull. This ſort of harrow is in very general uſe, in ſome diſtricts, for the purpoſe of brake-harrowing, or breaking down the rough tillage ſoils, while at the ſame time it is capable of ſupplying the place of the common harrow; but it is not by any means ſo eaſily wrought, as it requires much more power. It is not neceſſary to give any repreſentation of this kind of harrow, from its being ſo well known.

Common Brake Harrow.—This is a large maſſy kind of harrow, of conſiderable weight, having commonly four bulls, with five or ſix long tines fixed into each. It is an extremely powerful tool in reducing ſtiff, rough, heavy land into a powdery ſtate, in bringing it into cultivation; as well as for looſening couch-graſs, and other root-weeds, in the courſe of a naked or ſummer-fallow. It is, in ſome caſes, alſo employed after the ſeed is ſown, previouſly to the uſe of the lighter ſorts of harrows; and is commonly drawn by three or four horſes, though in ſome places by two horſes, and the ſame number of oxen.

Harrows of this deſcription have lately undergone much alteration and improvement by different perſons, ſo as to render them leſs difficult in their management, and give them more facility in the draught. And in ſome caſes it has been found uſeful to have them made of different ſizes, even ſo ſmall as to be capable of being drawn by one horſe. Theſe are made exactly in the ſame manner as thoſe of the larger kind, and may be formed by any common workman. The only difference in them is that the tines ſhould only be about ſeven inches in length.

The large improved harrow of this nature has uſually three or four bulls, which contain about thirty-four tines that have the length of about eleven inches, and which are a little racked or bent forward, by which means they do not ſo readily riſe out of the ground on meeting with obſtructions, and have the power of reducing the ſoil much more perfectly.

The two narrow parts are connected together by the uſe of iron hooks and eyes, ſo as to be at the ſame diſtance that the different bulls are from each other, by which they work much better, and with conſiderably leſs power of draught than when they are placed nearer to each other. The harrows would likewiſe have greater width behind than before, as by this contrivance they more readily relinquiſh the mouldy particles, and gather the roots of couch and other weeds far more effectually. A well conſtructed harrow of this deſcription is ſhewn at *fig.* 3, in which *a* is the moveable hook and bridle; *b*, an iron placed acroſs two bulls with holes perforated in it to receive the bridle-bolt, where neceſſary to remove it; *c*, *d*, the crooks and eyes for uniting the two harrows, with the bolts through the bulls, and nuts, and ſcrews; *e*, *f*, are the two fore-bolts, or wedges, in each harrow; *g*, *h*, the two hind ones; *i*, *k*, *l*, *m*, *n*, *o*, ſhew the three bulls of the foremoſt and hindmoſt harrows, which are capped with iron at the upper ends, to keep the bulls together, and make them ſlide more readily by any obſtructing matters; *p*, *p*, are the handles by which the harrow is lifted up or weighed upon; *q* ſhews the form of the tines, with the nuts and ſcrews for faſtening them in with.

There are other modes of forming and connecting harrows, beſides thoſe that have been noticed above; one of which is diſplayed at *fig.* 4, in which *a* is the piece of wood or iron by which the two harrows are united to each other with nuts and ſcrews, as at *t*, *t*; the places and method of attaching the draught to them is ſeen at *b b*; and *c c* diſplays the mode of fixing the horſes or other cattle in working them. This kind of harrow is in much employ in many places, eſpecially in the more nothern parts of the kingdom, being often drawn with one horſe.

There is a method employed to prevent harrows from getting over each other, where two or more are made uſe of together, that is generally practiſed in the northern diſtricts, which is that of placing a bar of ſome tough wood, uſually called a *lay over*, acroſs them; or a piece of crooked timber fixed to the outſide bulls, which approach each other, may anſwer the ſame purpoſe.

Wheel-Harrow.—This is a ſort of harrow which was invented by Mr. Knight, a farmer at Great Barfield, in Eſſex, and conſiſts of a frame of wood ſomewhat in the form of the common harrow, to the fore-part of which is attached a pair of low wheels, that are ſo managed as to raiſe or lower the harrow part at pleaſure.

Iron Harrow.—This is conſtructed wholly of that metal, and was invented by Mr. A. Young, in conſequence of his finding, from actual experience, that ſuch harrows as are formed of wood are apt to ſoon decay and fall in pieces; and in many caſes to be much too light to anſwer the intended purpoſe. The tines in this ſort of harrow are made ſo as to ſcrew through the double frame, which is ſeparated by a kind of iron waſhers, in order to afford greater ſteadineſs. It has likewiſe handles fixed to it for the purpoſe of raiſing it more conveniently, as well as to afford due preſſure where neceſſary. When formed in this way, the tool has been found to anſwer in the moſt perfect manner, while at the ſame time it is much more durable than the common ſorts of harrows. It is capable of being varied in its conſtructions, ſo as to ſuit the different intentions of the farmer. When well made, and rendered complete, it uſually coſts about ſix pounds ſix ſhillings. It may be ſeen at *fig.* 5.

Graſs Harrow.—In many parts of the kingdom it is the cuſtom to make uſe of a ſmall light kind of harrow, with ſhort light tines, ſet very cloſe upon the graſs lands, eſpecially where they are much ſubject to be over-run with moſs, in order to break and deſtroy its matted roots. It is alſo beneficial in covering in graſs-ſeeds, as well as other ſmall kinds of ſeeds, though much too little had recourſe to in ſuch caſes; as it is capable of not only rendering the bed of mould much more fine, but alſo of introducing the ſeed to the moſt proper depth, and covering it in the moſt complete manner. Where graſs-ſeeds are to be ſown over thin, patchy, ſward lands, this ſort of harrow may likewiſe be previouſly employed with great advantage. A harrow of this nature may be ſeen at *fig.* 6.

It has been ſtated, in the ſurvey of the county of Mid-Lothian, in the view of explaining the advantages that may reſult from the difference of poſition in the teeth or tines, that, in the harrow which is repreſented at *fig.* 2. and which is conſtantly drawn in the direction of the line *a a*, the twenty tines only form eleven different ruts or tracks, as a number of them follow each other in the ſame lines, and even ſome of theſe are not in the leaſt effective, as the two on the extreme corners *a*, *a*, *a*, *a*, are ſo unconnected with the reſt, as to be of no utility in the work, conſequently ſeven ruts, as ſhewn by the dotted lines in the figure, are only found to be properly executed. From this circumſtance, it of courſe happens that one harrow, when drawn ſingly, only covers three feet of ground; two, not more than about ſix feet; and three, which, though they do more in proportion, only cover ten feet; while the improved harrow that is ſeen at *fig.* 2. though it has only ſixteen tines, yet as each tine forms a ſeparate track in the direction ſhewn by the dotted lines, one harrow, when drawn ſingly, will cover four feet and a half; two harrows about eight feet, and three will cover twelve feet; while at the ſame time the ruts or tracks are only three inches eight tenths aſunder; though in the common harrow they are ſix inches apart.

But, if the common harrow were drawn in the direction *b b*, the twenty tines would conſtitute ſixteen ruts, though the one on each ſide, at the two oppoſite corners diagonally, would be more effective: and after all, this direction of the draught is not practicable with any but one harrow at a time, as where two or more are united, the dragging of the moſt diſtant one would interfere with that which is immediately before it. But in the improved harrow, the dimenſion is a ſquare of four feet, without the projection of the bulls at the ends. In the plate, the imaginary lines *a*, *a*, point out the direction of the draught; and *b b* is another line of the ſame kind, ſerving merely to ſhew the regular diſtance of the ruts, the figures at each tine exhibiting the diſtance in inches, at which they ſhould be inſerted from the extremities of the bulls.

HARROW, *Buſh*, the name of a ſort of harrow which is formed by the interweaving of ſome kind of bruſh-wood into a ſort of frame conſtructed for the purpoſe, and raiſed in the fore-part by two ſmall wooden wheels. It is occaſionally employed in putting graſs or other ſmall ſeeds, as well as for harrowing in dung, and earthy compoſts into graſs lands. See BUSH-*Harrow*.

HARROW, *Reſt*, in *Botany*. See ONONIS.

HARROW, *Triangular*, in *Rural Economy*, the name of a harrow which is conſtructed in the triangular ſhape, and which is often found beneficial in cleaning between the rows of bean, hop, and other ſimilar crops. But a ſuperior tool for this purpoſe will be noticed in ſpeaking of horſe-hoes. See HOE, and HORSE-*hoe*.

HARROWGATE, in *Geography*, a townſhip in the pariſh of Knareſborough, Claro-wapentake, and Weſt Riding of the county of York, England, has acquired conſiderable publicity from its medicinal ſprings, and is much frequented, in the ſummer months, by perſons to drink the waters. One of the ſprings diſcharges the moſt ſtrongly impregnated ſulphurated water of any in the kingdom. This is moſtly uſed for bathing by perſons in dropſical-ſcorbutic, and cutaneous diſorders, and is ſituated at Lower Harrowgate. About half a mile from the town is a chalybeate ſpring, called the Tewit-well. The Old Spa, diſcovered in 1571, is ſtrongly impregnated with iron, and its waters are recommended as a powerful tonic. The fame of theſe waters attracts much company to the place, and ſeveral large inns and lodging-houſes have been built for their accommodation. Among theſe are ſix inns or taverns, on a heath about one mile from the town. Here are an aſſembly room, a theatre, a promenade room, a library, billiard-room, &c.

Harrowgate lies two miles N.W. of Knareſborough, and 212 N. of London. Dr. Garnett publiſhed a pamphlet on the Qualities and Uſes of the Harrowgate Waters.

HARROWING, in *Agriculture*, the operation or action of the harrow in the performance of its work; which is a ſort of proceſs that is had recourſe to in ſeveral different intentions, ſuch as thoſe of reducing and breaking down the lumpineſs of the earthy matters, ſmoothing the ſurface of the ground after it has been ploughed, and the covering in the various kinds of ſeeds, whether of the grain or other deſcriptions. And it is not a leſs effectual means in the clearing of land from different ſorts of root and other weeds. In the execution of the firſt and laſt of theſe purpoſes, the more large and heavy kinds of harrows are in general employed, but for the mere purpoſe of covering in the ſeed, the lighter ſorts are commonly preferable.

It has been ſtated, that in ſome diſtricts it is the cuſtom, where ſingle harrows are made uſe of, for a man to drive three horſes and as many harrows, which, it is aſſerted, will do nearly, if not quite as much work, and in as effectual a manner, as four horſes in pairs, and two men are capable of executing, which is a circumſtance that ſhould not be diſregarded by the attentive farmer.

It is ſcarcely neceſſary to bring to the notice of the cultivator the great advantage that is derived from having the ſurface of tillage-land made ſmooth and even, and the mouldy parts properly broken down and reduced to a powdery condition after the ſeeds have been ſown. By theſe means the ſeeds not only derive a greater proportion of nouriſhment from the ſoil, but the particles of moiſture are more effectually retained in the ground, and, conſequently, the proceſs of vegetation proceeds in a more regular and exact manner.

It muſt be evident that ſtrong heavy lands will require much more harrowing in proportion, in order to reduce them into a proper ſtate of pulverization, than ſuch as are of a lighter nature, but at the ſame time, as all ſorts of land are rendered more firm and ſolid by the operation, the leſs ſtrong ſoils are harrowed the better, provided the intentions of the cultivators are accompliſhed. On the contrary, light ſpongy ſoils, eſpecially where there is any portion of moſſy or peaty matter, as they are rendered more compact and more retentive of moiſture by the proceſs, can ſcarcely have too much of the harrow. And it may be noticed, that light gravelly or ſandy ſoils ſhould be ſtirred as little as poſſible by the proceſs of harrowing, during the prevalence of hot or dry weather, in order that there may be as ſmall an eſcape as poſſible of their neceſſary moiſture. Nor ſhould thoſe of the more ſtiff, tenacious, and moiſt kinds be ever much touched by the harrow during wet ſeaſons.

In regard to the mode of performing the work of harrowing, it varies a little according to circumſtances. In covering in the ſeed after it has been ſown, the common and moſt uſual method of harrowing is in the firſt inſtance, along the ridges, then occaſionally acroſs them, and ultimately along them again. But where the ridges are level, or nearly approach to it, they are capable of being harrowed in either direction, at the pleaſure and convenience of the perſon who has the cultivation of the land, and it is of no material conſequence in what direction the harrow firſt paſſes them, when they are well ploughed, and the land is in a proper ſtate of tilth. In caſes, however, where the ridges are raiſed in the middle, and the ground but indifferently ploughed, it would be extremely improper to begin the work of harrowing by paſſing in a croſs direction of them, as by that means a conſiderable proportion of the ſeeds would be forced into the bottoms of the furrows and other crevices, and in that way be prevented from vegetating in a proper manner.

But in inſtances of harrowing where the principal intention is that of tearing up and deſtroying the roots of weeds and other noxious plants, which have been previouſly looſened by the uſe of the plough, conſiderably more effect will be produced by the harrows paſſing in a contrary direction to that in which the plough has gone, as the tines or teeth will be capable of drawing out a much larger quantity of ſuch roots than if they followed the courſe which the plough had taken.

In the work of harrowing for the mere deſtruction of ſeed-weeds, the mould of the land can ſcarcely be made too ſmooth on the ſurface, or too fine in its earthy particles; as by ſuch means, thoſe ſeeds which are near the ſurface will vegetate with more freedom, and in a more vigorous manner, and be thereby more readily extirpated from the ſoil by the ſubſequent harrowings that may be given to the land. In the work of making naked fallows, this ſhould be particularly attended to by the farmer.

In the buſineſs of harrowing there is ſtill another circumſtance which ſhould not by any means be overlooked. It frequently happens that after a field has undergone a proper naked or ſummer fallowing, been perfectly manured, and prepared in the beſt poſſible manner for the ſowing of wheat, that this cannot be performed in conſequence of the heavy falls of rain. For though it may ſeem as if there were no water upon the land, yet it is found ſo poachy and wet on trial, that no horſes can be put upon it for the purpoſe of harrowing in the ſeed, and the crop is merely thereby prevented from being put into the ground in due ſeaſon. This inconvenience has been attempted to be removed in ſome parts of Scotland, by the means which are deſcribed below, and which, where the ridges are pretty ſtraight, and not over broad, or too much raiſed in the crown, has been found to ſucceed in a manner beyond expectation. The contrivance is ſimply this. An axle, equal in length to the breadth of the ridge, is fixed upon two caſt wheels, to which are faſtened, by chains, as many harrows as are capable of covering the whole breadth of the ridge. Then two horſes are yoked, and one made faſt to each end of the axle, being made to walk in the furrows of the ridges; the wheels turning eaſily round ſo as to follow the horſes in the furrows, by which means the horſes' feet are prevented from doing any injury by poaching, and the ſeed equally covered as in the uſual method of harrowing. In this caſe care ſhould be taken not to turn the harrows ſhort at the ends of the ridges; to avoid which, the beſt method is probably that of going along one ridge and returning by the next, which ſhould be performed as often as may be found neceſſary for completing the work.

In the Agricultural Survey of Middleſex, it is complained that the buſineſs of harrowing is there a very tedious ſort of labour. The pace of the horſes is diſguſting, and one-fourth part of the time of the man who drives them, is taken up in unhitching them, which might be readily prevented by the means already noticed, and the uſe of whip reins in directing the animals, which ſhould have ſufficient length to permit the driver to walk behind the harrows, and which is a common practice on the borders of Scotland, as well as in the counties of Norfolk and Suffolk. It is contended that as a neceſſary conſequence they would harrow four times as much land in a given time as by their preſent mode, and that would be executed in a much better manner.

It is obvious, however, that the pace of the horſes muſt in a great meaſure depend upon the nature of the land and the harrow, yet the driving by long whip reins is without doubt a very great improvement in the performance of this ſort of farming labour. See TILLAGE.

HARRY ISLAND, in *Geography*, an iſland of the Atlantic, near the mouth of the Santee river, on the coaſt of South Carolina. N. lat. 33° 10′. W. long. 79° 12′.

HARSCHEF, in *Botany*, the name by which Avicenna, Serapion, and the reſt of the Arabian writers, call the *cinara*, or *artichoke*.

HARSEN's ISLAND, in *Geography*, an iſland near the entrance of the river St. Clair, in lake St. Clair, E. of Thompſon's iſland, containing 500 acres of land fit for culture, the other parts being meadow and marſh.

HARSHGOONE, a bay on the coaſt of Algiers, between Cape Figalo and Cape Hone.

HARSO, a ſmall iſland in the Baltic, near the coaſt of Sweden. N. lat. 58° 44′. E. long. 17° 16′.

HART, in the *Foreſt Law*, a ſtag or male deer of five years old complete. See DEER and STAG.

If the king or queen hunt him, and he eſcape, he is called a *royal hart*.

And if by ſuch hunting he be chaſed out of the foreſt, proclamation is commonly made in the places adjacent, that in regard of the paſtime the beaſt has afforded the king or queen, none ſhall hurt or hinder him from returning to the foreſt; upon which he is called an *hart-royal proclaimed*.

Harts at one year old have no horns, but only bunches; and at two years they are very imperfect, being ſtraight and ſingle; at three years old they grow out into two ſpears; at four, into three; and ſo increaſe every year in number of branches, till they are ſix years old; but after that their age is not to be known by their heads. February and March are the months in which they caſt their horns; and, in general, the older ones caſt them ſooner than the young ones. Thoſe that have been injured at rut, or which have been gelded, never caſt them at all; if they are gelded while young, they never have any horns: if after their horns are grown, they keep thoſe which they had on at the time as long as they live. The horns of ſome are reddiſh, thoſe of ſome black, and thoſe of others finally are white. The red horns are generally the largeſt and ſtrongeſt, the black are uſually ſhorter, and the white are worſt of all, being the leaſt ſolid or ſtrong.

This animal is the moſt cunning in its care of itſelf of all the deer kind. It is the moſt timorous of any, and by its windings and turnings, and other ſubtilties, as the running among herds of cattle, often deceives the huntſman, and puts a foil upon the dogs. In the chaſe, which generally is a long one, he takes over hedge, ditch, river, or whatever comes in his way, nothing ſtopping him.

This creature loſes its horns in the ſpring-time, as the other deer do; but, during the time that it is without them, does not appear, but abides in the thick woods, and only comes out in the night-time for food.

HART-*clover*, in *Agriculture*, a common name applied to a plant of the melilot kind. See CLOVER.

It may be found beneficial in the way of an artificial graſs in ſome caſes.

HART-*hunting*. See HUNTING.

HART's-*horn*, *cornu cervi*. See HART's *Horn*.

HART's-*horn*, in *Botany*. See PLANTAGO.

HART's-*tongue*, *lingua cervina*. See ASPLENIUM.

Sea-HART's *tongue*, *phyllitis marina*, in *Natural Hiſtory*, a name given by ſome authors to a ſpecies of marine ſubſtance, which, in ſome degree, reſembles the common hart's-tongue. It grows on the rocks at great depths, and is ſeldom ſeen, unleſs when taken up by the coral-fiſhers; its leaves are ſometimes ſingle, ſometimes they are divided into two; they are of a duſky green colour, and are about two inches in length; they have each a nerve or rib running along their middle; they are very thin and tranſparent, and are of a ſort of cartilaginous ſtructure, and each has ſeveral rows of ſmall points on each ſide of the middle rib, which not unaptly reſemble the ſeed ſpots on the leaves of ſome of the capillary plants; but not on thoſe of the *phyllitis*, or hart's-tongue, in particular, becauſe they are in that plant not round but oblong, and ſtand only in a ſingle row on each ſide of the rib. When this ſubſtance is viewed by the microſcope, it appears in all parts of the leaf full of little holes, and thoſe which are ſo plain to the naked eye, are no other way different from the imperceptible ones, but in that they are larger. See Coralline.

Hart-*wort of Marſeilles.* See Seseli.

Hart-*wort of Crete.* See Tordylium.

Hart-*wort, ſhrubby, Ethiopian,* is a ſpecies of the Bupleurum.

Hart, or *Stag-evil,* in the *Manege,* a ſort of rheum or defluxion that falls upon the jaws, and the other parts of the forehand of a horſe, which hinders him from eating; ſometimes, alſo, this diſtemper affects the parts of the hinder quarters.

HARTANITHE, in the *Materia Medica of the Ancient Arabs,* was one of the names of the ſtruthium, or lanaria herba of the Greeks and Romans, a kind of thiſtle, the root of which was uſed in the cleaning of wool.

HARTFIELD, in *Geography,* a mountain of Scotland, in the county of Peebles, on the confines of Dumfriesſhire, which, according to ſome accounts, is 3300, and by others, 2582 feet above the level of the ſea.

HARTFORD, a townſhip of America, in Windſor county, Vermont, on Connecticut river, in New Hampſhire; containing 1594 inhabitants.—Alſo, a poſt-town in Ontario county, on the E. bank of Geneſſee river, New York, 40 miles W. of Geneva; containing 535 inhabitants.—Alſo, a town in Cumbeland county, Maine, having 243 inhabitants.—Alſo, a fertile and populous, though hilly, county in Connecticut; bounded N. by the ſtate of Maſſachuſetts, S. by part of Middleſex and New Haven counties, E. by Tolland, and W. by Litchfield county; about 34 miles from N. to S. and at its greateſt breadth from E. to W. 30 miles. It is divided into 15 townſhips, and contains 42,147 inhabitants. Its chief town is Hartford.

Hartford *City,* the capital of Connecticut, on the W. bank of Connecticut river, in the county and townſhip of its own name, 50 miles N.W. from the mouth of the river; the townſhip is ſix miles ſquare. The town is divided by a ſmall ſtream, called Little river, with high romantic banks, over which is a bridge connecting the two diviſions of the town. It is regularly laid out, the ſtreets interſecting each other at right angles; the buildings are an elegant ſtate-houſe, two churches for Congregationaliſts, one for Epiſcopalians, and between four and five hundred dwelling-houſes; and contains 5347 inhabitants. A bank was incorporated in 1792. The town is well ſituated for trade, and is rich, flouriſhing, and commercial. It was ſettled in the year 1636; 223 miles N.E. of Philadelphia. N. lat. 41° 44′. W. long. 72 50′.

Hartford, a county of Maryland.—Alſo, a poſt-town of Ohio county, Kentucky, 736 miles from Waſhington, having 56 inhabitants.

Hartford, *Eaſt,* a town of Hartford county, Connecticut, on the E. bank of Connecticut river, oppoſite to Hartford, chiefly conſiſting of one broad ſtreet, 1½ mile in length, and containing 3057 inhabitants. On the different ſtreams which water the town are ſeveral mills; and it has alſo iron and glaſs works.

HARTHA, a town of Saxony, in the circle of Leipſic, 22 miles S.E. of Leipſic. N. lat. 51° 6′. E. long. 12° 50′.

HARTLAND, or Hertland, a market-town and pariſh in the hundred of Hartland, in the county of Devon, England, is ſituated at the north-weſt corner of the county on the coaſt of the Briſtol channel, on a neck of land called Hartland Point (deſcribed in old authors as Promontorium Herculis), and is bounded to the north by ſome boggy heights, where the rivers Tamar and Torridge have their ſource. From Hartland to Biddeford the land forms a bay, called Barnſtaple bay, ſo that theſe towns have but one port, which was made a ſea-port by act of parliament in the reign of queen Elizabeth. The church of Hartland is ſituated about a mile from the town, on a lofty eminence near the ſea. It is a large, handſome building, and conſiſts of a nave, two aiſles, and a chancel; the latter is divided from the body of the church by an ornamented ſcreen. The houſes in this pariſh, as returned under the late act, amount to 287; the inhabitants to 1546. A market, held here on Saturdays, is much frequented, particularly by the fiſhermen of Barnſtaple, Bideford, and other towns on the coaſt. Hartland is diſtant from London 116 miles.

In the vicinity of the town is Hartland abbey, the ſeat of Paul Orchard, eſq. The preſent building includes the ſcite and ſome portion of the ancient abbey, ſaid by Camden and other writers, to have been founded by Githa, wife of earl Godwin. Polwhele's Hiſtory of Devonſhire, folio.

Hartland *Point,* a cape of England, on the N.W. coaſt of the county of Devon, in the Briſtol channel. N. lat. 51°. W. long. 4° 26′.

Hartland, a townſhip of America, in Connecticut, the north eaſternmoſt of Litchfield county, containing 2318 inhabitants.—Alſo, a poſt town in Windſor county, Vermont, on the W. bank of Connecticut river, containing 1960 inhabitants.

HARTLEPOOL, a market town in the pariſh of Hart and ward of Stockton, county palatine of Durham, England, is a ſea-port and member of Newcaſtle. It is ſituated on a promontory, nearly encompaſſed by the German ocean, which, on the ſouth ſide of the town, forms a capacious bay. This is a very favourable place for landing troops, and hence, in the time of the Norman dynaſty, its harbour was much frequented. The town was then protected by fortifications. A market was ſecured to this place by Wm. de Bruce; and king John, in the ſecond year of his reign, granted to the free-burgeſſes of Hartlepool the ſame liberties and privileges as were enjoyed by the burgeſſes of Newcaſtle. The town thus obtained importance, but it was additionally improved by Robert de Bruce, grandſon of the above named William, who built a "haven, and a wall about the town, with ten towers on each ſide of the haven, and a chain to be drawn between them near the haven; which haven would hold 100 ſayle" of veſſels. "Few places in the kingdom," obſerves Hutchinſon, "give ſo perfect an idea of the fortifications of former times as Hartlepool. A long extended wall, ſtrengthened by demi-baſtions, at intervals, ſome rounded, others ſquare; various gates and ſally-ports, ſecured by machicolations, and the portcullis, ſome of the gates defended by angular, others by ſquare turrets; all the variety appearing which had grown into uſe in that age." Theſe walls, fortifications, &c. are minutely deſcribed by this author, and ſince his account was written, the whole has undergone a complete repair, and the harbour placed in a ſecure, or defenſible condition. This town is chiefly built on the weſtern ſide of a hill; and in the ſummer months is much frequented by viſitors for the purpoſe of ſea-bathing. The ſurrounding country is pictureſque and intereſting. North of the town, the coaſt is ſkirted with rocks, which are rendered cavernous by the violence of the waves, and preſent many romantic ſcenes at low water. The public buildings of the town are a chapel, town-hall, free-ſchool, and cuſtom-houſe. The civil government is veſted in a mayor, recorder, aldermen, and common-council. In 1800 this townſhip contained 230 houſes, with a population of 993 perſons. On the ſouth ſide of the town is a ſpring of chalybeate water, which is ſubmerſed by the ſea at every tide. About five miles north of Hartlepool is a very ſingular and romantic cluſter of rocks, in the numerous caverns called the Black Holes. Some of theſe rocks are detached from the ſhore, others have been entirely ſwept away by the tides, and ſome are perforated, and aſſume an arched appearance. Near the town are ſome collieries. Here is a ſmall weekly market, and four annual fairs. Hutchinſon's Hiſtory and Antiquities of Durham, 3 vols. 4to. A wide ſhort canal falls into Hartlepool harbour.

HARTLEY, David, in *Biography*, an eminent phyſician, and a profound moral and metaphyſical writer, was the ſon of a worthy clergyman, the vicar of Armley, near Leeds, in Yorkſhire, and was born on the 30th of Auguſt, 1705. He was admitted of Jeſus college, Cambridge, at the age of fifteen; he took the degree of M. A., and ultimately became a fellow of his college. His earlier ſtudies were conducted with a view to taking orders; but upon a more cloſe conſideration of the terms of clerical conformity, ſerious and inſurmountable ſcruples aroſe in his mind againſt ſubſcription to the thirty-nine articles of religion. Feeling, therefore, that he could not enter into the national eſtabliſhment without doing violence to his conſcience, he relinquiſhed all thoughts of the clerical profeſſion; but he ſtill continued to the end of his life in communion with the church of England, approving of its practical doctrines, and conforming to its public worſhip. He now determined to enter upon the ſtudy of medicine, for which his talents and the ſenſibility and humanity of his diſpoſition equally fitted him. "His mind was formed to benevolence and univerſal philanthropy;" ſays the author of the ſketch of his life and character, "he exerciſed the healing art with anxious and equal fidelity to the poor and to the rich. He viſited with affectionate ſympathy the humbleſt receſſes of poverty and ſickneſs, as well as the ſtately beds of pampered diſtemper and premature decrepitude. His manners were gentle; his countenance affable; his eloquence moral and pathetic." He commenced the practice of phyſic at Newark, in Nottinghamſhire; whence he removed to Bury St. Edmund's, in Suffolk: after this he ſettled for ſome time in London; and finally went to Bath, where he ſpent the remainder of his life, and died in the year 1757, at the age of 52.

Dr. Hartley was the author of ſome medical tracts relative to the operation of Mrs. Stephens's medicine for the ſtone, a diſeaſe with which he was himſelf afflicted: he was, indeed, principally inſtrumental in procuring for Mrs. Stephens the five thouſand pounds, granted by parliament for diſcovering the compoſition of her medicine, which was publiſhed in the gazette in June, 1739. In 1738 he publiſhed "Obſervations made on ten Perſons who have taken the Medicament of Mrs. Stephens;" and in 1739 his "View of the preſent Evidence for and againſt Mrs. Stephens's Medicine as a ſolvent for the Stone, containing 155 Caſes, with ſome Experiments and Obſervations," and a "Supplement to the View of the preſent Evidence, &c." His own caſe is the 123d in the above-mentioned "View:" but notwithſtanding any temporary relief which he might receive from the medicine, he is ſaid to have died of the ſtone, after having taken above two hundred pounds weight of ſoap, which is the principal ingredient in its compoſition. In the gentleman's magazine for February, 1746, Dr. Hartley publiſhed, with his name, "Directions for preparing and adminiſtering Mrs. Stephens' Medicine in a ſolid Form." Dr. Hartley is ſaid to have written in defence of inoculation for the ſmall-pox, againſt the objections of Dr. Warren, of Bury St. Edmund's; and ſome papers of his are to be met with in the Philoſophical Tranſactions. Haller informs us that ſeveral letters from him, in correſpondence with Morand, were inſerted in a "Collection" printed at Paris in 1740, 12mo.

But the principal work of Dr. Hartley, upon which his fame with poſterity ſecurely reſts, is the great metaphyſical treatiſe, which he preſented to the public in 1749, under the title of "Obſervations on Man, his Frame, his Duty, and his Expectations, in two parts," 8vo. The doctrine of vibrations, indeed, upon which he attempts to explain the origin and propagation of ſenſation, although ſupported by much ingenious reaſoning, is not only built upon a gratuitous aſſumption, but, as Haller has ſhewn, it attributes properties to the medullary ſubſtance of the brain and nerves, which are totally incompatible with their nature. The metaphyſical parts of this work, however, and more eſpecially his diſquiſition reſpecting the power of aſſociation, are monuments of great ſubtlety of reſearch, and of profound knowledge of the operations of the human mind. The moſt valuable edition of this work was publiſhed in 1791, 4to. with a ſketch of the life and character of the author, by his ſon David Hartley, including notes and additions to the ſecond (or moral and religious) part of his doctrines, tranſlated from the German of the Rev. Herman Andrew Piſtorius, rector of Poſeritz, in the iſland of Rugen. See Gen. Biography. Ann. Reg. 1775. Sketch prefixed to the edition of 1791.

Hartley, or *Hartley-Pans*, in *Geography*, a ſea-port and townſhip in the pariſh of Earſdon caſtle-ward, Northumberland, England, contained, in the year 1800, 348 houſes, and 1639 inhabitants. A harbour has been recently made at this place, chiefly at the expence of lord Delaval. The artificial baſon meaſures about 900 feet in length, by 30 feet in breadth, and is more than 40 feet deep. This harbour is moſtly uſed by coal veſſels, which carry this fuel from "Delaval's Hartley-Main" to the metropolis. Hartley is five miles north of Shields; and near it is Seaton-Delaval, a noble manſion, built by ſir John Vanburgh, for the Delaval family. Though ſmall, if compared with the ſpacious palace of Blenheim houſe, yet the manſion at Seaton is a fine and intereſting ſpecimen of ſir John's ſtyle of architectural deſign.

HARTMAN, George, in *Biography*, a German mathematician, who flouriſhed in the 16th century, invented what is denominated the artillery-ſtaff, "Baculus bombardicus," for the uſe of engineers. He was author alſo of a "Treatiſe on Perſpective," of which an improved edition was publiſhed by Paſquier du Hamel, at Paris in 1556.

Hartman, John Adolphus, was born at Munſter in the year 1680, and educated in the principles of the Jeſuits, into whoſe ſociety he was entered while he was very young. In 1715 he renounced the papal communion, and united himſelf to the Calviniſts at Caſſel, ſoon after which he was appointed profeſſor of philoſophy and poetry. In 1722 he was created profeſſor of hiſtory and eloquence at Marpurg, where he died in 1744. He was the author of many works, but the principal are, "Vitæ Pontificum Romanorum, Victoris III., Urbani II., &c." "The ſtate of ſciences at Heſſe:" "Precepta Eloquentiæ Rationalis, &c." He publiſhed likewiſe more than eighty academic diſſertations.

HARTMANN, John, a phyſician, was born at Amberg, in Bavaria. In the year 1591 he began to teach philoſophy and mathematics at Marpurg, where he took the degree of M.D. in 1606, and was appointed profeſſor of chemiſtry in 1609, being the firſt who publicly taught that ſcience there. He entered upon this office with great ardour, and his method of teaching procured him great reputation; inſomuch that the landgrave of Heſſe commanded him to ſettle at Caſſel, in order to attend his perſon as chief phyſician. He removed thither accordingly, though not without great reluctance at quitting his chair, in the year 1616, and continued there until his death, which took place on the 7th of December, 1631. He left the following works: "Philoſophus, ſive naturæ-conſultus Medicus, Oratio, &c." Marpurg, 1609. "Diſputationes chymico-medicæ, ſub ejus præſidio cenſuræ expoſitæ," ibid. 1611. "Praxis Chymiatrica," Leipſic, 1633; a poſthumous work, edited by his ſons, which paſſed through many editions. The following were alſo poſthumous: "Diatribe de uſu medico Microcoſmi, &c." Erfurth, 1635. "Tractatus phyſico-medicus de Opio," Witteburg, 1635 and 1658. "Anthropologia phyſico-medico-anatomica," Venice, 1696. A collection of his works under the title of "Opera omnia Medico-chymica," was edited at Francfort, 1664 and 1690, by Conrad Johren. Eloy. Dict.

HARTOGIA, in *Botany*, ſo named by Thunberg and the younger Linnæus, in memory of Hartog, a Dutch botanical traveller, by whom many plants from the Cape of Good Hope were firſt made known to European collectors. (The original *Hartogia* of Linnæus being referred to *Dioſma*, the preſent was choſen by Thunberg, who nevertheleſs, by an unaccountable error, ſubſequently miſtook it for the real *Schrebera ſchinoides* of Linnæus, as did Juſſieu. The latter genus however is a nonentity, appearing by his herbarium to be *Cuſcuta africana* of Willdenow, growing on *Myrica æthiopica*, and therefore another *Schrebera* was founded by Retzius, which turned out a *Celaſtrus*, the *glaucus* of Vahl, Symb. faſc. 2. 42. Finally a very noble and diſtinct *Schrebera* is, we hope, eſtabliſhed beyond further perplexity, by the late learned and excellent Mr. Dryander, in Roxburg's Plants of Coromandel, v. 2. 1. t. 101: ſee SCHREBERA.)—Linn. Suppl. 16. Thunb. Nov. Gen. 86, with a figure. Schreb. 81. Willd. Sp. Pl. v. 1. 669. Mart. Mill. Dict. v. 2. Lamarck. Dict. v. 3. 77. Illuſtr. 307. t. 76. (Schrebera; Thunb. Prod. part 1. n. 12.)—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Dumoſæ*, Linn. *Rhamni*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, in four (not five) deep, ſpreading, roundiſh, acute ſegments, deciduous. *Cor.* Petals four, alternate with the calyx and twice as long, equal, obovate, concave, inſerted under a glandular four-lobed receptacle, or nectary. *Stam.* Filaments four, awl-ſhaped, aſcending, ſhorter than the petals, inſerted between the lobes of the nectary; anthers vertical, ovate, furrowed. *Piſt.* Germen ſuperior, ovate; ſtyle ſhort; ſtigmas two, divaricated, cloven. *Peric.* Drupa dry, ovate. *Seed.* Nut ſolitary, containing two kernels.

Eſſ. Ch. Calyx in four deep ſegments. Petals four. Nectary a four-lobed gland. Stigmas two, cloven. Drupa with a two-ſeeded nut.

1. H. *capenſis*, the only known ſpecies. Linn. Suppl. 128. (Schrebera ſchinoides; Thunb. Prod. 28. t. 2.)—Native of woods at the Cape of Good Hope. A *ſhrub* five or ſix feet high, variouſly branched, ſmooth. *Leaves* oppoſite, two inches long, elliptic-lanceolate, obtuſe, ſerrated, ſmooth, veiny; entire at the baſe, and tapering down into a bordered footſtalk. *Flowers* ſmall, in ſhort axillary, drooping cluſters or panicles. *Fruit* oval, the ſize of a pea, roughiſh, but deſtitute of pubeſcence.—We cannot account for Thunberg's defining the calyx as five-cleft, which other authors copy from him; while in his own excellent figure in his *Prodromus*, and even in that of his *Nova Genera*, as far as any thing can be made of it, the calyx is four-cleft, the petals being four; according to the analogy of the natural order to which the plant belongs.

HARTOGIA, Linn. Gen. 108; Sp. Pl. 288. See DIOSMA.

HARTSOCKER, NICHOLAS, in *Biography*, was born at Gouda, in Holland, in the year 1656, and intended by his father for the profeſſion of a remonſtrant miniſter, but the ſon ſhewed a very early diſpoſition to ſtudy the works of nature, and his principal pleaſure conſiſted in contemplating the ſtars and planets, and in conſulting all the almanacs that he met with. Finding, however, that he could not underſtand the theory of the one, nor the conſtruction of the others, without ſome degree of mathematical knowledge, he hoarded up the little money allowed him for his pocket, to pay an inſtructor for communicating to him the principles of this ſcience. He now aſſiduouſly applied himſelf to his favourite ſtudies, and particularly to the ſtudy of the microſcope. By his obſervations with this inſtrument, which he improved, he made many diſcoveries, particularly with reſpect to the animalcula found in the ſemen of male animals. When he was about eighteen years old, he devoted, at the deſire of his father, ſome years to the ſtudies of the belles lettres, and other ſubjects connected with general literature, under the ableſt maſters at Leyden and Amſterdam. He embraced the Carteſian doctrines which he afterwards abandoned, and while he was at Amſterdam he had an opportunity of being introduced to M. Huygens, who took him as a travelling friend and companion to Paris. Here he met with M. Caſſini, who foretold that the young philoſopher would become very great if he proceeded in the path in which he had ſet out. Encouraged by the good opinion of ſo able an aſtronomer, he undertook to make ſome improvements in the glaſſes made uſe of in the obſervatory, and accordingly, with his own hand, conſtructed and ground excellent lenſes of various ſizes, one of which had a focus of ſix hundred feet. In 1694 he publiſhed "An Eſſay on Dioptrics," which was not only well received but procured him the eſteem of many men of learning, particularly of father Malebranche and the marquis de l'Hôpital. His next work was entitled "The principles of Natural Philoſophy." He was elected member of ſeveral foreign learned ſocieties, and was invited by the czar Peter I. to aſſiſt him in his mathematical ſtudies, but M. Hartſocker did not accept the invitation, chuſing rather to remain in his native country. The magiſtrates of Amſterdam, as an acknowledgment of the honour which he had done to Holland, in his preference of it in oppoſition to the high honours of a great emperor, erected for his uſe a ſmall obſervatory on one of the baſtions of the city. In 1704, after three years ſolicitation, he repaired to the court of the prince elector palatine, John William, by whom he was appointed his firſt mathematician, and honorary profeſſor of philoſophy at the univerſity of Heidelberg. In 1607-8, he publiſhed the lectures which he had read to the elector palatine, under the title of "Phyſical Conjectures." Upon the death of the elector, he removed to Utrecht, where he undertook a courſe of natural philoſophy, and where he ended his days in the year 1725. In the year 1730, his "Courſe of Natural Philoſophy" was publiſhed with additional pieces on phyſics and obſervations from the letters of Leeuwenhoeck. Moreri.

HARTY, in *Geography*, a ſmall iſland of England, at the S.E. end of the iſland of Sheppey, from which it is ſeparated by a narrow channel, and from the main land of the county of Kent, by the river Swale. It is entirely paſture land, and maintains about 4000 ſheep. It is a pariſh, and contains a church; and has a ferry acroſs the Swale, a little N. of Faverſham.

HARTZ, or Harz, a mountain and foreſt of Germany, riſing in the form of an amphitheatre, and extending from the bailiwick of Landgelſheim, in the principality of Wolfenbuttle, and the county of Goſzlar, through the E. part of the principality of Grubenhagen, a part of the county of Weenigerode, and the principality of Blankenburg, to the counties of Hohnſtein and Stolberg, as far as Hartzgerode, in the principality of Anhalt; being in length forty-eight miles, and in breadth about twenty. The mountains of the Hartz are otherwiſe called the Boſchea or Blockſberg; the higheſt being what is called the Great Blockſberg, which, (while the others are covered with wood, thus uniting the ancient confuſion of foreſt and mountain,) only preſents white ſtinted bruſh-wood; and the ſnow ſometimes remains till Midſummer, and even longer in the northern cavities. On the ſummit is a ſmall hovel, as a retreat for thoſe who aſcend. The height of the Great Brocken is by the barometer 3021 feet, and that of the Little Brocken 2713. The mountain of Blockſberg conſiſts chiefly of grey granite. Although rain, ſnow, and fog are more prevalent on the Hartz mountains than in the level country below it, they do not ſeem to affect the longevity of the inhabitants, if we except thoſe who are occupied in the mines and forges. The whole harveſt of theſe higher regions conſiſts of good hay, other productions of the ſoil, however cultivated, ſeldom ripening. The foreſt conſiſts of about one-third of hard wood; *viz.* oak, beech, aſh, aſpen, alder, birch, &c. and two-thirds of ſoft wood, ſuch as firs and pines. The timber is peculiarly uſeful, as it ſerves the purpoſes of the mines and forges. The minerals found here are yellow ochre, vitriol, ſalt-petre, ſulphur, and lapis calaminaris; together with cobalt, lead, borax, iron, copper, ſilver, and ſome gold. The ſilver mines of the Hartz were the firſt that were ever opened in the north of Europe. Some ſay they were firſt diſcovered in the year 968, and wrought by the command of the emperor Otho the Great. According to others, they were accidentally diſcovered in the tenth century by a hunter, whoſe horſe tied to a tree ſtruck with his feet and diſcloſed the mineral. The rock is gneiſs. The Hartz, and alſo its mine-works, are divided into Upper and Lower. The inhabitants of the Hartz conſiſt of miners, labourers in the ſmelting-houſes, wood-hewers, carriers, and the ſovereign's officers and ſervants; together with miniſters, ſchool-maſters, artificers, handicraft's-men, and tradeſmen, to whom are aſſigned certain immunities and privileges. The Hartz, and its mines, were formerly the joint property of the electorate of Hanover and of the duke of Brunſwic; but the ſhare of the latter has been more recently exchanged with Hanover for another diſtrict. The clear annual product of the mines is computed at 453,000 dollars, the dollar being eſtimated at 3*s.* 4*d.*

HARTZEIN, Joseph, in *Biography*, who flouriſhed in the eighteenth century, was deſcended from a patrician family at Cologne, and born in that city about the year 1694. He was firſt noticed in public life as an inſtructor in the belles-lettres, in the ſeminaries of his order; after which he was elected profeſſor of the learned languages at Milan. He next diſcharged the duties of confeſſor, preacher, and profeſſor of theology; and he alſo officiated as interpreter of the ſcriptures, publiſhing annually diſſertations which were well received by the learned world. He publiſhed "A Collection of the Councils of the Church of Germany," in four vols. folio, which had been begun by father Schannat. Hartzein was preparing a fifth volume for publication, when his labours were put an end to by an apoplectic fit, in the year 1763. He was author of many other learned works; particularly "Summa Hiſtoriæ omnis ab Exordio Rerum ad Annum à Chriſto Nato:" "Bibliotheca Scriptorum Colonienſium:" "Diſſertationes X Hiſtorico-criticæ in Sacram Scripturam."

HARTZGERODE, in *Geography*, a town of Anhalt-Bernberg, near the Hartz mountains; the houſes and walls are conſtructed of a motley kind of marble. It has a mine-office and caſtle; 24 miles S.W. of Bernburg. N. lat. 51° 40′. E. long. 11° 20′.

HARVA, a town of Sweden, in Weſt Gothland; 15 miles E. of Gotheborg.

HARVARD, a townſhip in the eaſtern part of Worceſter county, Maſſachuſetts; 23 miles N.E. of Worceſter; incorporated in 1732, by this name, in honour of the founder of Harvard univerſity, in *Cambridge*, (which ſee,) and containing 1400 inhabitants.

Harvest, in *Agriculture*, a name which is commonly applied to the ſeaſon in which grain, hay, and other crops are cut down, carried and ſecured in the barns or ſtack-yards.

The particular period at which the harveſt for corn and hay takes place, is ſooner or later according to the nature and ſtate of the climate, the qualities of the ſoil, and the peculiar circumſtances of the crops in regard to ſituation and kind. In the more northern diſtricts, the harveſt for both hay and corn is, however, in general, later by a month or ſix weeks than in thoſe of the ſouth. The hay-harveſt is very rarely completed before that of the grain is commenced, though in ſome it is pretty nearly the caſe.

Harvest *Beef*, a term uſed to ſignify the meat conſumed by harveſt-men, whatever the nature of it may be.

Harvest, *Corn*, a term ſignifying the time at which grain becomes ready for the ſickle, and fit to be cut down and preſerved in ſome way or other. It has been obſerved that the difference in the periods at which the corn-harveſt uſually commences in the different diſtricts of the kingdom, is very conſiderable, being probably greater than what happens in any other country of the ſame extent in Europe. There is ſcarcely one diſtrict that does not vary from another in this reſpect, ſo that the common duration of the harveſt in this country cannot be conſidered leſs than three months. It is uſually begun in the ſouthern and midland parts of the kingdom, towards the end of July, and the beginning of the following month; but in the northern diſtricts of Scotland, not until the firſt or ſecond week in September. And it is but rarely, that in theſe laſt ſituations it is finiſhed even in the moſt favourable ſituations, before about the end of October; and it not unfrequently happens that it is the middle of the ſubſequent month before it is wholly completed.

It may likewiſe be noticed that the periods are ſcarcely more various at which the harveſt begins in different parts of this country, than the modes are, in which the ſeveral different operations of that buſy ſeaſon are executed. In ſome caſes it is the cuſtom to reap or cut the corn with a ſickle, and bind it up into ſheaves of a moderate ſize; in others the cutting of the grain is executed by the ſcythe in ſome particular method or other, and often left without being bound up, though, in ſome caſes, it is bound into a ſort of bundles.

And further, in ſome inſtances a toothed ſickle is employed, while in others a ſickle with a cutting-edge is made uſe of for the purpoſe. The grain, when reaped or mown, is in many caſes ſet up into ſome ſort of hattock, and capped or covered with ſheaves of the ſame; but in others this is not by any means the caſe. In ſome inſtances, alſo, the grain is cut high, ſo as to leave a rough ſtubble, while in others, again, it is cut quite cloſe to the ſurface of the land. See Reaping.

In the Rural Economy of Yorkſhire, it is ſtated that there is no department of it that diſtinguiſhes the northern from the ſouthern and midland parts of the iſland ſo greatly as that of the method of performing the harveſt-work. And further, that probably none of the northern diſtricts are more ſtrongly marked with this diſcriminating characteriſtic than this. It is probable that nine-tenths of the corn that is cut within the kingdom is executed by men. In the counties of Surry and Kent, a woman may ſometimes be ſeen with a ſickle in her hand. But in Norfolk it is a ſight that is very rarely to be met with. Here, however, it is equally rare to notice a ſickle in the hand of a man, reaping, or provincially, ſhearing, being almoſt wholly performed by women. And three women and one man conſtitute what is termed a ſet, which, if the crop be a middling one, are capable of executing an acre a day. Where the corn is thin, one man is ſufficient to bind after four women; but where it is very thick upon the ground, he requires to have the aſſiſtance of a boy to make bands for him.

It is the practice in ſome caſes, to have the bands laid for the women to place their handfuls in, but more generally the corn is laid in heaps of about half a ſheaf each, the binder gathering them up carefully againſt his legs, in a ſimilar manner to that in which wheat ſtraw is uſually gathered upon the threſhing-floor. And this is much the beſt method, though ſomewhat more troubleſome, the corn being by this means bound up in a tight and even manner, the ſheaves being formed in an equal ſized manner.

The day-wages were, formerly, for a woman, during the harveſt, 10*d. per* day, and 2*s. per* day for a man. Conſequently at that time, wheat, which in the county of Surry would coſt 10*s.* or 12*s.*, and which, in any other county, would not be leſs than from 7*s* to 8*s.* would be in this diſtrict, (Yorkſhire,) cut for 4*s.* 6*d.* the acre.

It muſt be noticed, however, that within a few years the price of labour has greatly advanced, ſo that from 1*s.* 3*d.* to 1*s.* 6*d. per* day for a woman, and from 3*s.* to 3*s.* 6*d. per* day for a man, may probably, at preſent, be not far from the average price that is paid for harveſt labour. It is, however, conceived, that the ſaving of ſo much an acre is far from being the only benefit that is derived from the practice of employing women in the buſineſs of harveſt; the number of hands is multiplied; the poor man's income is increaſed; the parochial rates are leſſened; and the community in general are benefited by the diffuſion of the habit of induſtry, and the acquiſition of health. "How conducive to this, ſays the writer, are the employments of huſbandry compared with thoſe of manufactures! and the work of harveſt, ſo far from being thought a hardſhip, is, by women who have been bred to it, conſidered as a relaxation from domeſtic confinement and leſs agreeable employments."

The great change of circumſtances which has lately taken place in the country, has, however, rendered the employment of women in harveſt-work much leſs frequent than was formerly the caſe in moſt of thoſe diſtricts where they were formerly had recourſe to, and even in Yorkſhire this is much the caſe.

Harvest *Fly*, in *Natural Hiſtory*, the name of a large fly, remarkable for the noiſe which it makes in the ſummer months, and particularly about the time of harveſt. See Cicada.

Harvest, *Hay*, in *Agriculture*, that ſort of harveſt which relates to the buſineſs of converting graſs-crops into hay. See Hay and Hay-*Making*.

Harvest *Home*, the name of a ſort of feaſt that was formerly frequently given by farmers to their labourers and others, who were employed in the cutting and ſecuring the crops, at the cloſe of the buſy ſeaſon of harveſt. It is a cuſtom that does not prevail to any great extent at preſent. It is alſo occaſionally made uſe of to ſignify the ſong that is uſually ſung on the occaſion of this happy event.

Harvest *Labour*, that ſort which is practiſed in the field during the period of harveſt; comprehending the operations of reaping, mowing or cutting, and ſecuring crops of the grain kind.

Harvest *Men*, the name of thoſe labourers who are employed for the purpoſe of executing harveſt-work. In the engaging of this ſort of labourers, different methods are had recourſe to by the farmer, according to the nature of the circumſtances, ſituations, and ſeaſons; but at preſent, the moſt economical method is, probably, to let them have the work by the acre, ſo as to perform every thing which has any relation to it. It is, however, the practice in ſome places to hire them by the month, keeping them during the time in the houſe; in which way, though it may be very expenſive, the men are conſtantly at hand.

It has been ſuggeſted, that the victualling of harveſt-men, as practiſed in the county of Glouceſter, is extremely judicious and proper. They have no regular dinner. Their breakfaſt is cold meat. Their refreſhment in the field bread and cheeſe, with ſix or eight quarts of beverage. And at night, when they return home, they have a hot ſupper, after which each man has a quart of ſtrong beer, in order to alleviate the fatigues of the day which has elapſed, and to ſend him to reſt in good humour and ſpirits, by which he is prepared for the toil of the enſuing day. It is further ſuppoſed, that more than one advantage ariſes from this cuſtom. "All the work within doors, in the middle of the day, is got rid of; and the importance of continuing the work of the field, without a break through the prime part of it, is extremely evident, and capable of being properly appreciated by thoſe who from experience know how to value it.

It is, however, now moſtly the cuſtom in different parts, for the harveſt-men to have a dinner of meat in the middle of the day, either at home or in the field where they are at work, with as much ſmall and ſtrong beer as they can drink.

In the diſtrict noticed above, the hours of labour are very long, generally, where diſpatch is required, from dawn to duſk. And the quantity of work that is done is commonly above par, that is, from twenty to thirty loads of grain with one ſet of men. In moſt places, the rule is to begin as ſoon as they can ſee, and to work until the night falls.

Harvest-*Month*, a term applied to the time for which harveſt men are in general hired.

Harvest *Moon*. See Moon.

HARVESTING, the act of cutting down and ſecuring different ſorts of harveſt crops, ſo that they may be kept until they are wanted for uſe. There are various modes of effecting this kind of buſineſs; indeed, peculiarities are found attached to almoſt every different tract in the manner of executing it, ſome of which, if they were attempted to be introduced into others, would be conceived improper in many, and in ſome quite abſurd.

If it were, for inſtance, adviſed that, in Sutherland and Caithneſs in Scotland, the cultivators of the land ſhould purſue the methods of mowing and harveſting the grain in ſwath, or in cocks, that are practiſed in many of the counties of England, it would unqueſtionably expoſe the adviſer to the ridicule and contempt of thoſe who are more perfectly acquainted with the matter.

It muſt be evident, to every one who is converſant with the ſubject, that the manner of harveſting a crop that does not become perfectly ripened before October or November, ſhould, in conſequence of the uſual precarious ſtate of the weather at ſuch a ſeaſon, be very different, and that much more care and precaution are requiſite to preſerve it from injury than what is neceſſary for the purpoſe in July and the following month, when the days are ſo much longer, and the influence of the ſun ſo much greater. But this, though it does not by any means account for all the various methods in which the crops of grain are harveſted in the kingdom, many of which are probably continued rather in conſequence of long habit and the early prejudices of farmers, than from any conviction of their expedience, may, notwithſtanding, afford a pretty ſatisfactory reaſon why more precaution is required in the more northern parts of the iſland than is conceived neceſſary in the ſouthern and eaſtern diviſions of the country. In the latter of theſe, as has been already ſeen, the harveſt begins at an early period, and the farmer has, of courſe, but little to apprehend from long continued ſeaſons of unfavourable weather, or the rapid approach of the winter, which oppoſes numerous difficulties.

In whatever mode the work of harveſting is managed, it is clear that, as bad weather muſt greatly affect the profits of the cultivator, eſpecially where wheat-crops are concerned, it is proper that he ſhould be conſtantly on his guard to have a ſufficient number of hands at work, in order that the moſt may be made of the fine ſeaſon; for, without this, much loſs muſt be ſuſtained, and the title of *afternoon farmer* be applied to him. Indeed, when the weather is favourable at this period, there ſhould never be a ſingle moment loſt in getting forward with the work, as a proper degree of diſpatch is every thing.

With regard to the cutting of the crops, it is neceſſary to ſtate, that moſt ſorts of grain, except that of barley, ſhould be cut or reaped before they become over-ripe. But where barley is cut in an unripe condition, it is apt to ſhrivel, and become a bad ſample. It is, however, a practice with ſome farmers to leave the corn ſtanding ſuch a length of time, that it is ripe enough to *cut* and *carry*, as they term it, or until the ſheaves are capable of being carted home, on being bound up. This method can, however, only be purſued where the crops are quite clean and free from all ſorts of weeds.

It is ſtated, in the Report of Eaſt Lothian in Scotland, that the harveſting with winter-ſown wheat is ſometimes earlier than for other kinds of grain, only excepting Dutch oats. Spring-wheat is later, and, unleſs in favourable ſeaſons, is cut with other grains. It is, however, ſuggeſted, that there ſeems to be ſome diverſity of opinion among the farmers of this diſtrict, concerning the marks of ripeneſs in wheat, or the exact degrees of it that are requiſite to conſtitute a perfect ſample: ſome aſſert that cutting quick or early is the ſureſt mode of having the grain perfect; but others, on the contrary, are of opinion that it ſhould be dead ripe; or, in other words, that the circulation in the ſtraw, as well as the corn, ſhould be over before it is cut down. It is probable that the truth is to be found in the middle between theſe extremes; as the opinion is ſanctioned by the practice of the beſt farmers, who neither cut very quick, nor allow the wheat to be over ripened. Attentive obſervation readily points out the marks of maturity which are neceſſary for wheat, as well, indeed, as for every other ſort of grain, and which, when well conſidered, are ſanctioned by experience. As long as the circulation continues through the ear of the plant, the grain is deriving ſomething from the ſoil, and ſhould not be cut down; but the moment that is over, the ſooner it is cut down the better. The firſt appearance of the circulation being at a ſtand, conſiſts in a ſhrinking and whitening of the ſtrawy part immediately below the ear, which proceeds in a gradual manner downwards, until it reaches the bottom, when the grain is provincially ſaid to be *dead ripe*; in which ſtate the ſtraw becomes brittle, the ears are eaſily broken off, and the grains ſhake out in the time of handling. But to this ſtage it ought never to be allowed to come, as the loſs of grain is not only great, even under the moſt favourable circumſtances of calm and fair weather, but the quality is materially impaired by ſuch a long unneceſſary expoſure to the operation and influence of light and heat. It is a fact now well underſtood, that the nouriſhing and fermentable properties of all vegetable productions, whether grain or fruit, bear an exact proportion to the quantity of light and heat they have enjoyed during their growth and ripening; the benefits derived from theſe continue to be felt while the circulation goes on: but as ſoon as it ceaſes, theſe elementary ſubſtances begin to take away again what they had given formerly; the grain, of courſe, loſes its colour and flavour, and has every valuable quality diminiſhed. If it ſhould be overtaken by rain in that ſtate, the injury is infinitely greater than what happens to grain that is cut at an earlier period.

It would, conſequently, appear that the period at which wheat, and, in ſhort, all the other ſorts of white crops ſhould be cut, is when the ſtraw begins to ſhrink, and becomes white about half an inch below the ear; the circulation is then cut off, and all further benefit from its ſtanding is at an end; the grain has, in fact, taken every thing that is requiſite to perfect it from the ground; and as far as the value of the ſtraw, whether for fodder or other purpoſes, is concerned, an advantage is gained by cutting it while the circulation is going on, and by that means preſerving a part of the natural juices; the value of ſtraw, like that of hay, depending upon the proportion of natural juices it contains, and the pains which have been taken to preſerve them.

It is moſtly adviſed that ſuch wheat as is much infeſted with weeds, ſhould be cut three or even four days earlier than is uſual, in order that the weeds may have time to wither before the corn becomes too ripe, for if it ſhould not be cut before the grains are fully ripe, it will be liable to ſuſtain conſiderable injury by ſhedding, loſs of colour, and damage from rain, while it continues expoſed for the purpoſe of the weeds being rendered dry. A ſingle ſhower, or even a day's gentle rain, while it lies in ſwath, is, indeed, thought by ſome to be rather beneficial to the grain, by cauſing it to feel dry, and ſlippery in the hand, and threſh out the better; but every poſſible care ſhould at the ſame time be taken to guard againſt its being wetted too much in the field. When, however, through any unavoidable accident, it is laid up in too moiſt a condition, though it may not take any great harm in the mow, it will ſweat and adhere together, after being laid in a heap, when threſhed out, and have a perfectly white appearance from mouldineſs, as if dredged over with flower. As corn, in this ſtate, is not capable of being kept, it ſhould conſtantly be ſent to the market, and diſpoſed of as ſoon as poſſible.

Notwithſtanding it is ſuppoſed that moſt ſorts of grain are bettered by lying a ſhort ſpace of time in ſwaths, grips, or handfuls, in order to take the dews, which are believed to contribute to the rendering of the corn more plump, and of a better colour, yet the ſtraw is thereby greatly deteriorated as a fodder, unleſs the grain had been cut before it had attained its full maturity, and has laid out no longer than till it has become completely ripened. But in hot dry ſummer ſeaſons, when the grain ripens in a complete manner, and its own vigour ſupplies it with a proper colour, rendering it ſo plump as that the huſks readily yield their contents on threſhing, wheat need not lie out in the above ſtates before it is ſheaved, unleſs it ſhould have much graſſy matter among it, which ought never to be the caſe: in cold wet ſummers, however, wheat is ſometimes horny and pale, the grains thin, and in need of being plumped up; their huſks adhering ſo cloſe, that they require to be mellowed in order to their threſhing in a proper manner. The full grain which ſwells the chaff, even until it opens in fine fruitful years, is almoſt bare and expoſed to the conſtant effects of moiſture, the heavy ears in ſuch caſes ſpreading and hanging over the chaff, which of courſe opens and ſpreads wider, letting the rains in at the bands more expeditiouſly than in leſs kindly ſeaſons, when the grain is more light, and the ears in the ſhock ſtand more erect and cloſer.

It is pretty generally the practice in moſt parts of the kingdom to cut the rye and wheat crops with the ſickle or reaping-hook, a tool which would appear to have been employed for the purpoſe from the moſt early periods of the art of huſbandry. But, in ſome caſes, this tool is employed in a toothed ſtate, while in others it has ſimply a cutting edge. The work is commonly done equally well whichever is made uſe of for the purpoſe. The buſineſs of reaping is performed differently, in reſpect to height and other circumſtances, according as the cuſtom of the diſtrict may prevail. It is uſual, in ſome of the midland counties, and in many of thoſe on the ſouth-eaſt coaſt, to cut the wheat crops at the height of twelve or fifteen, and ſometimes eighteen, inches from the ground; the handfuls, as they are reaped, being laid on bands formed from ſome of the reeds of the crop twiſted or knotted together near to the ear part. Theſe different parcels being bound up into what are termed ſheaves, are either ſuffered to lie upon the ſtubble for a few days previouſly to their being carried, or they are ſet up on their bottoms in double rows, the head of the one ſheaf inclining againſt that of the other oppoſite to it, ſo as to form a ſort of irregular triangle if the baſe be included. But in ſome other caſes the ſheaves are ſet up into a kind of ſtouk without being hooded.

In moſt of theſe caſes, as ſoon as the crop is carted off the land, the ſtubble is mown by means of a ſcythe, and, after being raked into large heaps, is conveyed away to the farm-yard, where it is uſed, either for thatching buildings, corn and hay ricks, or as litter for the ſtock.

However, in the north and weſt of this country, and in every part of Scotland where wheat and rye are grown, the crops are reaped as cloſe to the ſurface of the ground as can be conveniently done; and the ſheaves, after being bound up, are ſet into ſhocks, which are provincially termed *ſtouks*, conſiſting of a double row of five ſheaves, or ſometimes ſix, over which, in moſt places, two ſheaves are put in ſuch a way as to completely cover and protect the others in their upper parts. Theſe have the title of *hood* or *cap-ſheaves*, which, when properly placed, have an extremely good effect in preventing even very heavy rains from penetrating and injuring the grain below in any very material degree. It is the cuſtom in ſome places, as ſoon as the hood-ſheaves have been put on the ſtouk, with their root ends uppermoſt, to have their heads ſpread carefully over the top of the ſtouk; as, by the ears being thus reclined, they are in a great meaſure free from injury themſelves, and at the ſame time guard the ſtouks they cover from almoſt any rain that can fall; and, with the view of more effectually preſerving theſe hood-ſheaves in the ſituations in which they have been put, a parcel of ſtraws, the uſual thickneſs of a band, is taken from each ſide below the band of one of the ſheaves, which, together, form a ſort of ropes, that, being conveyed round the other ſheaf, binds them faſt to each other, and of courſe preſerves them both in their due ſituations.

Some, however, conſider this practice of hooding or covering the tops of the ſtouks, as greatly retarding the completion of the work of harveſting, let the nature of the climate be what it may, as the crops in ſuch caſes cannot be ſo quickly ready for being ſecured in the houſe, or built into ſtacks, as when it is fully expoſed to the influence of the atmoſphere. It is conſequently ſuppoſed that the propriety of employing this precaution againſt the effects of bad weather muſt depend in a great degree upon the period at which the crop is reaped, the ſtate of the weather at the time, and the general nature of the climate in the particular ſituation or place. In every one of theſe there is often ſo great and almoſt regular a difference, that the means which the cautious farmer may find it prudent to make uſe of in ſome ſituations, will in others be, if not improper, at leaſt much leſs neceſſary. It is aſked to what, except the circumſtance of the harveſt commencing at earlier periods, and that of the weather continuing more uniformly favourable, it is owing, that the farmers in the ſouthern parts of this country never hood or cover their wheat crops in ſheaf, while that precaution is never overlooked or omitted in the northern parts of the iſland? If this variation in the practice be not accounted for on the above grounds, it is ſuppoſed difficult to explain the cauſes from which it has originated.

By others, both the above practices are ſuppoſed wrong. In fine weather the ears of corn cannot be too much expoſed to the ſun and dews; and even where the grain is thin, a ſlight ſhower is often of great benefit to it. In a rainy ſeaſon they cannot be covered too cloſely; conſequently, in the work of covering the wheat, as in many other branches of rural economy, the farmer muſt be guided by the nature of the ſeaſon, and not by the uſual cuſtom of the diſtrict in which he may reſide.

It is a cuſtom in Oxfordſhire, and ſome other counties, to bind up the wheat into ſheaves, notwithſtanding it may be full of weeds, and ſet them up in three ſheaves together, each ſomewhat ſloping againſt the other, afterwards covering them at their tops with two others opened at their ear ends, which are extended and placed in a downward direction. In this way their wheat crops were formerly let ſtand for three weeks, or longer, in the field, before they were carried, as no wet could, it was imagined, hurt the grain, or cauſe it to grow in the ear. Theſe are now, however, let ſtand a much ſhorter time in the field, being kept more clean from weeds.

In the county of Wilts it was formerly a pretty common practice to form their wheat crops, after being cut into what they term pooks, in which the ſheaves are ſet in a circle with the ears upwards, on which another circle of ſheaves is placed, and ſo on, contracting each round until the pile terminates in a ſort of point, over which a ſheaf, opened in the middle, is turned with the ears downwards, ſomething in the manner of the hackle of a bee-hive, as ears thus turned do not ſo readily grow, though much wet may fall upon them; and, from the bottom of a ſheaf being broader than its top, the upper ones ſhelve over the under ones in the pooks, in the manner of the eaves of a houſe, and the whole is thus kept dry. A pook may in this way be made to contain a load, or even two loads, and render the grain ſecure from wet. But it is not a method that is much had recourſe to at preſent, the grain being left in the field a much ſhorter time than was formerly the caſe. Beſides, it is a mode that takes up too much time.

It is conceived, by a late writer, that the practice of leaving the wheat ſtubble ſo long as to render mowing afterwards neceſſary, is chiefly confined to the more ſouthern and midland counties; and further, that though this be unqueſtionably a remain of the method of harveſting which was introduced by the Romans, it does not ſeem worthy of being imitated at preſent, as being expoſed to numerous difficulties that do not apply to the general and uſual mode of executing the work. It is well known to thoſe converſant with the buſineſs, it is ſuppoſed, that the higher the crop is cut the more heads and ſtems are broken off and dropped; and that whoever will take the trouble of examining a field in which a long ſtubble has been left, will find the loſs of grain extremely great, indeed far more than in caſes where the crops have been reaped pretty cloſe to the ground. Further, the reaping of a crop of wheat, barley, or oats, of the uſual length and thickneſs, is not only better and cleaner, but, at the ſame time, more expeditiouſly performed when cut near to the ſurface of the land. The reaper, by leaning the handful he has reaped gently againſt the ſtanding grain, can go on to cut and keep together with the greateſt facility, a much larger quantity than he can graſp in his hand. But, on the contrary, when the crop is cut twelve or eighteen inches from the ground, he is under the neceſſity of graſping the ſtems before cutting, or they will infallibly drop upon the ſtubble and be loſt. In the former caſe too, an expert reaper will, at every time he ſtoops, reap three or four times the quantity that can be done by the perſon who is obliged to lay hold of the different ſtems; and if to this be added the loſs of grain and of ſtraw, with the unavoidable expence of mowing, raking, carting, and ſtacking the ſtubble, it will, it is ſuppoſed, be difficult, perhaps, for the moſt zealous advocates for this method of harveſting, if it be ſuperior to the other, to diſplay in what this ſuperiority is to be found.

In the report of the county of Perth in Scotland, where cloſe reaping is much practiſed, it is ſtated that low ſhearing produces additional provender for live ſtock; and where the whole of the ſtraw is not required for uſe as food, the cattle will reject the coarſer part, which may ſerve as litter, and being trodden under their feet, will greatly augment the quantity of manure. If a long ſtubble were to be ploughed into the ſoil before winter, it might be of ſervice; but when it has been bleached by the rain and wind, and corroded with the action of froſt, the whole of its juices, and all its manuring virtues, are in a great meaſure loſt and deſtroyed. It is ſuggeſted, that this practice without doubt originated in the idea, that ſeems in former times to have been entertained, that in place of building the crops of wheat in ſtacks, as is at preſent the uſual method of proceeding in other parts of the iſland, it was indiſpenſably requiſite to ſecure them in the barns. The force of prejudice, and the diſlike of innovation of every deſcription may, it is ſuppoſed, have had the tendency, of not only continuing it ſo long, but of contributing to its general eſtabliſhment. (See Reaping.)

In almoſt the whole of the ſouthern parts of this country, the crops of both oats and barley, as well as of peas and beans, are mown by means of a ſtiff ſort of ſcythe, and either repeatedly turned over in the ſwaths, or formed into ſmall cocks, in which ſtates they continue until they are ready for being conveyed to the barns or ſtack-yards. As ſoon as they are in this condition, the carts or waggons are ſet to work, and the whole of the hands that can be ſpared employed in raking the ground after them. In ſhort, the buſineſs is managed pretty nearly in the ſame manner as that in which hay making is performed. The mowing and harveſting grain in ſwath or in cocks, if practices, that can in any climate or ſituation be admitted as beneficial, can only, it is imagined, be conſidered ſo where the harveſts are early, and where the climate is extremely mild, favourable, and ſteady. This being the caſe, it is not probable that ſuch methods can ever become generally eſtabliſhed in this country. For it is believed, that the benefits derived from harveſting the above different ſorts of crops in the ſheaf are extremely numerous, in compariſon to thoſe of the practices that have been juſt noticed.

Indeed, the writer of the Rural Economy of Yorkſhire, appears juſtly ſenſible of their ſuperiority, though much in the habit of harveſting grain in the ſwath, and ſtates the comparative advantages of the different methods to be greatly in favour of the ſheaf method, for all theſe ſorts of grain. The waſte throughout is much leſs; the corn is at once got out of the way of the weather; the labour of carrying, houſing, or ſtacking is infinitely leſſened; much barn room is ſaved, the labour of threſhing is leſs; the ſtraw, where the harveſt proves wet, makes much better fodder; and, under the whole of the circumſtances, the grain preſerves its colour in the ſheaf far better than in the ſwath. And after having ſtated the ſeeming inconveniency of harveſting grain in the ſheaf to principally conſiſt in the increaſe of labour at the outſet, it is concluded that, upon the whole, the quantity of labour performed by men is diminiſhed, not increaſed, by the practice of harveſting in the ſheaf. When to this is added the eaſe and expedition in the work of carrying; which is the moſt important buſineſs of harveſt, and that which requires the greateſt diſpatch, it may be fairly concluded, it is ſuppoſed, that by harveſting in the ſheaf, the labour, the anxiety, and the riſk of harveſt are leſſened, and at the ſame time the quantity, as well as the value of the produce, is augmented. And farther, it is ſuggeſted by another writer, that if the above author had been perfectly acquainted with the great benefits derived from the uſe of threſhing machines, and been alſo aware of the almoſt impoſſibility of threſhing clean by ſuch machinery, unleſs where the grain is ſpread out evenly upon the board, and taken in regularly by the feeders, he would have ſtated this as one principal reaſon why crops of the oat and barley kinds ſhould be harveſted in the ſheaf method.

In different parts of Yorkſhire, and ſome other neighbouring diſtricts, it is an uſual cuſtom to mow the crops of oats, barley, beans, and other ſimilar kinds with the ſcythe, and then to bind them up into ſheaves, ſetting them up afterwards into ſtacks in the manner that has been already noticed, in ſpeaking of wheat crops. Where it is the intention to harveſt grain in the ſwath, or cock method, the uſual mode is to mow in an outward direction, or from the ſtanding corn, as is practiſed with graſs; but when it is deſigned, that it ſhould be bound up into ſheaves, it ſhould be mown inwards, or towards the ſtanding grain. By this means, and that of fixing what is termed a cradle over the ſcythe, or bows made of willow ſhoots on the heel, or lower end of the ſcythe ſhaft, the corn is made to fall eaſy and regularly off the ſcythe, and to reſt againſt the ſtanding grain in an inclining manner. A woman and a boy generally attend each mower. The boy is, for the moſt part, engaged in making bands, but in ſome caſes alſo in binding the ſheaves. The woman, with a long toothed wooden or iron toothed rake, having a ſhort ſhaft, or handle, gathers and collects the grain, after being mown, into portions about the ſize of a ſheaf, and, with equal dexterity and quickneſs, lays it regularly into the band, without ever ſtooping or touching it with the hands. However, in ſome ſituations this ſort of work is more conveniently accompliſhed by means of a kind of fork, which is formed with two prongs below, ſomewhat in the manner of the common hay fork, to which are fixed at the upper part two upright prongs, by which the grain is removed from the ſwath, and collected into ſheaves, the lower prongs lifting it up, while thoſe on the upper ſide prevent its falling backwards, and determine the quantity which is ſufficient for the ſheaf. By this ſimple contrivance, it is ſuppoſed, that the grain may be gathered more regularly, and much more expeditiouſly into the ſheaf, than by the labour of the hand, as uſually practiſed.

It is uſual, as ſoon as the mower has reached the end of the field, in ſome places, for him to begin to bind and ſet the ſheaves into ſtouks, which he goes on doing in the whole of his returning courſe towards the end of the ſwath, where he began with the ſcythe. In this caſe the woman is, in the mean time, employed in raking the ſtubble, which, on lands that have been properly harrowed and rolled, is eaſily done, and ſo effectually, that ſcarcely a ſtem is loſt. In the work of performing theſe different operations, there are, however, ſeveral variations to be met with in the practice of different places.

It is ſuggeſted, that this plan of harveſting oats, barley, and ſome other crops, may, for numerous reaſons, be conſidered ſuperior to that of reaping, and conſequently, deſerve more than ordinary attention from thoſe who are not well acquainted with the practice, and who are not ſo much attached to ancient cuſtoms, as to diſregard every means of improvement, becauſe they are not generally adopted in the places where they are ſituated. The great ſcarcity of labourers, and the rapid advances in the rates of harveſt wages, are felt in the moſt ſevere manner, and complained of with earneſtneſs; of courſe every mode, by which the number can with propriety be reduced, and by which various other deſcriptions of labourers, as women, boys, girls, &c. can be ſubſtituted with propriety in the harveſt-field, muſt have the tendency of obviating the loſs, inconvenience, and additional expence, to which the farmer is ſubjected, in conſequence of the deficiency in the number of hands, which is too frequently experienced at ſuch buſy ſeaſons. It is contended, indeed, that without the aid which is derived during the harveſt months from the poor neglected peaſantry of Wales and the Highlands of Scotland, the grain crops in many of the more fertile parts of the iſland could not, by the preſent generally practiſed mode of harveſting, be cut and gathered in, without taking ſuch a number of hands from the various manufactures of the country, as would be inconvenient, and at ſuch rates of wages as would almoſt amount to the prohibition of the cultivation of grain crops.

It is ſtated, on the ground of attentive examination, that the mode of harveſting which is practiſed in Yorkſhire, is preferable, in every point of view, as a general method, to any other that has been adopted in the kingdom. And that it ought to be introduced into the northern and weſtern parts of this country as well as every part of Scotland, eſpecially wherever improved cultivation, and various extenſive manufactories have been eſtabliſhed.

Notwithſtanding oat, barley, bean, and ſome other ſimilar kinds of crops, are however occaſionally mown with the ſcythe, they are, as has been already ſeen in the greateſt portion of the iſland, cut by the ſickle; and in the ſouthern parts of it moſtly by women, while in Scotland there is generally a pretty equal mixture of men and women employed in the buſineſs. There, in general, the ploughmen are no farther engaged in the harveſt work, than merely in bringing home the crops to the ſtack yards. In ſome particular diſtricts however, eſpecially towards the northern extremities, every operation of the plough and harrow, &c. is ſuſpended, and the ploughmen are made to bear a ſhare in the labours of the harveſt field. There is nothing particular in the manner of performing harveſt work in this part of the iſland; the grain being chiefly reaped low with the ſickle, bound up into ſheaves, and ſet in ſtouks.

In regard to the rates of harveſting, they are extremely various, according to particular circumſtances, in the different parts of the kingdom, and of courſe not capable of being aſcertained with any uſeful accuracy. But it may be noticed that a man, accuſtomed to the uſe of the ſcythe, is capable of performing his work over as much ground as four reapers. The expence in the ſcythe method is of courſe much leſs, the number of hands much reduced; and other deſcriptions of them than thoſe at preſent employed, rendered capable of being uſeful, conſequently leſs difficulty experienced in providing a ſufficient number.

Beſides, the work is executed in an equally complete manner, and with far more expedition; while at the ſame time the quantity of the neceſſary article ſtraw is greatly augmented.

It may be remarked that greater expedition in harveſting is requiſite in proportion to the heat of the ſeaſon; as grain that is haſtily ripened, ſcorched up by the action of the ſun, and full in the ear, ſpeedily takes on a ſtain, is quickly injured by moiſture, and eaſily ſheds by every blaſt of wind. It is conſequently adviſable to loſe no time in ſuch caſes, but immediately to employ a greater number of perſons as reapers, as more cannot be required than that the corn be well ripened, and good in the colour, to produce which the leſs it then lies abroad, either in the grip or ſheaf, the better. Reaping high where the bottom is weedy may greatly aſſiſt in this view. And for hilly diſtricts it has been ſuggeſted by an old writer, that grain can never be better houſed, when it is perfectly ripe, hard, and has no mixture of weedy matter, than by gripping it and carting as faſt as it is cut down, as the dampneſs cauſed by its lying upon the ground during the night is not eaſily expelled. With wheat it is moſt generally adviſable to turn ſuch grips as are left out, as early as poſſible after they have been formed, in order that they may ſpeedily become dry. In this way they are capable of being preſerved longer from ſprouting in the ear in caſe there ſhould be rain. But when dripping weather or driving miſts enſue, and continue for any length of time after ſuch grips have been loaded with wet, it is impoſſible for the art of man to prevent their growing. Independent of other accidents, even the bare weight of the ears will ſink the grips to the ground, though they may have been laid in the lighteſt manner, by which they muſt be injured if ſuffered to remain long out in bad ſeaſons. And on ſomething of this principle it is that the farmers in the counties of Leiceſter and Northampton, eſpecially where the lands are rich, deep, and flat in their ſituation with much incloſure, leave a very high wheat ſtubble, on which the grips of corn are held up and ſupported quite hollow and free from the ground, and of courſe are more eaſily dried by the ſun and the wind; for it may be remarked that on rich ſoils the grips will grow more readily after they have taken wet, when on the naked ground, than in the contrary circumſtances, particularly in hilly ſituations.

In all caſes the more forward the harveſt ſeaſon is, and the more warm the weather, and the longer the grain may remain with ſafety in the field, whether it be in grips or ſheaves, as ſuch expoſure to the atmoſphere after it is cut not only mellows it, but makes it threſh better and look finer, as has been already ſuggeſted. Hence, when the wheat harveſt takes place by the middle or before the latter end of July, which is ſometimes the caſe, there is little danger in letting the grain lie abroad for three or four days, or even a week, if it be not over ripe when cut, though a rainy day or two ſhould intervene, as at ſuch a period of the year the ſun is generally ſo hot, the days ſo long, and the dews commonly ſo trifling, that the corn ſoon dries even after a heavy ſhower; while in the middle, and ſtill more towards the end of the following month, the rains commonly begin, the dews are more powerful, and the ſun's drying power ſo greatly leſſened, that if wet weather takes place then, the grain will be much more liable to grow and be injured.

It has been ſuggeſted, by way of caution, by an old writer, that it is material in hilly diſtricts not to bind the grips of wheat into ſheaves, at too early a period in the courſe of the day, as in ſuch ſituations they have taken ſuch a damp by having lain upon the ſurface of the ground, that though the ſtraw and chaffy ears may appear dry as ſoon as the dew is firſt diſſipated, and the ſun has ſhone a few hours upon them, there will ſtill remain an inward dampneſs in the ſtraw and grain, which will be injurious in the ſtack or mow. The afternoon ſhould of courſe be choſen for the purpoſe of gripping and binding the grain into ſheaves in ſuch places, the work being finiſhed before the approach of night. It is beſt, however, to lay the bands in the morning, as they will then twiſt better and be leſs brittle than after the ſun has ſhone ſome time on the corn. They ſhould always be made ſtrong and well twiſted together, in order that they may contain the corn without giving way. But though the modes adviſed above may be practiſed with propriety in ſome inſtances, and for ſome kinds of corn, they ſhould not be much employed for wheat crops, as it is found that the leſs they are expoſed to wet and heat the better. On this principle, the practice of covering the ſhocks of wheat with cloths and mats, is in uſe in ſome places in the county of Kent, as between Sandwich and Dover. The mats are found the beſt and are the moſt commonly employed. By this means it is ſuppoſed that the ſample of the grain is ſo much improved, that the bakers at Dover give a decided preference to ſuch as is treated in this manner. The expence of mats for this uſe is about ſeven-pence each, which, if properly taken care of, will laſt many years.

In regard to the buſineſs of tying up the ſheaves, it may be noticed that it is a work that is not always ſufficiently attended to. By way of diſpatch the reapers are ſometimes apt to bind them too near the ear ends, the conſequences of which are that they ſlip through the bands, do not hold together while they are thrown into the carts in loading, and moſt generally fall through the bands before they are threſhed. When ſlight rain is foreſeen at harveſt time, it is the beſt way to bind up the grips of corn as faſt as they are formed into ſheaves, as ſmall ſhowers will wet them ſo much as to prevent its being done with propriety. But it is better never to cut grain at all under the circumſtances of wet, as it is always a bad practice, where it can be avoided. When the harveſts are wet it is the beſt to have the ſheaves ſmall, as from their being thin at the tops, and falling cloſe, the rain does not ſo readily ſink down into the middle of them, and thence get through to the bands, which it is very liable to do in large ſheaves that lie broad and take up more room. The ſmall ſized ſheave is likewiſe the moſt proper, where there is much weedy matter intermixed with the grain, which however ought never to be the caſe, as the air, ſun, and wind, have greater power in drying than under the contrary circumſtances. And the writer of "Minutes of Agriculture" adviſes, that the ſheaves ſhould only be tied in a looſe manner, and neither too large or too ſmall; they muſt not, however, be left too looſe, as in that caſe they will be in danger of ſlipping through the bands wholly, beſides their being difficult to load and worſe to ſtack. It is likewiſe ſuggeſted, that they be ſet up in ſuch a way as only to juſt touch each other at the butts and ears, a ſpace of a foot and a half being left between each ſheaf, at the ſpot where they are bound, the ears of the bands being conſtantly turned inwards. In general, it is aſſerted, the ſmall looſe-tied ſheaves will dry ſoon, while the large tight-tied ones of the ſame ſhock will grow; and that the ears of the bands are the firſt parts that begin to grow. Further, that thoſe ſhocks which ſtand free and open, are much ſofter than thoſe of which the ſheaves ſtand together in a cloſe huddled manner, through which neither ſun nor air can penetrate. It is ſtill farther recommended that inſtead of tying the bands near the butts, as is uſual, they ſhould be tied looſely about the ſame diſtances from the tops, ſpreading out the butts, and ſetting up the ſheaves in the ſugar loaf form ſingly, leaving the inſides totally hollow. By this means they are enabled to dry quickly; when by ſhifting the bands back again the ſucceeding day to the common binding places, and opening the ears a little, they become ſpeedily in a ſtate for carrying. This, however, is a mode that cauſes conſiderable additional trouble.

In places where the harveſts are late and rainy, the preſervation of grain crops is moſtly arduous aud difficult. Conſequently, other methods beſides thoſe commonly employed, and which have been already detailed, are had recourſe to occaſionally, ſuch as what are termed gaiting and hutting. Theſe modes are, however, only practiſed in ſuch caſes as where, from the precarious ſtate of the weather, the crops would be in great danger of being ſpoiled, without ſome unuſual exertion. Theſe methods are made uſe of in ſeveral of the more northern counties of England, as well as in ſome parts more towards the north in Scotland, and do not appear bad methods of harveſting grain crops in late unfavourable ſeaſons. The work is executed in this manner: the ſheaf, inſtead of being bound tight towards the butt-end, as is commonly the caſe, is tied ſlackly, and the band moved up until it reach ſome of the ears. The binder then ſets the ſheaf in a rather forcible manner on its bottom, ſo as to give it a ſort of baſe to ſtand upon. And where the corn is gaited by thoſe who are experienced in the buſineſs, the bands are conſtantly puſhed down the middle of the ſheaves, after they have been ſet on end, and the bottoms ſpread out, the middles being left hollow, and care taken to form ſmall openings towards the ſouth, by which contrivance the air as well as the ſun have the greateſt poſſible influence in preſerving the crops, and rendering them fit for being carried and ſtacked up. In caſes where grain crops are cut in a wet ſtate, as not unfrequently happens towards the end of a late harveſt, this is in all probability the beſt plan that can poſſibly be deviſed for preventing the threatening miſchief. The mode of hutting in the field, in order to ſave grain in bad harveſt ſeaſons, is alſo a practice often had recourſe to with ſucceſs, in the north-weſtern parts of Scotland, eſpecially when put up in a tolerable ſtate of dryneſs. The huts are made upon the field immediately after the crops are reaped, and bound up into ſheaves. They are, in general, only formed of ſuch a ſize, that a man is capable of building them in ſtanding upon the ground; and conſiſt in common of from twelve to twenty ſtooks, in proportion as the ſtraw is more or leſs bulky. If theſe huts be properly formed, and a ſheaf or two carefully ſpread over their tops, ſomewhat in the umbrella method, ſcarcely any weather, however bad, or of whatever continuance, will affect the grain in any material degree.

Upon taking one of theſe huts down, after it had ſtood five or ſix weeks, or probably longer, under the moſt ſevere rains that had happened during any harveſt for a great length of time, it was found that, except a few of the top-ſheaves, the whole was in a ſurprizing ſtate of preſervation. And this was the more remarkable, as the crops in ſome of the adjacent fields where this precaution had been neglected, though carefully ſtooked and hooded, were grown and matted together in ſuch a way that every ſtook formed an united maſs, not only of vegetable, but vegetating matters. In places where the harveſts occur at a late period; where the weather is unfavourable, and where the approach of winter is apprehended, the practice of hutting grain in the field may be ſafely adviſed as a beneficial plan. And where the weather continues long rainy, and there is reaſon to apprehend the ſpringing of the grain in the ear, or that heavy falls of ſnow may take place, as occaſionally happen, the moſt proper method is to reap and gait as expeditiouſly as poſſible.

In regard to houſing and ſtacking of grain products, it is the cuſtom of ſeveral of the northern, midland, and ſouth-weſtern parts of the kingdom, to have the barns of a large ſize, and to houſe the whole, or at leaſt as much as poſſible of the wheat crops directly from the field. But in moſt other parts the wheat, as well as other ſorts of crops, are built into ſtacks in a yard for the purpoſe, as near as poſſible to the barns, into which it is conveyed only as it may be found convenient for being threſhed out. And crops of the oat, bean, barley, and pea kinds are almoſt every where put into ſtacks in the yards appropriated for them, being raiſed in different forms, according to the cuſtom of the particular ſituations. With reſpect to houſing the crops from the field, it can only be practiſed with propriety when they are perfectly clean and dry; and is of courſe a method which, if it were adopted to any extent in thoſe diſtricts where the climate is particularly precarious and unfavourable, could not fail to be attended with bad effects. The building of the crops into ſtacks is without doubt the beſt and moſt convenient method of preſerving the grain as well as the ſtraw; but in the view of preventing loſs by vermin, and the bottoms of the ſtacks from injury and muſtineſs by their coming in contact with the moiſt ground, they ſhould always be built on a frame-work placed upon pillars of ſtone or wood. Where this is the caſe, and the caps of the pillars are of ſuch dimenſions and ſo placed as to prevent the entrance of rats and mice into the ricks, theſe being well built and properly thatched, the grain will keep in excellent condition for a very great length of time.

With regard to the buſineſs of carrying the crops from the fields, notwithſtanding there is much diverſity in the ſize, ſhape, and conſtruction of the carts and waggons that are employed for the purpoſe, as well as in the ſtrength of the teams by which they are drawn, there is but little variation in the general mode of conducting the work. The grain crops, in whatever mode they may be harveſted, are put upon the carriages by perſons ſtationed in the fields expreſsly for the purpoſe, and on being drawn to the rick-yard are forked by the carters to the ſtacks.

It has been lately ſuggeſted, that where the number of teams are ſufficient, in carting the wheat crops, three waggons ſhould be employed ſomewhat in this manner, one of them loading in the field, one unloading, and one upon the road going, in different directions. For this, five or ſix horſes are quite ſufficient, with two men to pitch, the ſame number to load, one to drive, and two to manage the buſineſs of unloading; in the whole ſeven, which make great diſpatch. But the uſe of ſingle-horſe carts is far ſuperior, whatever the number of horſes employed in the work may be. Let each of theſe be in a well formed cart, and a great deal more ground will be cleared than can be effected by the waggons.

In inſtances where the grain crops are harveſted from the ſwaths, a number of perſons are employed in the buſineſs of ſtacking, an operation which is conducted in the ſame way as for hay; but where the grain is bound up into ſheaves, one perſon only is neceſſary in forming the ſtack, unleſs where it is of more than ordinary dimenſions; in which caſe the aſſiſtance of a boy is commonly required, who receives the ſheaves from the carter, and hands them to the man who is employed in building the ſtack. In executing this kind of work it is neceſſary to attend to different circumſtances, ſuch as the ſhape and the manner of building, trimming, and thatching, as upon each of theſe being properly performed, much benefit depends in the preſervation of the contents. See Stacking *and* Thatching *of Grain*.

Where it is difficult to provide a ſufficient number of reapers, and where the farms are very large, as well as the crops various, it is obvious that a much longer time is requiſite to complete the buſineſs of harveſt, than under the contrary circumſtances. The experience of bad harveſts ought to ſuggeſt the propriety and advantage of ſowing at an earlier period, and of exerting every poſſible means, at the critical ſeaſon of harveſt, to collect and get in as quickly as can be ſafely done the grain crops, and not by any cauſe to neglect the opportunity of gathering a ſmall portion, becauſe a great deal is not ready. And in no caſe to be engaged in reaping, when the teams ought to be employed in loading and ſecuring the grain, nor for one moment to loſe ſight of the great object which is to crown the labours of the year. Tedious and unfavourable harveſts are ſerious evils, and the loſſes, inconveniences, and anxieties which they produce, are only to be alleviated by the greateſt attention, care, and exertion during ſuch buſy periods.

HARVEY, William, in *Biography*, a celebrated phyſician and anatomiſt, and author of one of the moſt important diſcoveries ever made in phyſiology, was born at Folkſtone, in Kent, on the 1ſt of April 1578. He received the rudiments of his education at a grammar-ſchool in Canterbury, and in 1593 was admitted a penſioner of Gonville and Caius college, Cambridge. At the age of 19 he went abroad for profeſſional improvement, and, after viſiting France and Germany, fixed himſelf at Padua, at that time the moſt celebrated medical ſchool in Europe. Here he took his doctor's degree in 1602; and, returning to England, repeated his graduation at Cambridge, and ſettled in the practice of his profeſſion in London. He became a fellow of the College of Phyſicians in 1603, and a ſhort time afterwards was appointed phyſician to St. Bartholomew's hoſpital. In 1615 he was nominated lecturer on anatomy and ſurgery to the college, an appointment which was probably the more immediate cauſe of the publication of his grand diſcovery of the circulation of the blood. The date of this promulgation is not abſolutely aſcertained: it is commonly ſaid that he firſt diſcloſed his opinion on the ſubject in the year 1619; but the index of his MS. "De Anatomia univerſa," containing the propoſitions on which the doctrine is founded, refers them to April, 1616. Yet with a patience and caution, peculiarly characteriſtic of the ſound philoſopher, he withheld his opinions from the world, until reiterated experiment had amply confirmed his doctrine, and had enabled him to demonſtrate it in detail, and to adduce every proof of its truth of which the ſubject is capable. It is unneceſſary here to enter into the controverſy reſpecting the previous knowledge of the ſubject by the ancients, for which ſome have contended, or to ſtate the ſteps by which ſome of

Harvey's predeceſſors had paved the way for his diſcovery, or the abſurdities to which the bigotry and prejudices of his contemporaries carried them, in their oppoſition to his doctrine; theſe points have been amply elucidated in a former article. (See CIRCULATION, *Diſcovery of.*) As this was a diſpute in which no particular intereſts oppoſed the final reception of truth, Harvey had the ſatisfaction of living to ſee his doctrine fully eſtabliſhed, and all reputable oppoſition withdrawn. It is ſomewhat mortifying, however, to find that, ſo far from advancing his reputation and ſucceſs as a candidate for practice, this unrivalled diſplay of ſagacity, induſtry, and knowledge ſeems to have had a contrary effect; for he never appears to have occupied the higheſt rank as a medical practitioner. "Perhaps," ſays Dr. Aikin, "his experimental reſearches took him out of the common road to popular eminence; and they ſeem to have expoſed him to the prejudice ſo commonly prevailing againſt an innovator; for we find him complaining to a friend, that his practice conſiderably declined after the publication of his diſcovery."

The character which Harvey had obtained, recommended him however to the notice of the court; he received conſiderable favours from James I., and ſtill greater regard from Charles I., who uſed to attend occaſionally, with ſome of his courtiers, to witneſs his diſſections and experiments. The intereſt which his majeſty took in the ſucceſs of his anatomical reſearches, was of ſingular ſervice to him in his inquiries relative to generation, as the king's favourite diverſion of ſtag-hunting furniſhed him with the opportunity of diſſecting numerous females of that ſpecies in different ſtages of pregnancy. Harvey had held the appointment of phyſician extraordinary to James, and was now made phyſician in ordinary to Charles; who alſo evinced his regard by appointing him to accompany the young duke of Lennox in his travels. It is probable too, that he accompanied the king himſelf, in his journey to Scotland in 1633; for he has given from his own view a moſt elegant and lively deſcription of that great reſort of ſea-fowl, the Baſs-iſland. At the breaking out of the civil war, he remained attached both by office and affection to the royal perſon, and after the battle of Edge-hill, went, with the reſt of the houſehold, to Oxford, where he received other marks of favour. During theſe troubles, his houſe in London was pillaged, and his papers, containing obſervations in anatomy and natural hiſtory, the reſult of the labour of many years, particularly relating to the generation of inſects, were deſtroyed. Of this irretrievable loſs he has complained in his works in terms which, though mild and modeſt, ſhew how ſeverely he felt it. (See Exercitat. lxviii. ad finem.) Upon the ſurrender of Oxford to the parliament, he retired to a private mode of life in London, at Lambeth, or at his brother's houſe at Richmond.

He had publiſhed his firſt work on the circulation in the year 1728, under the title of "Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus," at Francfort, which place, by its great ſairs, afforded the beſt means of circulating his opinions throughout Europe. The oppoſition which was excited againſt the new doctrine, had alſo cauſed him to publiſh two other "Exercitations," in refutation of his opponents. In 1651, when Harvey was in the 71ſt year of his age, he was prevailed upon by Dr. George Ent, who viſited him in his retirement, to publiſh, or rather to ſuffer him to publiſh, his other great work, the "Exercitationes de generatione animalium," which had employed a large portion of his time and attention. Theſe exercitations are ſeventy in number, and the general inference from the whole of the facts is the univerſal prevalence of oval generation. This work has undergone numerous editions on the continent.

In the following year, 1652, Harvey had the ſatisfaction of ſeeing his merits acknowledged by his brethren in an unuſual and moſt honourable manner; by a vote of the college, his buſt in marble was placed in their hall, with a ſuitable inſcription recording his diſcoveries. He returned this compliment, by preſenting to the college, at a ſplendid entertainment to which he invited the members, an elegantly furniſhed convocation room, and a muſeum filled with choice books and chirurgical inſtruments, which he had built, at his own expence, in their garden. On the reſignation of Dr. Prujean, in 1654, Harvey was unanimouſly nominated to the preſidency, but he declined the offer on account of his age and infirmities. He ſtill, however, frequented the meetings of the college; and his attachment to that body was ſhewn more conſpicuouſly in 1656; when, at the firſt anniverſary feaſt inſtituted by himſelf, he gave up his paternal eſtate of fifty-ſix pounds *per annum* in perpetuity, for their uſe. The particular purpoſes of this donation were, the inſtitution of an annual feaſt, at which a Latin oration ſhould be ſpoken in commemoration of the benefactors of the college, a gratuity for the orator, and a proviſion for the keeper of his library and muſeum. His old age was afflicted with infirmities, eſpecially with moſt excruciating attacks of the gout; but he lived to complete his 80th year, and expired on the 3d of June 1658, in great tranquillity and ſelf-poſſeſſion.

The private character of this great man appears to have been in every reſpect worthy of his public reputation. Cheerful, candid, and upright, he lived on terms of great harmony with his friends and brethren, and exhibited no ſpirit of rivalry or hoſtility in his career. He ſpoke modeſtly of his own merits, and generally treated his controverſial antagoniſts with temperate and civil language, often very different from their own. He wrote in a remarkably perſpicuous Latin ſtyle, which is flowing and even eloquent where the ſubject allows of ornament. The College of Phyſicians very properly honoured his memory by a ſplendid edition of all his works in quarto, 1766, to which a Latin life of the author was prefixed, elegantly written by Dr. Laurence. See Gen. Biog. Aikin's Biog. Mem. of Med. Eloy. Dict. Hiſt.

Harvey, Gideon, alſo a phyſician, was born in Surrey. He acquired the Greek and Latin languages in the Low Countries, and was admitted of Exeter college, Oxford, in May 1655. He afterwards went to Leyden, where he ſtudied medicine, ſurgery, and pharmacy, and thence to Paris, and ultimately took his doctor's degree in ſome French univerſity. He returned to Holland, where he was admitted fellow of the college of phyſicians at the Hague, and alſo made phyſician to Charles II. in his exile. After his return to London, he was ſent to Flanders, in July 1659, in the office of firſt phyſician to the forces, after which duty he travelled through Germany to Italy, ſpending a conſiderable time at each of the principal ſeats of learning, and then returned through Switzerland and Holland to England. On the arrival of William III., he was appointed phyſician to the Tower. He died about the year 1700.

Gideon Harvey publiſhed ſeveral works after the termination of his travels, which are nearly forgotten. Unlike his predeceſſor of the ſame name, whoſe modeſty equalled his knowledge, and who never proceeded a ſtep without fact and experiment. Gideon Harvey was a vain and hypothetical prater throughout. Under the pretence of reforming the art of medicine, he attacked the characters of the moſt eminent phyſicians of the time, combining the moſt inſulting ſarcaſms, with many glaring falſhoods and abſurdities; and although, in the general war which he waged, he juſtly fell upon many abuſes which then prevailed in the profeſſion, yet he often committed great errors of judgment; and in the attempt to diſplay his wit, exhibited but too many proofs of malignancy in his diſpoſition. His principal work, part of which was publiſhed in 1683, and part in 1686, was entitled "The Conclave of Phyſicians, detecting their Intrigues, Frauds, and Plots againſt the Patients, &c." He alſo publiſhed a treatiſe on ſyphilis, under the title of "Little Venus unmaſked," Lond. 1668. "Morbus Anglicus, or the Anatomy of Conſumption, &c." 1673. "De Febribus Tractatus Theoreticus et Practicus, præcipue quo Praxim curandarum Febrium continuarum modernam eſſe lethiferam et barbaram, abunde patefit," 1672. "Diſeaſe of London, or a new Diſcovery of the Scurvy," 1675. "The family Phyſician, and the houſe Apothecary," 1678. "Caſus medico-chirurgicus," 1678. "New Diſcourſe of Small Pox and Malignant Fevers, &c." 1685. "Art of curing Diſeaſes by Expectation," 1689. "The Vanities of Philoſophy and Phyſic," 1700. See Eloy. Dict. Hiſt. Biograph. Dictionary.

Harvey's *Iſland*, in *Geography*, an iſland in the Southern Pacific ocean, compoſed of three or four ſmall iſlands, united together by rocks, covered by the ſea; the whole about 20 miles in circumference; diſcovered by Captain Cook in 1773. S. lat. 19° 18′. W. long. 158° 48′.

Harvey's *Point*, a cape on the coaſt of North Carolina, in Albemarle ſound. N. lat. 36° 6′. W. long. 76° 34′.

HARUN, a town of Perſia, in Segeſtan; 15 miles S.W. of Zareng.

HARUSPEX, or Aruspex, in *Antiquity*, a ſort of prieſt, or diviner, who inſpected and conſidered the entrails of beaſts, particularly thoſe of victims, to find ſigns or indications of ſomething he wanted to know. See Aruspices.

Cicero, De Divinat. lib. ii. explains the difference between aruſpex and haruſpex.

HARUTSCH, in *Geography*, a mountainous diſtrict of Africa, in the road from Augela to Temiſſa, divided into black and white Harutſch. The mountainous deſart, called black Harutſch, Harutch-el-Aſſuat ("Mons ater" of Pliny) is repreſented by Mr. Horneman, as the moſt remarkable region that fell under his obſervation during his journey to Mourzouk. Its extent was ſtated to him to be ſeven days' journey from N. to S., and five days' journey from E. to W. In his ſubſequent travels from Fezzan to Tripoly he fell in with another branch of the Harutſch, and received information that it extended much farther to the W. At Mourzouk he was told that there were black mountains on the road leading ſouthward to Bornou, on which the temperature was cold, and from which the people of Mourzouk obtain their iron; and theſe mountains he conjectured to be alſo branches of the Harutſch. The rugged, broken, wild, and terrific ſcene which this deſert tract affords, ſuggeſts to the naturaliſt, that the convulſed form and appearance of this mountainous diſtrict are owing to a volcanic irruption at ſome remote period. The general face of the country exhibits continual ranges of hills in various directions, from eight to twelve feet only in height; and between theſe, on perfect flats, and without any gradual aſcent, riſe up inſulated mountains, whoſe ſides are very ſteep from the baſe. The maſs of theſe mountains conſiſts of a ſtony ſubſtance, of various colour and denſity, in ſome parts compact and heavy, and in others having ſmall holes and cavities. Contiguous to the black Harutſch is the white Harutſch, or "Harutſch-el-abiat." This diſtrict is an immenſe plain, interſperſed with iſolated hills, and extending to the mountains that riſe towards Fezzan. The ſtones which cover this plain appear glazed, and this is the caſe with the rocks which occaſionally riſe or project from the level. Among the ſtones are found fragments of large petrified marine animals, but moſtly ſhells cloſed up and iſolated: theſe ſhells, when ſtruck, emit a ſhrill ſound, and the fracture exhibits a vitreous appearance. The low, bare, calcareous hills that border the plain, are compriſed by the Arabs in the Harutſch-el-abiat; but our traveller obſerves that they are of a very different nature. Of all which he ſaw, this range of hills contains the greateſt number of petrifactions; conſiſting of conchs, ſnail-ſhells, fiſh, and other marine ſubſtances. He found heads of fiſh, large and heavy enough as a burden to one perſon; and in the adjacent vallies were numerous ſhells, of the ſame kind with thoſe found in the great plain, and which had the ſame glazed appearance.

HARWICH, a ſea-port, borough, and market town in the pariſh of Dover-court, within the hundred of Tendring and county of Eſſex, England, conſiſted, in the year 1800, of 493 houſes, and contained 2761 inhabitants. The houſes are ſeated on a point of land, which projects into the ſea, and is bounded to the north by the eſtuaries of the rivers Stour and Orwell. In the vicinity of the town are ſome remains of a conſiderable encampment, which it is ſuppoſed was either formed, or occupied, by the Romans, as ſeveral coins, and fragments of a teſſellated pavement, have been diſcovered beneath the ſurface of the ground. The Saxon Chronicle records a battle, which was fought near this port, between the fleet of Alfred, and 16 Daniſh ſhips, in the year 885, when the latter were completely defeated and every veſſel taken. In the time of king Edward II. Harwich was made a borough and market town by charter, dated 1318. Several ſubſequent monarchs confirmed and enlarged this charter, but the preſent corporation, &c. are regulated and governed by a charter from king James I. paſſed in the 12th year of his reign. The town was formerly ſurrounded by fortified walls, which were provided with embattled gate-ways. Here were alſo a caſtle, and various ſmall forts, or block-houſes. The ſea has waſhed away the foundations of the latter, and the former has been levelled to the ground. The parochial chapel here, was founded by Roger Bigod in the thirteenth century. Among ſeveral monuments within it, is one to ſir William Clarke, knight, who was ſecretary at war to kings Charles I. and II. The other public buildings here are a town-hall and gaol, a ſchool-houſe and a cuſtom-houſe. Harwich has a dock-yard provided with ſtore-houſes, launches, and other requiſites for building and fitting out veſſels. Some third-rates and other veſſels of large burden have been built here. The harbour is deep and ſpacious, and the anchorage good. Near the town is a light-houſe for the uſe of mariners in coming in and going out of this harbour. Many ſmacks, belonging to Harwich, are employed in the North-ſea fiſhing: their burden has been calculated at more than 3000 tons, and they give employ to about 500 ſeamen. This is the uſual port, in times of peace, for packets which ſail to Holland, Germany, &c. Hence kings William III. and George I. and George II. viſited this place in their reſpective journies to and from the continent. Her preſent majeſty landed here on her firſt viſit to this kingdom. Harwich has recently become a place of reſort for ſea-bathers, for whoſe accommodation, many improvements have been made in the town. In a cliff ſouth of Harwich, various teeth of large animals, and bones of great ſize have been found. Some writers have conjectured theſe to be the remains of the elephants brought into England by

Claudius in the year A.D. 43. On a point of land oppoſite to Harwich, but in the county of Suffolk, is a ſtrong fortification called Languard-fort, which was erected to defend this harbour in the time of king James I. About one mile S.W. of Harwich is Dover-court, the church of which was celebrated, in the age of monachiſm, for its miraculous rood, or crucifix, which was much frequented by pilgrims and religious devotees. Morant's Hiſtory, &c. of Eſſex, 2 vols. folio. Hiſtory of Harwich and Dover-court, 4to.

Harwich, a poſt-town of America, in Barnſtaple county, Maſſachuſetts, ſituated on Cape Cod, between Yarmouth and Chatham, extending acroſs the cape, which is here about ſix miles broad, and containing 2857 inhabitants; 88 miles S.E. of Boſton.—Alſo, a townſhip in Rutland county, Vermont, watered by Otter creek, and containing 153 inhabitants.—Alſo, a townſhip in the weſtern diſtrict of Upper Canada, having lake Erie on the S. and the river Thames on the N.

HARWINGTON, a poſt-town of Connecticut, in Litchfield county, eight miles E. of Litchfield; containing 1431 inhabitants.

HARWOOD, Edward, in *Biography*, was born in the year 1729, and having paſſed with reputation through his grammatical learning, he was entered as ſtudent for the profeſſion of a Diſſenting miniſter, in the academy ſupported by Mr. Coward's funds. Upon quitting this place, he engaged as an aſſiſtant to a boarding ſchool at Peckham, and preached occaſionally for ſome neighbouring miniſters in and out of London. During this period of his life he ſtudied very diligently the Greek and Roman claſſics, to which he was devoted through life. In 1754 he undertook the care of a grammar ſchool at Congleton in Cheſhire, and preached for ſome years, on alternate Sundays, to two ſmall ſocieties in the vicinity of that town. In 1765 he removed to Briſtol, and in about five years he was obliged to quit his ſituation on account of his principles as an Arian and Arminian, terms which, among the ignorant and bigotted, are regarded with as much horror as Atheiſm; for rendering proper homage to the one only true God; and for aſcribing to him the attributes of infinite benevolence, extended to all his creatures in a tract entitled “The melancholy Doctrine of Predeſtination expoſed.” Mr. Harwood could ſcarcely walk along the ſtreets of Briſtol without inſult. This is his own account of the matter, but it muſt not be forgotten that he was charged with immoralities that are never endured in a diſſenting miniſter, who depends for his ſupport on the voluntary contributions of his hearers. From one or other, or perhaps from both theſe cauſes he was unable to purſue his profeſſion and left Briſtol. He had, previouſly to this, obtained the degree of doctor of divinity from one of the Scotch univerſities; with this he came to London, and obtained employment as a literary character, and alſo as an inſtructor in the Greek and Latin claſſics. He died miſerably poor in the year 1794, after having been confined many years in conſequence of a paralytic attack. He was author of many uſeful and popular works. Of theſe the moſt important and intereſting are his “New Introduction to the ſtudy and knowledge of the New Teſtament,” in two volumes 8vo. “Five Diſſertations on the Athanaſian and Socinian Schemes,” the object of which was to prove the truth of Arianiſm. “The Life and Character of Jeſus Chriſt delineated:” and “A View of the various Editions of the Greek and Roman Claſſics,” which has been ſeveral times reprinted, and has, as well as his “Introduction to the New Teſtament,” been tranſlated into ſeveral foreign languages.

Harwood's *Iſland*, in *Geography*, a ſmall iſland in the gulf of Georgia, on the N. coaſt of the iſland of Favida. N. lat. 49° 50′. E. long. 235° 46′.

HAS, a town of Arabia Felix, in the province of Yemen, in the Tehama; capital of a diſtrict, and reſidence of a Dola, 40 miles N. of Mocha. A conſiderable quantity of earthenware is manufactured here, eſpecially coarſe drinking cups. The diſtrict is of narrow extent, being bounded on one ſide by Zebid, and on the other by the territories of the Scheick of Ibn Aklun. N. lat. 14° 58′. E. long. 43° 25′.

HASAB, a town of Candahar, in the province of Gaur, near the river Belaſe; 25 miles S.W. of Gaur.

HASAKLU, a town of Aſiatic Turkey, in Natolia; five miles N.W. of Beiſheri.

HASANI, a ſmall iſland in the Red ſea, near the coaſt of Arabia. N. lat. 24° 54′.

HASBET, a town of Egypt, on the E. ſide of the Nile, oppoſite to Roſetta.

HASCARA, a town of Morocco; 85 miles N. of Morocco.

HASCHID-U-BEKEL, an independent ſtate of Arabia, in the province of Yemen. This extenſive territory, named alſo “Bellad-el-Kobail,” the country of the Highlanders, is poſſeſſed by a number of confederated Scheicks; but the other, expreſſive of the confederacy, is the name by which it is more commonly known. It extends northward as far as the deſert of Amaſia; on the S. and E. it is bounded by the dominions of the Imam and the principality of Kaukeban; and towards the W. it meets the ſovereign ſtate of Abu-Ariſch. This highland country contains many Scheicks, deſcended from ancient noble families, each of whom rules within his own dominions as a ſovereign prince; and yet, unable ſeparately to reſiſt any powerful neighbour, they have combined to defend themſelves by a common force. The country inhabited by theſe confederates poſſeſſes various degrees of fertility. Some vallies, which produce fruit in great abundance, are interſperſed among the hills, and even the higher grounds are cultivated and fertile. Cattle in conſiderable number are ſcattered upon the heights; but few conſiderable villages are to be ſeen. The town of Kheivan, in the diſtrict of the ſame name, is remarkable for having been the ſeat, firſt of the Hamjare monarchs, and afterwards of the Imams. Ruins of a very ancient palace are ſtill to be ſeen there.

HASE, Theodore, in *Biography*, was born at Bremen in the year 1682, and educated under the moſt eminent profeſſors in the Dutch and German univerſities. In the year 1707 he was elected profeſſor of the belles lettres at the univerſity of Hanau, but in the following year he was recalled to his native city, where he received the appointments of miniſter of the church of St. Mary, and profeſſor of the Hebrew language in the univerſity. In 1712 he was created doctor of divinity, and in 1718 was choſen a member of the Royal Society of Berlin. He died in the year 1731, leaving behind him a collection of critical diſſertations, which were publiſhed after his death, in one volume octavo. Moreri.

HASEK, in *Geography*, a town of Perſia, in the province of Kerman; 40 miles S.E. of Kabis.

Hasek, or *Haſſek*, a town of Arabia, in the province of Hadramaut, 684 miles E.N.E. of Mocha; known only for the traffic which its inhabitants, as well as thoſe of “Merbat,” carry on in incenſe produced in that neighbourhood.

HASEL, one of the ſmaller Hebrides, near the S. coaſt of Egg. N. lat. 56° 51′. W. long. 6° 3′.

HASELE, in *Ichthyology*. See Cyprinus *Dobula*.

HASELHUHN, in *Ornithology*. See TETRAO *Bonaſia* and TETRAO *Mexicanus*.

HASELOE, in *Geography*, a ſmall iſland of Denmark, in the Cattegat; 12 miles from the iſland of Zealand. N. lat. 56 11'. E. long. 11 45'.

HASEN, a town of Pruſſia, in Natangen; 20 miles E.S.E. of Angerburg.

HASENMULLER, DANIEL, in *Biography*, was born at Eutin, a town in Holſtein, in the year 1651, where he received the elements of a learned education: and when he was about fifteen years of age he was ſent to Lubec to proſecute his riper ſtudies. He particularly excelled in his knowledge of the Greek and oriental languages, and was, in the year 1683, appointed to the profeſſorſhip of the Greek language at the univerſity of Kiel, to which was added that of the Hebrew and oriental languages. He died before he had completed his fortieth year, having previouſly illuſtrated his name by many learned works given to the public; of theſe we may notice "Diſſertatio de Linguis Orientalibus:" "Biblia parva Græca, in quibus dicta inſigniora omnia ex Verſione Septuagintavirali ſecundum Ordinem, Librorum biblicorum obſervatum in biblis parvis Opitianis, cum cura exhibentur:" and "Janua Hebraiſmi aperta." Moreri.

HASER, in *Geography*, a town of Egypt; 13 miles S.E. of Tineh.

HASFURT, a town of Germany, in the principality of Wurtzburg; 12 miles E. of Schweinfurt.

HASINELLAS, in the *Glaſs-making Trade*, are a number of hooks faſtened to the ſides of the working furnace, by means of which the workmen are able to reſt and turn their veſſels as they heat them. Neri's Art of Glaſs, p. 242.

HASJO, in *Geography*, a town of Sweden, in Medelpadia; 13 miles S.W. of Hernoſand.

HASK, a morbid condition which is attended with a ſort of huſky cough, affecting horſes, pigs, and ſome other kinds of animals. See HUSK.

HASLACH, in *Geography*, a town of Germany, in the lordſhip of Hauſen, on the Kinzig; 18 miles N.N.E. of Friburg.

HASLED, a town of Sweden, in the province of Weſt Gothland; 69 miles N.E. of Uddevalla.

HASLEMERE, a borough and market town, in the pariſh of Chidingford and hundred of Godalming, Surrey, England, was formerly a conſiderable place, but is now reduced to 144 houſes, containing a population of 642 perſons. It is an ancient borough by preſcription, and has ſent members to parliament ſince the 27th year of the reign of Elizabeth. The right of election is veſted in "the freeholders of meſſuages, lands, or tenements lying within the borough and manor." This property belongs to the earl of Lonſdale, by whoſe father it was purchaſed of Meſſrs. Chandler and Leach for the ſum of 24,000*l*. The number of voters is about 60. Like the generality of ſmall boroughs, this has been the ſubject of much litigation and parliamentary conteſt. In 1775 a cauſe was tried by a committee of the houſe of commons, reſpecting a complaint againſt the ſitting members "for ſplitting and dividing of freeholds." (Oldfield's Hiſtory of Boroughs, &c. vol. iii.) This town is ſeated at the border of the county, near its junction with Suſſex, and is deſcribed to have formerly had ſeven pariſh churches, which were deſtroyed by the Danes. Here are a ſmall market on Tueſdays, and two annual fairs. (Manning's Hiſtory, &c. of Surrey.)

HASLERUS, or HASLER, in *Biography*, is the name of an eminent muſical family that flouriſhed at Nuremberg, in the ſixteenth century, during three or four generations. They were not only able organiſts, but voluminous compoſers, chiefly of eccleſiaſtical muſic; and ſeem all ſucceſſively to have been patroniſed by the Fuggers of Augſburg, thoſe wealthy merchants and munificent encouragers of learning and the arts.

HASLI, in *Geography*, a diſtrict of Switzerland, in the canton of Berne, ſituated in a beautiful valley, S.E. of the lake of the Brientz, and watered by the Aar, and other ſmaller ſtreams. The inhabitants are well made, ſtout, and warlike, and the women are generally handſome. The principal wealth of this diſtrict ariſes from the ſale of cheeſe, which they ſend in great quantities to Italy. The chief town is Meyringen.

HASLINGDEN, a market town and chapelry in the large pariſh of Whalley and county of Lancaſter, England, is about 14 miles north of Mancheſter, and conſiſts of 844 houſes and 4040 inhabitants. Like moſt of the Lancaſhire towns, this contains ſeveral linen, cotton, and woollen manufactories, which within the laſt twenty years have occaſioned a great influx of inhabitants, and a large increaſe of buildings into the valley below the old town. By an inquiſition of the parliament commiſſioners in June 1650, this parochial chapelry conſiſted of the townſhip of Haſlingden and part of Roſſendale, which together contained about 300 families; in 1801 there were 773 families in this townſhip only. The government of the town is veſted in a conſtable and ſix churchwardens, who have under their care ſix diviſions or poſts; two of theſe have a chapel of eaſe, ſubject to Haſlingden, called Goodſhaw chapel, about two miles from the town on the Burnley road. From a ſpirit of induſtry and enterpriſe which pervades all ranks of perſons in this diſtrict, great improvements have taken place in the town; among others, a handſome ſquare is already completed, which contains ſome capital buildings. Eſſential advantages have been derived from the canals which afford the benefit of water-carriage for heavy articles, which formerly uſed to paſs many miles by land. A number of mills are eſtabliſhed on the river for carding cotton and wool, and for ſpinning them into twiſt and woollen yarn, to make flannels. (Whitaker's Hiſtory, &c. of Whalley, 4to.)

HASLINGDEN *Canal*. At the time of compiling our article CANAL, we gave an account of this intended canal, for which an act paſſed in 1793, but it does not appear that any ſteps have yet been taken towards its execution: it was intended for connecting the Mancheſter, Bolton, and Bury canal with the Leeds and Liverpool canal.

HASPARRAN, a town of France, in the department of the Lower Pyrenées, and chief place of a canton, in the diſtrict of Bayonne, ſeven miles S.E. of Bayonne. The place contains 4156, and the canton 8440 inhabitants, on a territory of 170 kiliometres, in 7 communes.

HASSA, a town of Nubia, 10 miles N. of Goos.

HASSA *alrhai*, in the *Materia Medica of the Arabian Phyſicians*, a name given to a plant, the virtues of which they commend on many occaſions.

The meaning of the words *haſſa alrhai* is *virga paſtoris*, ſhepherd's rod; but though it happens that the names of theſe two plants agree in ſignification, there is nothing elſe in which they agree, the haſſa alrhai being the ſame plant with the polygonum of the early writers, which, with the epithet of *maſculum*, ſtood for the common knotgraſs; and when the word *fæmininum* was added, ſignified the common *equiſetum*, or horſetail, which was called *polygonum*, for the ſame reaſon the knotgraſs was, that is, becauſe its ſtalks were compoſed of a great number of joints. Theſe two plants agree in the virtues of agglutinants and aſtringents, to neither of which virtues our *virga paſtoris* has any title.

HASSADA, in *Geography*, a town of Bengal; 20 miles E. of Kiſhenagur.

HASSAN, in *Biography*, eldeſt ſon of Ali, by Fatima, daughter of Mahomet, was born in the third year of the hegira A.D. 625. He was advanced to the caliphate in 660 without any oppoſition, though the mildneſs of his temper ill fitted him for the turbulent ſcenes in which he was likely to be engaged. Scarcely had he aſcended the throne when he was obliged to contend with Moawtyah, at the head of a powerful army. The caliph was defeated and took refuge in a ſtrong caſtle, the governor of which was ſtrongly ſolicited to put Haſſan to death, which he peremptorily refuſed. Haſſan, ſhocked at the ſcenes of devaſtation and blood, to which he had been an eye witneſs, determined to abdicate his office; which he accompliſhed in the preſence of the general aſſembly of the people of Cufa, in the great moſque, and which he attributed to his anxious deſire of ſparing the blood of his people. He now retired to Medina with ample proviſion for his future ſupport. Of this he expended the greater part in acts of charity, ſometimes he did not even leave himſelf ſufficient to alleviate the common wants of nature. Twice he ſtripped himſelf of all he poſſeſſed, and thrice he divided half his ſubſtance among the poor. Haſſan paſſed eight years in a private condition, and obtained univerſal reſpect from his countrymen on account of his many virtues, and was venerated for his reſemblance to his grand-father Mahomet, who had been particularly kind to him, when he was a child. He died in the year 669: his death was imputed to poiſon. Being preſſed to name the perſon whom he ſuſpected of the foul deed, he replied "The life of this world is made up of nights that vaniſh away. Let him alone till he and I meet before the tribunal of God." Univer. Hiſt.

Hassan, in *Geography*, a town of Africa, on the coaſt of Tripoly. N. lat 31°. E. long. 16° 18′.—Alſo, a town of Perſia, in the province of Irak; 80 miles N.N.E. of Hamadan.

Hassan, *Chillibec*, a town of Aſiatic Turkey, in the government of Sivas; 32 miles E. of Sivas.

Hassan *Pacha Palanka*, a town of European Turkey, in Servia; 60 miles N.N.E. of Novibaſar.

HASSE Adolfo, *detto il* Sassone, in *Biography*, from his having been born at Bergendorf in Lower Saxony, within eight miles of Hamburgh.

Quantz relates, in his own memoirs written by himſelf, that in the year 1725, he went to Naples, where he met with his countryman Haſſe, who then ſtudied under Aleſ. Scarlatti. Haſſe had not, as yet, diſtinguiſhed himſelf by any compoſitions for the ſtage; however, it was at this time, that a conſiderable Neapolitan banker employed him to ſet a ſerenata for two voices, which he did in the preſence of Quantz; the ſingers who performed in it were Farinelli and Teſi. Haſſe gained ſo much reputation by this production, that it paved the way to his future ſucceſs, and he was ſoon after appointed compoſer of the great opera at the theatre royal.

Quantz intreated Haſſe to introduce him to his maſter, Scarlatti, to which he readily conſented; but upon mentioning him to the old compoſer, he ſaid, "My ſon, you know I hate wind inſtruments, they are never in tune." However, Haſſe did not ceaſe importuning him, till he had obtained the permiſſion he required.

In 1726, the year after the deceaſe of his maſter Aleſſandro Scarlatti, he had diſtinguiſhed himſelf ſufficiently to be called upon to ſet the opera of "Seſoſtrate" for the great theatre at Naples; and in 1728 he ſet "Attalo Re di Bitinia," for the ſame theatre. Theſe two operas ſeem to have been forgotten by the compoſer himſelf. in the verbal enumeration of his works, which we obtained from him at Vienna in 1772. But we are in poſſeſſion of the printed book of the words of both theſe dramas, with the above dates, to which his name is prefixed in the following manner: "La Muſica è del Signor Giovanni Adolfo Haſſe detto il Saſſone, Maeſtro di Capella di S. A. S. il Duca di Brunſwick;" the record is indiſputable. In 1730 he ſet two operas for Venice, "Daliſa," in which the principal ſingers were Paſi, Amorevoli, and Fauſtina, whom he married about this time; and "Artaſerſe," written by Metaſtaſio, in which the principal parts were performed by Farinelli and Cuzzoni. In one of theſe he is called maeſtro ſopranumerario of the royal chapel of Naples; and in the other maeſtro di capella of Auguſtus, king of Poland, and elector of Saxony. In 1732 he compoſed "Cajo Fabricio" for Rome; and "Demetrio" for Venice. Theſe dramas, particularly the two written by Metaſtaſio, and the great ſingers who performed in them, eſtabliſhed his reputation, which extended to every part of Europe.

Haſſe was the favourite compoſer of Italy and Germany from the year 1730 to 1755. He and the Fauſtina were in the ſervice of the court at Dreſden, till it was beſieged by the king of Pruſſia, when, in the bombardment of that city, all his books, manuſcripts, and effects were deſtroyed by fire.

The abilities of this admirable vocal compoſer are but little known in England, as but few of his beſt compoſitions are printed, and thoſe, except his "Salve Regina," of the moſt trivial kind. However, the comic dances which he compoſed for the Fauſans ſhewed that he could trifle with grace. His air, "Pallido il Sole" is ſtill heard with pleaſure, though more than 70 years old. On aſking Metaſtaſio what maſter, of all the compoſers who had ſet his dramas to muſic, had expreſſed his ideas the moſt to his ſatisfaction, he replied, "though he is not my countryman, I believe it was Saſſone." But his merit was ſo long and ſo univerſally eſtabliſhed on the continent, that we never converſed with a ſingle profeſſor on the ſubject, who has not allowed him to be the moſt natural, elegant, and judicious compoſer of vocal muſic, as well as the moſt voluminous compoſer of his time: equally a friend to poetry and the voice, he diſcovered as much judgment as genius in expreſſing words, as well as in accompanying his ſweet and tender melodies. Always regarding the voice, as the firſt object of attention in a theatre, he never ſuffocates it by the learned jargon of a multiplicity of inſtruments and ſubjects; but is as careful of preſerving its importance as a painter, of throwing the ſtrongeſt light upon the capital figure of his piece.

As a proof how little we are acquainted with the works of Haſſe in England, though he ſet all the ſerious dramas of Metaſtaſio, except "Temiſtocle," many of them two or three different times, to diſplay the talents of different ſingers; yet out of the whole number of his operas, amounting to more than 100, we never heard one of them performed entire on our ſtage, except, in 1757, "Artaſerſe," in which Farinelli firſt appeared in London, was ſuppoſed to be wholly the work of Haſſe; but ſeveral of the ſongs, particularly the famous bravura air *Son qual Nave*, were compoſed by Riccardo Broſchi, the brother of Farinelli.

Beſides operas, Haſſe compoſed oratorios, maſſes, motets, and chamber duets, in the ſtyle of Steffani, innumerable. So that it may be ſafely averred, that in fertility and variety of works, he ſurpaſſed every compoſer of the laſt century, except Galuppi and Piccini.

We ſhall add nothing more to our account of the genius and abilities of this elegant and intelligent maſter, except the melancholy record of his death, at Venice, in 1784, whither he had retired with his wife, the Fauſtina, and two accompliſhed daughters, in 1783, to terminate his ſplendid and active life in peace and tranquillity.

HASSEIAH, in *Geography*, a town of Syria, in the pachalic of Damaſcus, governed by an Aga; 52 miles N.E. of Damaſcus.

HASSELA, a town of Sweden, in the province of Helſingland; 26 miles N.W. of Hudwickſwal.

HASSELOE, a ſmall iſland of Denmark, between Laaland and Falſter. N. lat. 54° 44′. E long. 11° 54′.

HASSELQUIST, Frederick, in *Biography*, one of the favourite pupils of Linnæus, and eminently diſtinguiſhed by his illuſtrations of the natural hiſtory and medicine of the Levant, was born at Toernvalla, in Eaſt Gothland, Jan. 3d, 1772, old ſtyle. He was the ſon of a poor curate, who died at an early age, and whoſe widow, on account of mental and corporeal infirmities, was obliged to be placed in the hoſpital at Vadſtena. Her brother, a worthy clergyman of the name of Pontin, took pity upon the orphan, and educated him, with his own children, at the ſchool of Linkoeping; but Haſſelquiſt was ſoon deprived of this benefactor, and the learning he had by this time acquired was now his only reſource. He was obliged to become the tutor of young children till he was old enough to go to the univerſity. By a ſimilar plan he was enabled to ſupport himſelf after he entered at Upſal in 1741, inſtructing ſuch as knew leſs than himſelf, for trifling gratifications, while on the other hand he made the beſt uſe of the advantages he there enjoyed for his own improvement. He ſoon took a decided turn for phyſic and natural hiſtory, and had ſome talents for poetry. His diligence did not paſs unobſerved nor unrewarded, and his ſuperiors procured him, in 1746, a royal ſtipend or ſcholarſhip. In June, 1747, he publiſhed his theſis, entitled *Vires Plantarum*, under the preſidency of Linnæus, who ſays, " he wrote it well and defended it ſtrenuouſly." This is reprinted in *Amœn. Acad.* v. 1. 418, and in ſeveral other places. It is one of the beſt of the Linnæan diſſertations, ſetting forth the erroneous and often fooliſh principles on which plants had formerly been employed in medicine, and ſuggeſting a truly philoſophical one in their natural botanical affinities. The whole is illuſtrated by innumerable facts and illuſtrations, often very ingenious, and at leaſt as accurate as moſt medical writings of that day. This eſſay is a commentary on the 12th chapter of the *Philoſophia Botanica*, and has been made much uſe of by Mr. Roſe in his Elements of Botany, p. 404—438.

In one of his botanical lectures in 1747, Linnæus ſpoke of the countries of whoſe natural hiſtory little or no account had as yet been communicated to the learned world. Among theſe, he obſerved, was Paleſtine, one of the moſt important and intereſting in this reſpect, to the philoſopher as well as the divine, but of whoſe productions we had leſs knowledge than of thoſe of India. This remark fired the zeal of young Haſſelquiſt. In vain did his preceptor, ſecretly delighted with his enthuſiaſm, repreſent to him the difficulties of the undertaking, the diſtance, the dangers, the expence, and above all the weak ſtate of his own health, particularly of his lungs. All this did but increaſe his ardour, and he, in his turn, repreſented the benefit his conſtitution was likely to derive from a change of climate, in a pulmonary complaint. With reſpect to all other impediments, he declared he would rather walk all the way than have his purpoſe croſſed. Had he read Shakſpeare, he would doubtleſs have ſaid, he was ſo enamoured with ſcience that he would go " barefoot to Paleſtine for a touch of her nether lip."

Haſſelquiſt's firſt ſtep was to ſolicit aſſiſtance from certain funds deſtined for the ſupport of travellers, but he was unſucceſsful. He obtained indeed ſome private ſubſcriptions, and the various profeſſors at Upſal beſtowed upon him ſeveral of the royal ſtipends appropriated to the aſſiſtance of indigent ſcholars. Of the amount of the whole we are not informed, but it is repreſented as far inadequate to his undertaking. He began, however, to learn the oriental tongues, at the ſame time that he was completing his academical ſtudies, reading lectures, and obtaining the degree of licentiate in phyſic. The faculty, conſidering his merit and circumſtances, would not allow him to be at any expence on this occaſion, any more than for his attendance on the lectures of the profeſſors. The degree of doctor of phyſic was afterwards conferred on him during his abſence at Cairo, March 8th, 1751, with the ſame honourable and delicate attention to his peculiar ſituation. In the ſpring of 1749 he went to Stockholm, read lectures on botany there during the ſummer, and ſo far recommended himſelf to public notice, that the company of merchants trading to the Levant, offered him a free paſſage to Smyrna in one of their ſhips, in which he ſet ſail Auguſt 7th, arriving at Smyrna on the 27th of November, 1747. He kept a regular journal of his voyage. Touching at Gottenburgh, he there met Toreen, juſt returned from China with abundance of treaſures for his maſter Linnæus, in whoſe works they have at various times been communicated to the public.

At Smyrna Haſſelquiſt met with the kindeſt reception from his relation, Mr. Rydelius, the Swediſh conſul, as well as from the French conſul, M. Peyſonel, one of the firſt who ſuſpected the animal nature of corals. He ſpent the winter in noticing every thing he could meet with, reſpecting the main objects of his purſuit, in this place and its neighbourhood, as well as the religious ceremonies and manners of the people. He viſited the houſe and garden, once occupied by the famous Sherard, at Sedekio, near Smyrna, but found no traces of any great care having been taken to adorn the garden, or to ſtore it with exotic plants. He made an excurſion to Magneſia, his quality of phyſician cauſing him to be received every where with reſpect. As the ſpring advanced he became deſirous of extending his enquiries, and early in May ſet ſail for Alexandria, where he arrived on the 13th. Here the palm-trees, which now firſt preſented themſelves to his notice, excited him to enquire into and to verify the celebrated hiſtory of their artificial impregnation, of which he wrote a full account to Linnæus. Having ſpent two months in ſeeing all he could at Alexandria, Roſetta, and Cairo, he viſited the Egyptian pyramids in July, brought from thence *Chondrilla juncea*, the only plant he could find, which is now in the herbarium of his preceptor, was hoſpitably entertained by the Arabs, and returned ſafe to Cairo, where he had afterwards an opportunity of ſeeing the caravan depart for Mecca, of which he has given an ample and intereſting deſcription, as well as of many other feſtivals and exhibitions. He viſited the catacombs, and examined many mummies of the ancient *Ibis*, by the ſize of which he was induced to take this famous bird to be a ſpecies of *Ardea*, common and almoſt peculiar to Egypt, very different from the *Tantalus Ibis* of

Linnæus. The learned Cuvier, however, has recently ſhewn that naturaliſts have been widely miſtaken on this ſubject, Mr. Bruce alone having indicated the real *Ibis*, in his vol. 5. 172, which is a ſpecies of Curlew hitherto ſcarcely known to naturaliſts, and now called by Cuvier *Numenius Ibis*, in Ann. du Muſeum d'Hiſt. Nat. v. 4. 116, t. 52, 53. It is the *Tantalus æthiopicus* of Latham, Ind. Ornith. 706. A great objection to this determination is the weakneſs of its bill, which ſeems by no means ſo fit as that of an *Ardea* for the mode of life which rendered it ſo famous, the deſtruction of reptiles. Cuvier, however, removes this doubt, by aſſerting that he found the remains of a ſerpent's ſkin in one of the mummies of the *Ibis*. After all, though numbers of other birds of the ſame natural family were doubtleſs employed every ſeaſon in feeding on reptiles, at the receſs of the Nile, the *Ibis* might be ſelected for protection and for divine honours, either, as Cuvier ſuggeſts, becauſe it fed on ſome peculiarly noxious, though not large animals of that kind; or for ſome ſuperſtitious reaſon, forgotten in the lapſe of ages, equivalent to no reaſon at all.

Haſſelquiſt proceeded in March, 1751, to Damiata, whence he ſailed for Jaffa, or Joppa, and arrived there after a voyage of four days. He had now reached the great theatre of his enquiries, the Holy Land, and he entered upon the examination of its productions, and their ſacred as well as medical hiſtory, with all the zeal which had at firſt prompted him to the journey, and which was crowned with eminent ſucceſs. Having ſpent near two months in this celebrated country, he ſailed from Seide the 23d of May, for Cyprus, from whence he proceeded to Rhodes, and to Stanchio, the ancient Cos, finally returning to Smyrna in the end of July.

From time to time, in the courſe of his travels, he had written to Linnæus, and had ſent home various natural curioſities, as well as ſeveral diſſertations, which were printed in the Tranſactions of the Upſal and Stockholm Academies. Nine appear in a volume of the former, in 1751. Theſe are on the *Mimoſa Lebbeck*, Linn. Sp. Pl. 1503, which is the *ſpecioſa* of Jacquin's Ic. Rar. t. 198; on the *Cervus Camelopardalis; Mus Jaculus; Turdus Cyanus; Fulica atra* taken at Smyrna; *Coluber Vipera*, the true officinal viper, for which our *C. Berus* had always previouſly been miſtaken; *Coluber Ceraſtes*, or horned viper; *Anguis Ceraſtes*, horned ſnake; *Lacerta Scincus*, the famous reſtorative lizard of the Arabs; and *Sepia octopodia*, eight-armed cuttleſiſh, the celebrated enemy of the great muſcle *Pinna muricata*, which laſt is warned of its approach by one or more little crabs, that always reſide within its ample ſhell, and are thus protected from external danger in their turn. In the Stockholm Tranſactions for 1750, 1751, and 1752, Haſſelquiſt wrote on the eruptive diſeaſe called the Aleppo mark; on the Egyptian vulture, *Vultur Percnopterus*; on the preparation of ſal ammoniac in Egypt; on the uſe of locuſts as food in Arabia, ſhowing that the paſſage of ſcripture, which mentions ſuch as the food of St. John in the deſart, is to be literally underſtood; and finally, another paper on the *Mus Jaculus*, or Jerboa, the *Dipus Jaculus* of later writers. His Letters to various friends were occaſionally printed, in a periodical publication called Literary News, at Stockholm; and in return for the entertainment and information he gave his countrymen, they contributed ſome neceſſary ſupplies towards his expenſive undertakings. Unfortunately he had, in the meanwhile, ſacrificed, inſtead of reſtoring his health. "The ſerpent he had long harboured in his boſom," to uſe the emphatic words of Linnæus, "awoke." He flattered himſelf, as all in his condition do, and thought that a winter's repoſe at Smyrna might reſtore him. He tried the country air and a milk diet, but he "waſted away daily, like a lamp whoſe oil is ſpent, and departed this life, Feb. 9, 1752, at ſix in the evening, to the inexpreſſible grief of all who knew him," in the 31ſt year of his age.

In the courſe of his expenſive journies and his illneſs, this unfortunate young man had unavoidably incurred debts beyond what his caſual ſupplies from home could liquidate; and the collections and manuſcript notes, which ſtill remained at Smyrna, were ſeized by his creditors, for a ſum amounting to 14,000 dollars of copper-money, or about 350*l*. ſterling. This circumſtance was no ſooner made known, through Linnæus and his friend Bæck, to the accompliſhed queen of Sweden, Louiſa Ulrica, the worthy ſiſter of the great Frederick of Pruſſia, than ſhe immediately redeemed theſe treaſures out of her own purſe, gave Linnæus all the duplicates, and commiſſioned him to arrange and publiſh the manuſcript journal and remarks of his deceaſed pupil; a taſk which he undertook with alacrity, and executed with care and judgment. Theſe papers were given to the public in 1757, in Swediſh, except ſeveral Latin deſcriptions, under the title of *Iter Palæſtinum*, or a Journey to the Holy Land, in one volume 8vo. with a biographical preface by Linnæus, who ſubjoined to the work the very intereſting letters of Haſſelquiſt to himſelf. This book has been tranſlated into ſeveral languages, and appeared in Engliſh, at London, in 1766; but this tranſlation is in many parts defective, eſpecially with regard to the natural hiſtory and the ſcientific names, and being become very ſcarce, a new and improved edition is much wanted, to which a good index would be a valuable addition. In 1758 the above mentioned Dr. Bæck, phyſician to the queen, publiſhed, at Stockholm, an oration in praiſe of Haſſelquiſt, in 8vo.

Haſſelquiſt muſt ever rank high as an original and faithful obſerver, not only in his own immediate line of ſtudy, but in whatever came before him. His illuſtrations of the natural hiſtory of Scripture are above all things valuable and correct. Far leſs prone to go learnedly and ingeniouſly aſtray than his diſtinguiſhed countryman Olaus Celſius, in the *Hierobotanicon*, he has, by accurate obſervation and plain ſenſe, cleared up many difficulties, which commentators, without the former, and diſdaining the latter, have often embroiled. Haller, in his Bibl. Bot. v. ii. 403, has given Haſſelquiſt due praiſe, but is ſcarcely correct in ſaying he has "ſomething concerning caprification, where he doubts of the Linnæan fecundation." This might ſeem to imply that our author doubted of the ſexes of plants; but Haller certainly only meant that he doubted of the manner in which Linnæus thought the fecundation of the fig was accompliſhed by inſects, which Tournefort ſaw, and yet would not admit the doctrine of the ſexes. See CAPRIFICATION, and FICUS, n. 105. Haſſelquiſt's obſervations, however, by no means invalidate the one more than the other. He remarks indeed that the *Cynips Pſenes*, Linn. Syſt. Nat. ed. 12. v. 1. 919, by eating the germens of the *Ficus Carica* does more harm than good; and in his letter of September, 1750, to Linnæus, in ſpeaking of *F. Sycomorus* and the *Cynips* which inhabits its bloſſoms, he ſays he "has much reaſon to doubt whether this inſect contributes any thing towards its fecundation, but will make ſome farther inquiry." To the firſt remark of Haſſelquiſt it may be anſwered, that, though many of the germens are devoured by the inſect, probably none at all would be impregnated without its help; and the latter doubt, to which Haller ſeems to allude, is removed in the botanical part of the book, under *Ficus Sycomorus*, where, while an original account is given of a ſpontaneous gangrenous ſpot in that fruit, by which its bloſſoms become expoſed, the aſſiſtance of the *Cynips Sycomori* in fecundating it is expreſsly admitted. Curious ſpecimens of this minute animal, ſent by Haſſelquiſt, from Cairo, are preſerved in the Linnæan cabinet. Theſe are gummed on a peculiar very delicate ſubſtance, by way of paper, with whoſe hiſtory and origin we are unacquainted, though it is now ſold in London, of various colours, in ſmall ſquare pieces, for making artificial flowers, for which its texture is admirably calculated.

A rude attack has been made by the celebrated Buffon upon Haſſelquiſt's deſcription of the *Camelopardalis* in particular, and the *Viverra Ichneumon.* As nothing to the purpoſe is ſaid againſt either of his accounts, though the Latin of Haſſelquiſt is copied ſo erroneouſly as to be made abſolute nonſenſe, and then criticiſed for its ſtyle; and as the attack evidently originates in Buffon's antipathy to the whole Linnæan ſchool, it ſcarcely merited the honour of ſo ample a refutation as Dr. Sparmann has beſtowed upon it, in his voyage to the Cape of Good Hope, chapter 14th. To have been a pupil of Linnæus, a ſyſtematic naturaliſt, a man of religion, probity, and morality, might well excite the ſpleen of the man who dared to allow that "his own genius was equal to the majeſty of nature;" but ſuch qualities will ever embalm the memory of Haſſelquiſt, who might be content to yield to the French philoſopher without a ſigh of regret, all that the latter ever aſſumed, and even all he deſerved. Haſſelquiſt's Works. Haller's Bibl. Bot. S.

HASSELQUISTIA, in *Botany*, ſo named by Linnæus in juſt commemoration of his pupil, Frederick Haſſelquiſt, M.D. its diſcoverer. See the preceding article. Linn. Gen. 135. Schreb. 180. Willd. Sp. Pl. v. 1. 1379. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 1. 332. Sm. Prod. Fl. Græc. v. 1. 180. Juſſ. 224. Gærtn. t. 21. (Tordylium; Lamarck. Illuſtr. t. 193. f. 2.)—Claſs and Order, *Pentandria Digynia.* Nat. Ord. *Umbelliferæ.*

Gen. Ch. *General umbel* of about ten ſpreading rays, of which the five outermoſt are longeſt; *partial* of twice as many, the outermoſt longeſt, incurved. In the place of the central partial umbel, is a ſtalked, capitate, black, fleſhy, abortive body, downy and whitiſh at the top. *General Involucrum* very ſmall, of five or more awl-ſhaped reflexed leaves; *partial* halved, of three awl-ſhaped reflexed leaves to the outer umbels, of one only to the inner ones. *Perianth* very minute, of five teeth. *Cor. Univerſal,* irregular, radiated, both in the general and partial umbels; flowers of the diſk either male, or abortive as in the general umbel; *partial* of five unequal, ſpreading, inflexed and variouſly cloven petals. *Stam.* Filaments five in each flower, capillary, longer than the ſmaller petals; anthers roundiſh. *Piſt.* Germen inferior, turbinate, compreſſed; ſtyles two, thread-ſhaped, the length of the ſtamens, erect, preſent in almoſt all the flowers; ſtigmas obtuſe. *Peric.* none. *Fruit* of the *circumference* nearly orbicular, ſmooth, compreſſed almoſt flat, thickened at the edge, notched at the baſe and ſummit, ſeparable into two parts; of the *diſk* ſemigloboſe, ſmooth, deeply concave on one ſide, with a contracted crenate orifice. *Seeds* two in the fruit of the circumference, one in that of the diſk.

Eſſ. Ch. General and partial involucrum of ſeveral leaves. Flowers radiant; thoſe of the diſk male; central abortive. Fruit of the radius orbicular, flat, crenate; of the diſk urceolate, hemiſpherical, ſingle-ſeeded.

Obſ. Adanſon and Lamarck conſider this genus as a *Tordylium,* with partially imperfect flowers and fruit; in which they are right, provided ſexual, and conſequently ſeminal, differences be not taken into conſideration at all in defining genera of the umbelliferous order. But if the Linnæan principles be ſolid, for which, in this caſe, we can by no means ſtrenuouſly contend, the genus of *Haſſelquiſtia* is as diſtinct as any of its tribe; and indeed the difference of its ſeeds is ſo ſtriking and peculiar, as to afford a ſtrong argument in favour of thoſe principles. The ſpecies are two.

1. H. *ægyptiaca.* Linn. Sp. Pl. 355. Suppl. 179. Jacq. Hort. Vind. v. 1. 37. t. 87.—Leaves pinnate; leaflets pinnatifid, cut.—Gathered by Haſſelquiſt in Arabia. Linn. Am. Acad. v. 4. 270. Miller cultivated it at Chelſea in 1768 or earlier, as appears by the eighth edition of his Dictionary, but it is not now preſerved in the gardens, being an annual or biennial of a tender conſtitution, and, though very curious to a botaniſt, not likely to attract mere amateurs. The *ſeeds* however are rather a ſtriking object. The *ſtem* is a foot or two high, erect, branched, leafy, furrowed, more or leſs rough with deflexed hairs. *Leaves* light green, of three or four pair of wedge-ſhaped, pinnatifid and cut ſmooth leaflets, with an odd one. *Umbels* terminal, erect, broad, flattiſh. *Flowers* white. Buxbaum's *Paſtinaca orientalis, foliis eleganter inciſis.* Cent. 3. 16. t. 27, is deſcribed with yellow equal petals, and heart-ſhaped ſtriated ſeeds, ſo that it cannot belong to the *Haſſelquiſtia,* though cited doubtingly by Linnæus.

2. H. *cordata.* Jacq. Hort. Vind. v. 2. 91. t. 193. Linn. Suppl. 179.—Leaves heart-ſhaped, crenate; ſimple or ternate.—The native country of this ſpecies is unknown. Jacquin received its ſeeds from the Swiſs botaniſt, Mr. Dick, who had them from Spielmann, and he ſays they agreed exactly with thoſe of the former, except in being one-third ſmaller. Gærtner however repreſents them as ſcarcely crenate. The *root* is annual. Whole plant pale green and downy, diſtinguiſhed from moſt of the umbelliferous tribe by its broad heart-ſhaped crenate *leaves,* which ſtand on long ſheathing ſtalks, ſometimes bearing a pair of rather narrower leaflets alſo. The *flowers* are white, in more compact umbels, the leaves of their general involucrum more numerous and conſpicuous, than in the former.

HASSELT, in *Geography,* a town of France, in the department of the Lower Meuſe, and principal place of a diſtrict, divided by the river Damar into two parts, one of which is in the county of Campine, the other in Looz; 16 miles N.N.W. of Liege. The place contains 5824, and the canton 12,001 inhabitants, on a territory of 95 kiliometres, in 6 communes. N. lat. 50° 56′. E. long. 5° 23′.—Alſo, a ſmall but handſome town of Holland, in Overyſſel, ſituated on the Vecht; 10 miles E. of Campen. N. lat. 52° 38′ E. long. 6° 1′.

HASSELWICK, a town of Norway, in the dioceſe of Drontheim; 18 miles N.N.W. of Drontheim.

HASSI, a town of European Turkey, in the province of Macedonia; 56 miles N.N.W. of Akrida.

HASSLACH, a town of Germany, in the biſhopric of Bamberg; 24 miles N.N.E. of Bamberg.

HASSOCK, denotes a baſs, or cuſhion made of ruſhes, to kneel or reſt the feet on in churches.

HASTA, or Hasta Pura, among *Medaliſts,* ſignifies a kind of ſpear or javelin, not ſhod, or headed with iron; or rather an ancient ſceptre, ſomewhat longer than ordinary, occaſionally given to all the gods.

The haſta is ſuppoſed a ſymbol of the goodneſs of the gods, and of the conduct of providence, which is equally mild and forcible.

Hasta, in ſome countries, is a meaſure, or quantity of ground amounting to thirty paces: thus called, according to M. Du-Cange, from the haſta, or rod, wherewith it was meaſured.

HASTATI, or Hastarii, among the *Romans,* ſoldiers armed with ſpears, who were always drawn up in the firſt line of battle.

HASTATUM, Folium, in *Botany*, a halberd-ſhaped leaf, conſiſting of an oblong central lobe, with two tranſverſe, uſually ſmaller, lobes at its baſe. See Leaf.

HASTE, or Quicken *your Hand*, in the *Manege*, called in French *hatez le main*, or *hatez*, *hatez*, is an expreſſion frequently uſed by riding-maſters, when a ſcholar works a horſe upon volts, and the maſter has a mind he ſhould turn his hand quicker to the ſide on which the horſe works; ſo that if the horſe works to the right, he turns quicker with his ſhoulders to the right: and the contrary is obſerved, if the horſe works to the left.

HASTING-Pear, a name given, by the gardeners, to a ſpecies of pear, called alſo by ſome the green chiſſel pear; this is a moderately large pear, and is longiſh towards the pedicle: its ſkin is thin, and of a whitiſh green; the pulp is melting, and of a ſugary flavour. It ripens in July.

HASTINGIA, in *Botany*, ſo named by the late Dr. John Gerard Koenig, long employed in botanical reſearches at Bengal, in honour of his patron, the celebrated governor Warren Haſtings. This deſign, however, has hitherto proved abortive, the firſt genus choſen for the purpoſe being the *Abroma* of Jacquin, Linnæus, and Schreber; ſee Abroma; and the ſecond being publiſhed by Retzius, under the uncouth name *Holmſkioldia*, by which we ſhall hereafter notice it. See Sm. Exot. Bot. t. 80, and Introd. to Botany, 403.

HASTINGS, in *Geography*, a borough and market-town in the hundred of Baldſtow, and rape of Haſtings, in the county of Suſſex, England, conſiſts of three pariſhes, which contain 562 houſes, and 2982 inhabitants. The town is ſeated between two hills, on the coaſt, near the eaſtern extremity of the county, and being the chief of the cinque-ports, thence derives peculiar privileges and immunities. The hiſtory and peculiar nature of theſe ports have been already explained in the eighth volume of this work. This place appears to have been occupied by the Saxons, if not previouſly by the Romans. King Athelſtan is ſaid to have had a mint here. Camden, however, attributes the origin of the town to a noted Daniſh pirate, who conſtructed a fort here to protect his men, and ſecure a retreat after pillaging the ſurrounding country. Soon after the Norman conqueſt, it is evident that a caſtle was ſtanding here, as it is noticed in the time of William Rufus. This caſtle, and the original town, are ſaid to have been undermined, and carried away by the ſea, which continually encroaches on this coaſt; and a ſubſequent town is ſtated to have been burnt by the French in 1377. After its re-creation, it was divided into three pariſhes. Different charters have been granted to the town by Edward the Confeſſor; Williams I. and II.; Henry II.; Richard I.; Henry III.; Edward I.; Elizabeth; Charles II.; and James II. Haſtings has ſent members to parliament ever ſince the reign of Edward III.; and has generally been under the immediate controul and command of miniſters. The right of election was declared, in 1698, to be veſted in "the mayor, jurats, and freemen, reſident and not receiving alms, only." This number is twelve. Few boroughs have manifeſted a more corrupt ſyſtem, or been more the ſubject of political contention, than this: and in reviewing its hiſtory for the purpoſe of narrating it in an important national publication, we muſt lament the proſtitution of freedom, and deeply regret the corruption, political debaſement, and depravity of thoſe men who are entruſted with franchiſes, and who barter the independence of their country for a diſgraceful ſubſiſtence. A full account of the political hiſtory of this place is preſerved in Oldfield's Hiſtory of Boroughs, &c. vol iii. p. 27—47.

The town was formerly fortified with a wall, ſome ſmall remains of which are yet ſtanding. On a hill, eaſtward of the town, are the banks and foſſes of an encampment, which ſome authors aſcribe to the Romans, but it was moſt probably formed by William, duke of Normandy, previous to his battle with Harold. On the edge of the cliff, weſtward of the town, are the walls, &c. of an ancient caſtle, which was formerly of great extent, and muſt have been of great importance. Within its walls was a free royal chapel: the dean of which obtained a patent from Edward III. to build himſelf a manſion contiguous to it. Near the caſtle a priory for black canons was founded in the time of Richard II. Some fragments of the walls now remain. The harbour, now called the Stade, was formerly a place of commerce and ſecurity for veſſels, but in the time of queen Elizabeth the pier was deſtroyed by a ſtorm, and has never ſince been reſtored. Sloops and cutters, from 50 to 100 tons burthen, are the only veſſels that put in here. At the weſt end of the Stade is a fort, mounted with eleven twelve-pounders. Though the trade of this place has been much reduced, yet a large quantity of herrings, mackarel, and trawl-fiſh is annually caught near it, and brought into the town. Some fiſhing and long boats are built here. The town has weekly markets on Wedneſdays and Saturdays, and three annual fairs. The coaſt, being ſandy and clean, is favourable for bathing, and ſeveral machines are kept. The Haſtings Guide, 8vo. 1797.

Hastings, *Battle of*, a memorable event in the annals of Engliſh hiſtory, was fought between William, duke of Normandy, and Harold II., king of England, on the 14th of Oct. 1066. The Norman invader had landed his ſoldiers, horſes, ſtores, &c. at Pevenſey, on the coaſt of Suſſex, on the 29th of September, and after conſtructing a fort there, for the protection of his fleet, marched his army to Haſtings, where the whole continued to be actively employed in fortifying an encampment, collecting proviſions, and making other preparations for ſelf-defence, and for military operations. At the arrival of William in England, his adverſary Harold was ſeated with his army at York, but marched from that city as ſoon as he was appriſed of the event, and proceeeded, without halting, to the Suſſex coaſt. By rapid marches, deſertion, &c. his force was conſiderably diminiſhed; but in ſpite of ſuch diſadvantages, he very imprudently and unwiſely reſolved to riſk a battle the next day after his arrival on the downs near Haſtings. Both armies were drawn up in regular lines, and both prepared for a ſtubborn conteſt and decided iſſue. The Engliſh were all on foot, armed with ſwords, ſpears, and battle-axes; and formed themſelves into one deep and compact body; in the centre of which the king, with his brothers Gurth and Leofwin, placed themſelves with the royal ſtandard. The Normans formed in two lines, the firſt compoſed of archers and ſlingers, and the ſecond of heavy-armed troops; whilſt the cavalry, commanded by the ambitious invader, were ſtationed in the rear and at the wings. (W. Pictavin, p. 201, and Matthew Paris, p. 3.) On a ſignal given, the Normans ruſhed forward, and diſcharged a ſhower of arrows on their opponents; and the Engliſh not only ſuſtained the firſt aſſault, but retaliated with equal vigour and obſtinacy. The conflict was deſperate and ſanguinary: whilſt one party was irreſiſtibly impelled by the proſpect of gaining a country, or loſing life; the other was determined to riſk the latter in defence of their homes, their friends, and families. The Normans, however, being ſuperior in numbers, with the advantages of cavalry, ſcite of ground, and vigour of troops, after a whole day's fight, completely conquered the

Engliſh. The ſlaughter was great, and the victory complete. Harold, his two brothers, and many of the Engliſh officers, were ſlain, and the remaining troops diſperſed. Some hiſtorians aſſert, that no leſs than 15,000 Normans fell on the field of battle, and a larger number of their adverſaries. This, however, ſeems a little exaggerated. In obtaining this victory, William ſecured an eaſy paſſage to the throne; and after reſting and refreſhing his army for a few days, marched towards London. In this journey he had to encounter ſome impediments; but in a ſhort time he reached the capital, and was elected to the Engliſh throne. For other particulars relating to the conqueſt and acceſſion of William I., ſee CONQUEST, vol. ix.; ENGLAND, *Hiſtory of*, vol. xiii.; and BATTLE-ABBEY, vol iv. Henry's Hiſt. of Great Britain, vol. v. and Miller's Hiſtorical View of the Engliſh Government, vol. ii.

HASTINGS, a county in Upper Canada, bounded on the E. by the county of Lenox, on the S. by the bay of Quinte, and comprehending all the iſlands near it in the ſaid bay and river Trent.

HASTING's *Bay*, a bay on the N.E. coaſt of the iſland of St. Matthew, in the Mergui Archipelago, diſcovered by Capt. Forreſt in 1783, and called by him one of the fineſt harbours in the world.

HASTING's *Iſland*, an iſland in the Mergui Archipelago, near the N. coaſt of the iſland of St. Matthew, about four miles long, and two miles in its greateſt breadth. N. lat. 10° 6′.

HASTIVE, a French term, ſometimes uſed in Engliſh for *early*, *forward*, or ſomething that comes before the ordinary time or ſeaſon.

The haſtive fruits are ſtrawberries and cherries. We have haſtive peas, &c.

HAT, a covering for the head, worn by the men throughout the weſtern part of Europe.

Hats are chiefly made of hair, wool, &c. worked, fulled, and faſhioned to the figure of the head.

Hats are ſaid to have been firſt ſeen about the year 1400, at which time they became of uſe for country wear, riding, &c. F. Daniel relates, that when Charles II. made his public entry into Rouen, in 1449, he had on a hat lined with red velvet, and ſurmounted with a plume, or tuft of feathers: he adds, that it is from this entry, or at leaſt under this reign, that the uſe of hats and caps is to be dated, which henceforward began to take place of the chaperoons and hoods that had been worn before. In proceſs of time, from the laity, the clergy alſo took this part of the habit, but it was looked on as a great abuſe, and ſeveral regulations were publiſhed, forbidding any prieſt, or religious perſon, to appear abroad in a hat without coronets, and enjoining them to keep to the uſe of chaperoons, made of black cloth, with decent coronets; if they were poor, they were at leaſt to have coronets faſtened to their hats, and this upon penalty of ſuſpenſion and excommunication. Indeed, the uſe of hats is ſaid to have been of a longer ſtanding among the eccleſiaſtics of Britanny, by two hundred years, and eſpecially among the canons; but theſe were no other than a kind of caps, and from hence aroſe the ſquare caps worn in colleges, &c.

Lobineau obſerves, that a biſhop of Dol, in the twelfth century, zealous for good order, allowed the canons alone to wear ſuch hats; enjoining, that if any other perſon come with them to church, divine ſervice ſhould immediately be ſuſpended. Tom. i. p. 845.

Hats make a very conſiderable article in commerce: the fineſt, and thoſe moſt valued, are made of pure hair of an amphibious animal, called the caſtor or beaver, frequent in Canada, and other provinces of North America. See BEAVER.

HATS, *Method of making*.—Hats, we have obſerved, are made either of wool, or hair of divers animals, particularly of the caſtor, hare, rabbit, camel, &c. The proceſs is much the ſame in all; for which reaſon we ſhall content ourſelves to inſtance in that of caſtors.

The ſkin of this animal is covered with two kinds of hair; the one long, ſtiff, gloſſy, and pretty thin ſet: this is what renders the ſkin, or fur, of ſo much value: the other is ſhort, thick, and ſoft, which alone is uſed in hats.

To tear off one of theſe kinds of hair, and cut the other, the hatters, or rather the women employed for that purpoſe, make uſe of two knives, a large one, like a ſhoe-maker's knife, for the long hair; and a ſmaller, not unlike a vine-knife, wherewith they ſhave, or ſcrape off, the ſhorter hair.

When the hair is off, they mix the ſtuff: to one-third of dry caſtor putting two-thirds of *old coat*, *i. e.* of hair which has been worn ſome time by the ſavages, and card the whole with cards, like thoſe uſed in the woollen manufactory, only finer; this done, they weigh it, and take more or leſs, according to the ſize or thickneſs of the hat intended. The ſtuff is now laid on the hurdle, which is a ſquare table, parallel to the horizon, having longitudinal chinks cut through it; on this hurdle, with an inſtrument called a *bow*, much like that of a violin, but larger, whoſe ſtring is worked with a little bow-ſtick, and thus made to play on the furs, they fly and mix together, the duſt and filth at the ſame time paſſing through the chinks: this they reckon one of the moſt difficult operations in the whole, on account of the juſtneſs required in the hand to make the ſtuff fall preciſely together, and that it may be every where of the ſame thickneſs. In lieu of a bow, ſome hatters make uſe of a ſieve, or ſearce of hair, through which they paſs the ſtuff.

After this manner they form gores, or two capades, of an oval form, ending in an acute angle at top; and with what ſtuff remains, they ſupply and ſtrengthen them in places where they happen to be ſlenderer than ordinary; though it is to be remembered, that they deſignedly make them thicker in the brim, near the crown, than towards the circumference, or in the crown itſelf.

The capades thus finiſhed, they go on to harden them into cloſer and more conſiſtent flakes by preſſing down a *hardening ſkin* or leather thereon; this done, they are carried to the *baſon*, which is a ſort of bench with an iron plate fitted therein, and a little fire underneath it; upon which laying one of the hardened capades, ſprinkled over with water, and a ſort of mould being applied thereon, the heat of the fire, with the water and preſſing, imbodies the matter into a ſlight hairy ſort of ſtuff, or felt; after which, turning up the edges all round the mould, they lay it by, and thus proceed to the other; this finiſhed, the two next are joined together, ſo as to meet in an angle at the top, and only form one conical cap, after the manner of a manica Hippocratis, or flannel bag.

The hat thus baſoned, they remove it to a large kind of receiver or trough, reſembling a mill-hopper, going ſloping or narrowing down from the edge or rim, to the bottom, which is a copper kettle, filled with water and grounds, kept hot for that purpoſe. On the deſcent or ſloping ſide, called the *plank*, the baſoned hat, being firſt dipped in the kettle, is laid, and here they proceed to work it, by rolling and unrolling it again and again, one part after another, firſt with the hand, and then with a little wooden roller, taking care to dip it from time to time, till at length, by thus fulling and thickening it four or five hours, it is reduced to the extent or dimenſions of the hat intended. To ſecure the hands from being injured by this frequent rolling, &c. they uſually guard them with a ſort of thick gloves.

The hat thus wrought, they proceed to give it the proper form, which is done by laying the conical cap on a wooden *block*, of the intended ſize of the crown of the hat, and thus tying it round with a packthread, called a *commander:* after which, with a piece of iron or copper bent for that purpoſe, and called a *ſtamper*, they gradually beat or drive down the commander all round, till it has reached the bottom of the block, and thus is the crown formed; what remains at bottom, below the ſtring, being the brim.

The hat being now ſet to dry, they proceed to *ſinge* it, by holding it over a flare of ſtraw, or the like: then it is *pounced*, or rubbed over with pumice, to take off the coarſer knap; then rubbed over afreſh with ſeal-ſkin to lay the knap a little finer; and laſtly, carded with a fine card to raiſe the fine cotton, with which the hat is afterwards to appear.

Things thus far advanced, the hat is ſet upon its block, and tied about with a packthread as before, to be dyed. The dyer's copper is uſually very large, holding ten or twelve dozen of hats. The dye, or tincture, is made of logwood, verdigris, copperas, and alder-bark; to which ſome add galls and ſumac.

In the manufacture of La Cote d'Or, ſays citizen Chauſſier, (Journal Polytechnique, i. p. 160, &c.) the nut-gall is not uſed, and oak-bark has been ſubſtituted with advantage.

Here the hat is kept boiling for about three quarters of an hour; then taken out and ſet to cool, and then returned to the dye, and this for ten or twelve times ſucceſſively. For the method of dyeing hats, ſee Dyeing *of Hats*.

The dye being complete, the hat is returned to the hatter, who proceeds to dry it, by hanging it in the top or roof of a ſtove or oven, at the bottom of which is a charcoal fire; when dry, it is to be ſtiffened, which is done with melted glue or gum ſenegal, applied thereon by firſt ſmearing it, and beating it over with a bruſh, and then rubbing it with the hand. The next thing is to *ſteam* it on the *ſteaming baſon*, which is a little hearth or fire-place, raiſed three feet high with an iron plate laid over it exactly covering the hearth; on this plate they firſt ſpread cloths, which being ſprinkled over with water to ſecure the hat from burning, the hat is placed brim downwards thereon; when moderately hot, the workman ſtrikes gently on the brim with the flat of his hand, to make the joinings incorporate and bind ſo as not to appear; turning it from time to time, this way and that way, and at laſt overturning and ſetting it in the crown.

When ſteamed ſufficiently and dried, they put it again on the block, and bruſh and *iron* it on a table or bench for the purpoſe, called the *ſtall-board;* this they perform with a ſort of irons like thoſe commonly uſed in ironing linen, and heated like them, which being rubbed over and over each part of the hat, with the aſſiſtance of the bruſh, ſmoothens and gives it a gloſs, which is the laſt operation; nothing now remaining but to clip the edges even with ſciſſars, and ſew a lining to the crown.

The ſeveral operations employed in hat-making, are ſeparately deſcribed under the articles Felting, Fulling, and Dyeing, to which the reader is referred. The laſt operation, ſays Chauſſier, (ubi ſupra), conſiſts in lining the inner ſurface of the crown, as well as of the brim of the hat, with a glutinous ſubſtance, which in drying gives firmneſs to the work, and preſerves its form. The uſual compoſition is made of gum arabic, common gum, and Flanders glue, which are diſſolved together in a ſufficient quantity of water, and brought to the requiſite thickneſs by boiling. This preparation, ſimple and eaſy as it appears, is not indifferent with regard to the beauty and duration of the work. If it be too tenacious, it renders the ſtuff dry and brittle, and after ſome months uſe, a kind of greyiſh incruſtation is formed on the ſurface, which alters the texture. "It appeared to me, (ſays Chauſſier), that this effect was cauſed by the gum arabic which is added to the glue. I therefore ſought among the plants of our own country for a ſimple preparation, which might be ſubſtituted inſtead of theſe natural and friable gums. The mucilaginous principle abounds in a great number of plants, and may be eaſily extracted by ebullition; and a gum may even be formed by evaporation, which preſerves its ſuppleneſs and flexibility. Theſe conſiderations induced me to recommend, inſtead of the uſual preparation, a ſolution of glue in a decoction loaded with the mucilage of linſeed oil. This preparation has been long uſed with economy in the manufactory, and with advantage in the excellence of the work. Since that time citizen Margueron having communicated to me his obſervations on the mucilage which may be extracted from the leaves of the horſe-cheſnut tree *(maſronier d'Inde)*, and having aſcertained how great a portion of mucous and adheſive matter theſe leaves afford, eſpecially when the foliation is in its vigour; a ſtrong decoction of theſe leaves has been uſed with much ſucceſs to make the preparation with glue." Our author adds, that there are many other native plants which would be equally proper to afford factitious gums, and of which the uſe would be very advantageous.

Hats, *Laws relating to.* By 24 Geo. III. c. 51, all retailers of hats, commonly called felt or wool, ſtuff or beaver hats, or any leather or japanned hats, ſhall take out a licence from the ſtamp-offices, for which ſhall be paid within the bills, 40*s*., elſewhere 5*s*.; which licence ſhall be renewed annually, ten days before the end of the year. If any retailer ſhall ſell any felt hats without a licence, he ſhall forfeit 50*l*.; and every perſon who ſhall ſell any leſs quantity than one dozen of hats at one time to any one perſon, ſhall be deemed a retailer. Such perſon ſhall put over his door, or in the front of his houſe or ſhop, the words "dealer in hats by retail," on pain of forfeiting 40*s*.; and if an unlicenſed perſon put up theſe words, he ſhall forfeit 50*l*. For every hat ſold by a licenſed retailer ſhall be paid the following duty: *viz.* if not exceeding the value of 4*s*., 3*d*.; above 4*s*. and not exceeding 7*s*., 6*d*.; from 7*s*. to 12*s*., 1*s*.; and above 12*s*., 2*s*. By 36 Geo. III. c. 125, all hats, previous to the delivery of them, ſhall be ſtamped on the lining; however, any licenſed dealer may ſell to any other of the ſame deſcription any unſtamped hats. The penalty for ſelling unſtamped hats is 10*l*.; and for fixing ſtamped linings after they have been uſed, there is a penalty of 10*l*. and the ſame penalty alſo for receiving on ſale, or wearing hats unſtamped. Counterfeiting or forging of ſtamps is a capital felony. By 43 Geo. III. c. 68, for every hat, as above deſcribed, imported, ſhall be paid a duty of 1*l*. 1*s*., and on exportation ſhall be allowed a drawback of 10*s*. 6*d*. For the encouragement of the hat-manufacture, it is enacted by 24 Geo. III. c. 21. that no hare or coney ſkins ſhall be exported on the penalty of 500*l*. and forfeiture of the ſame; and every perſon aſſiſting ſhall forfeit 40*l*. Dyeing ſuch ſkins incurs a forfeiture of the ſame, and of 20*l*. For the further encouragement of the hat-manufacture, all goats' hair or Turkey goats' wool may be imported duty free.

Hats for women have been made in various forms, of ſilk, ſtraw, ſhavings of wood, ivory, feathers, gold, and ſilver.

HAT is alſo figuratively uſed for the dignity of a cardinal, or a promotion to that dignity. In this ſenſe they ſay, to expect a hat; to claim, or have pretenſion to the hat, &c.

Pope Innocent IV. firſt made the hat the ſymbol or cognizance of the cardinals; enjoining them to wear a red hat, at all ceremonies and proceſſions, as a token of being ready to ſpill their blood for Jeſus Chriſt. See CARDINAL.

HAT, in *Heraldry*. See CHAPEAU.

HATBOROUGH, or HATFIELD, in *Geography*, a town of America, in Montgomery county, Pennſylvania, on the N. E. ſide of Pannepack creek, containing a library of more than 1000 volumes, and 520 inhabitants.

HATCH, in *Engineery*, is a moveable board for penning or letting off water, otherwiſe a paddle, ſluice, &c.

HATCH, in *Mining*, or pie, knot, &c. denotes the meeting or croſſing of two veins of ore, which is uſually rich in ſuch places.

HATCH, in *Rural Economy*, a term ſignifying a brood of any ſort of oviparous birds, ſuch as hens, ducks, geeſe, turkeys, &c. See POULTRY.

HATCHEL, or HITCHEL, in the *Manufactory of Flax, Hemp, &c.* a tool not unlike a card, for dreſſing and combing them into fine hairs. See CARD.

They conſiſt of ſharp-pointed iron pins, or teeth, ſet orderly in a board.

Of theſe there are ſeveral ſorts, ſome with finer and ſhorter teeth, others with them coarſer and longer.

HATCHES, in a *Ship*, a ſort of trap-doors in the midſhip, or between the main-maſt and fore-maſt, through which goods of bulk are let down into the hold. There are ſeveral of theſe ſquare or oblong paſſages in the deck of a ſhip, leading from one deck to another, and into the hold or lower apartments. Hence, the

HATCH-*way* is that place where hatches are.

To lay any thing in the hatch-way, is to put it ſo that the hatches cannot be come at, or opened.

HATCHES, *Coamings of the*. See COAMINGS.

HATCHES are alſo flood-gates, ſet in a river, &c. to ſtop the current of water.

The word is particularly uſed for certain dams or mounds, made of rubbiſh, clay or earth, to prevent the water that iſſues from the ſtream-works, and tin-waſhes in Cornwall, from running into the freſh rivers.

The tenants of Bulyſtoke, and other manors, are bound to do certain days work to the hatches.

HATCHES, in *Mining*, a term uſed in Cornwall, to expreſs any of the openings of the earth, either in mines, or in ſearch of them; the fruitleſs openings are called eſſay hatches; the real mouths of the veins, tin-hatches; and the places where they wind up the buckets of the ore, wind-hatches.

HATCHET, an inſtrument wherewith to hew wood. The hatchet is a ſmaller, lighter ſort of ax, with a baſil edge on its left ſide; having a ſhort handle, as being to be uſed with one hand.

HATCHET, a ſmall ax, uſed by the pioneers, who go before to prepare the ways for an army, by cutting down hedges, buſhes, ſtyles, or gates. The grenadiers carry ſometimes each a hatchet by his ſide; and the French dragoons, who have but one piſtol, have a hatchet hanging at their ſaddle-bows on the right ſide.

HATCHET *vetch*, in *Botany*. See CORONILLA and BISERRULA.

HATCHET-*ſhaped Leaf*, *folium dolabriforme*, a ſucculent leaf of a form ſcarcely ſeen but in *Meſembryanthemum dolabriforme*, Curt. Mag. t. 32. See LEAF.

HATCHING, the act whereby fecundated eggs, after ſeaſonable incubation, exclude their young.

Hatching, with reſpect to the oviparous tribe, amounts to the ſame as parturition, or delivery, in the viviparous. In Egypt they formerly hatched all their chickens by the heat of an oven: the method whereof is given us by Mr. Greaves, in the Philoſophical Tranſactions, N° 117, or Abridgment, vol. ii. p. 851, &c. This practice of hatching eggs without incubation, is ſaid by the Egyptians to proceed from the experience, that, at a certain ſeaſon, the eggs foſtered only by the hens are commonly unprolific; whereas of thoſe hatched in the ovens, not quite one-third is loſt. This art, ſays Niebuhr, ("Travels in Arabia, &c." p. 92. Eng. ed.) is much neglected at preſent by the Egyptians, who probably did not derive from it all the advantage which they expected. Unleſs at Cairo, he ſays, there are no furnaces for this purpoſe; theſe belong to the Pacha. They are uſed only in ſummer; for the hatching, it is ſaid, does not ſucceed ſo well in winter. Private perſons indeed carry ſome eggs to the furnaces, and pay ſo much per hundred, to a perſon who undertakes the management of hatching them. The owners mark their eggs; and the hatcher is obliged to ſhew the marks upon thoſe which fail in the hatching. But according to this traveller's account, the number of chickens hatched in this way is not very conſiderable.

They have houſes built for the purpoſe, having a long entrance, on each ſide whereof are twelve or fourteen ovens, whoſe bottoms and ſides are formed of ſun-dried bricks, lined with mats for the eggs to lie on, and the tops covered with ſticks, except two ſpaces, which are brick, and ſerve as hearths to build the fires on wherewith the eggs are to be heated; over theſe is another ſtory of ovens, having holes, which are either ſtopped with tow, or left open at pleaſure, to govern the heat of the ovens below.

They begin to heat the ovens in the middle of January, ſpending on them every morning about a hundred pounds weight of camels' or buffalos' dung, and the like quantity at night, till the middle of February; by which time the ovens are too hot for the hand to be held to the walls. After this they put in the eggs to hatch, which they continue ſucceſſively to the end of May.

The eggs are firſt put upon the matts in the lower ovens, upon the ground, 7 or 8000 eggs in number, and laid only double one upon another: in the ovens over theſe, the fire is made in the little channels, from whence the heat is conveyed into the lower; the eggs directly under theſe hearths lie threefold.

At night when they new-make their fires in their hearths, they remove the eggs that were directly undermoſt, laying three upon one another, in the place of thoſe which lay on the ſides only double; and theſe being now removed, they lie treble under the hearth, becauſe the heat is greater there than on the ſides.

Theſe eggs continue in the lower ovens fourteen days and nights; after which they remove them into the upper; and in theſe, there being no more fire uſed, they turn the eggs four times every twenty-four hours. Mr. Browns ſays, (in his "Travels in Africa," p. 77.) that the eggs are placed on each row of ſhelves in ſuch a manner as not to touch each other; and that they are moved five or ſix times in every 24 hours. He adds, the ovens where theſe eggs are placed are of the moſt ſimple conſtruction, conſiſting only of a low arched apartment of clay, in which are formed two rows of ſhelves, and that all poſſible care is taken to diffuſe the heat equally throughout, and there is but one broad aperture, large enough to admit a man ſtooping. At the end of the firſt eight days, he ſays, it is known which eggs will not be productive.

The 21ſt, or 22d day the chickens are hatched, which the firſt day do not eat; the ſecond day they are fetched away by women who give them corn, &c. The maſter of the ovens hath a third part of the eggs for his coſt and pains, out of which he is to make good to the owners (who have two-thirds in chickens for their eggs) if any happen to be ſpoiled or miſcarry.

The fire in the upper ovens, when the eggs are placed in the lower, is thus proportioned: the firſt day there is the greateſt fire, the ſecond leſs than the firſt; the fourth more than the third, the fifth leſs; the ſixth more than the fifth, the ſeventh leſs; the eighth more, the ninth without fire; the tenth a little fire in the morning; the eleventh they ſhut all the holes with flax, &c. making no more fire; for if they ſhould, the eggs would break. They take care that the eggs be not hotter than the eye of a man, when they are laid upon it, can well endure. When the chickens are hatched, they put them into the lower ovens.

The number of theſe ovens in different parts of the country, which are attended by the inhabitants of a village called Bermè, is about 386, and they uſually keep them at work for ſix months; as, therefore, each brood is perfected in twenty-one days, it is eaſy in every one of them to hatch eight different broods of chickens. If we ſuppoſe that only two-thirds of the eggs are hatched, and each brood conſiſts of at leaſt 30,000 chickens, the ovens of Egypt are capable of producing, yearly, at leaſt 9,264,0000 chickens.

Mr. Reaumur has diſcovered, that the heat neceſſary for this purpoſe, is nearly the ſame with that marked 32 upon his thermometer, or that marked 96 on Fahrenheit's. If, therefore, theſe eggs be kept in this degree of heat, they will as certainly hatch, as if the parent hen had ſat upon them; and indeed it is impoſſible it ſhould be otherwiſe, ſince this heat anſwers nearly to that of the ſkin of the hen, or even of mankind; ſo that the empreſs Livia, as Pliny relates, might truly hatch a chicken in her boſom, if ſhe had but the patience to keep an egg there for the ſame number of days that it ought to have continued under a hen.

After many experiments Mr. Reaumur found, that ſtoves heated by means of a baker's oven, ſucceeded equally well with thoſe made hot with layers of dung. The furnaces of glaſs-houſes, and thoſe of the melters of metals, might no doubt be made to anſwer the ſame purpoſe: if, therefore, an eaſy method could be found to regulate the heat of the ſtove, it would be extremely convenient for bakers or paſtry-cooks to hatch, with little or no expence, a very great number of chickens, which they might diſpoſe of to the country people, to be reared till marketable. Should a thermometer be judged neceſſary for this purpoſe, it will be ſufficient to mark on it only ſuch degrees as are abſolutely neceſſary; by which means the inſtrument will not only come cheaper, but be more readily underſtood by the ignorant people, for whoſe uſe it is deſigned.

Such an inſtrument however may be wholly diſpenſed with; a lump of butter, of the ſize of a walnut, melted with half as much tallow, ſerving to indicate the heat of the ſtove with ſufficient exactneſs; when the heat is too great, this mixture, which is kept in a phial, will become as liquid as oil; and when the heat is too ſmall, it will remain fixed in a lump; but it will flow like thick ſyrup, upon inclining the bottle, if the ſtove be of a right temper: great attention therefore ſhould be given to keep the heat always at this degree, by letting in freſh air, if it be too great, or ſhutting the ſtove more cloſe, if it be too ſmall.

But this is not all. That all the eggs in the ſtove may equally ſhare the irregularities of the heat, it will be neceſſary to ſhift them from the ſides to the centre, and *vice verſâ*: thereby imitating what the hens themſelves do by thoſe upon which they ſit; for hens are frequently ſeen to make uſe of their bills to puſh to the outer parts thoſe eggs which were neareſt to the middle part of their neſt, and to bring into that middle part ſuch as before lay neareſt to the ſides of the ſame.

As to the form of the ſtoves, no great nicety is neceſſary: a chamber over an oven will do very well, only in order to aſcertain the due degree of heat, it will be neceſſary to have phials of butter, as directed above, in ſeveral parts of the rooms; and when the heat wants to be either increaſed or diminiſhed, it is ſufficient to diminiſh or increaſe the communication between the air in the room and that abroad, by opening or ſhutting ſome of the openings made in the wall for that purpoſe.

In order to cheriſh the new-hatched chickens, capons may be taught to tend them in the ſame manner as hens do. Mr. Reaumur tells us, that he has ſeen above two hundred chickens at once, all led about and defended by only three or four ſuch capons, which clucked like hens, to call in the chickens that had ſtrayed too far off; and even redoubled their call, when they found any nice bits, to invite the young brood to come and pick them up: nay cocks may be taught to do the ſame office, which they as well as capons will continue to do all their lives afterwards. But Mr. Reaumur, not ſatisfied with the aſſiſtance he could procure from cocks and capons, has invented a ſort of low boxes without bottoms, and lined with furs; theſe, which he calls artificial parents, not only ſhelter the chickens from the injuries of the air, but afford a kindly warmth, ſo that they preſently grow fond of them, and take the benefit of their ſhelter as readily as they would have done under the wings of a hen.

For a few weeks after hatching, it will be neceſſary to keep the chickens in a room artificially heated, and furniſhed with theſe boxes; but afterwards they may be ſafely expoſed to the air in the court-yard, in which it may not be amiſs to place one of theſe artificial parents to ſhelter them, ſhould there be any occaſion.

As to the manner of feeding the young brood, they are generally a whole day after being hatched, before they take any food at all; and then a few crumbs of bread may be given them for a day or two, or millet ſeed mixed with the crumbs; after which they will begin to pick up inſects and graſs for themſelves.

People in the country, who have plenty of conveniences for the raiſing of poultry, will hardly give themſelves the trouble to hatch chickens in this artificial manner. It is in villages near great towns, and principally in the neighbourhood of the capital city, that it would be of the greateſt importance to promote the eſtabliſhment of this kind of ſtoves. Vide Mr. Trembley's Abſtract of the Art of Hatching domeſtic Fowls, tranſlated from the original Treatiſe of M. Reaumur, where he explains every difficulty.

HATCHING, or *Haching*, in *Deſigning and Engraving*, ſignifies the making of lines with a pen, pencil, graver, or the like; and interſecting, or going acroſs thoſe lines, with others drawn over them another way.

The depths and ſhadows of draughts are uſually formed by hatching or hatch-work. See ENGRAVING and ETCHING.

HATCHING, among *Miners*, See DIGGING.

HATCHING, or *Claking*, is applied to any wall or bank of earth, or puddle-gutter, when it is not upright but overhangs in one direction.

Hatchings are of great uſe in *Heraldry*, to diſtinguiſh the ſeveral colours of an eſcutcheon, without its being illuminated.

The firſt kind of hatching in pale, or from top to bottom, ſignifies *gules*, or *red:* the ſecond is feſs, acroſs the coat, *azure*, or *blue*.

Hatching in pale, counter-hatched in feſs, ſignifies *ſable*, or *black*. Hatching in bend, proceeding from right to left, ſignifies *green;* and that in bars, from left to right, *purple*.

When the coat is only dotted, it is ſuppoſed to be *or*, or *gold;* and when quite bare or void, *argent*, or *white*.

This invention is commonly aſcribed to F. Pietra Sancta; though the Sieur de la Columbiere has diſputed his title to it.

HATCHMENT, the marſhalling of ſeveral coats of arms in an eſcutcheon.

Hatchment is alſo a popular name for an *atchievement*. Atchievement, in a general ſenſe, denotes the arms, creſts, and ſupporters, which a perſon has a lawful right to bear, with all the exterior ornaments, as helmet, mantle, motto, &c.

By theſe hatchments, or funeral eſcutcheons, it may be known after any perſon's deceaſe, what rank either he or ſhe held when living; and if it be a gentleman's hatchment, whether he was a bachelor, married man, or widower, with the like diſtinctions for gentlewomen. In the hatchment, (*Plate Heraldry, Hatchments, fig.* 1.) are repreſented the arms of a private gentleman and his wife parted per pale, the dexter ſide, which is *gules, three bars or*, for the huſband; having the ground without the eſcutcheon black, which denotes the man to be dead; and the ground on the ſiniſter ſide being white ſignifies that the wife is living. When a married gentlewoman dies firſt, the hatchment is diſtinguiſhed by a contrary colour from the former; that is, the arms on the ſiniſter ſide have the ground without the eſcutcheon black, whereas thoſe on the dexter ſide, for her ſurviving huſband, are upon a white ground: beſides, the hatchment of a gentlewoman is differenced by a cherub over the arms inſtead of a creſt. (See *fig.* 2.) When a bachelor dies, his arms may be depicted ſingle, or quartered, with a creſt over them, but never impaled as the others are; and the whole ground without the eſcutcheon is black. (See *fig.* 3.) When a maid dies, her arms, which are placed in a lozenge, may be ſingle or quartered, have the whole ground black, and inſtead of a creſt have a cherub over them. (See *fig.* 4.) When a widower dies, his arms are repreſented impaled with thoſe of his deceaſed wife, having a helmet, mantling, and creſt over them, and the whole ground without the eſcutcheon black. (See *fig.* 5.) When a widow dies, her arms are impaled with thoſe of her deceaſed huſband, but incloſed in a lozenge; over them is placed a cherub inſtead of a creſt, and the whole ground without the eſcutcheon is black. (See *fig.* 6.) If a widower or bachelor ſhould be the laſt of his family, the hatchment is depicted as in *fig.* 7, and that of a maid or widow, whoſe family is extinct by her death, is depicted as in *fig.* 8. having a death-head generally annexed to each hatchment, denoting, that death has conquered all. The ſame rules are obſerved with reſpect to the eſcutcheons placed on the hearſe and horſes uſed in pompous funerals, except that they are not ſurmounted with creſts, but always plain; however, herald-painters commonly enſign thoſe of peers with coronets, and that of a maiden lady with a knot of ribbands. Porny's El. of Her. p. 246, &c.

HATCHY, in *Geography*, a navigable river of America, in the ſtate of Teneſſee, which runs weſterly into the Miſſiſippi, about 19 miles N. of Wolf river, N. lat. 35° 5'. W. long. 70° 28', and is about 80 yards wider ſeven miles from its mouth.

HATDER, a town of Aſiatic Turkey, in the government of Moſul; 20 miles N. W. of Tecrit.

HATFIELD, a pariſh in the wapentake of Strafforth and Tickill, in the Weſt Riding of the county of York, England, contains 290 houſes, and 1301 inhabitants. Here is a large church, the living annexed to which is a perpetual curacy. This place is particularly noticed in the agricultural report of the county, for its large chace, which contains about 180,000 acres of land; nearly one-half of which was formerly a moraſs. In the reign of king Charles I. ſir Cornelius Vermuyden, having drained it, brought the greater part into a ſtate of profitable cultivation. For this purpoſe he is ſaid to have expended nearly 400,000*l.* About 5000 acres of this land are appropriated as common for the benefit of the neighbouring inhabitants. On a ſmall iſland in the midſt of this moraſs formerly lived William of Lindholme, a noted hermit, whoſe cell, and other memorials of him, were ſtanding here in the year 1747. Near the village are ſeveral remains of entrenchments. This place is about three miles from Thorn, and 167 north of London.

Hatfield, or *Biſhops' Hatfield*, a market town in the hundred of Broadwater, Hertfordſhire, England, was, in the Saxon times, called Haethfeld, from its ſituation on a heath, and was an ancient demeſne of the Saxon kings, till Edgar, in the tenth century, granted it to the abbey at Ely, in Cambridgeſhire. On the converſion of that foundation into a biſhopric, in the reign of Henry I., it became attached to the new ſee; and the manor-houſe becoming a palace of the biſhops, the town was thenceforth diſtinguiſhed by the appellation of Biſhops'-Hatfield. Queen Elizabeth, who had reſided in the biſhop's palace ſome years previous to her acceſſion to the throne, greatly admired the ſituation; and by virtue of a ſtatute, which gave her the power of exchange, procured the alienation of this manor from the then biſhop of Ely, Richard Cox. James I., in the third year of his reign, exchanged it for the houſe, manor, and park of Theobalds, with his miniſter Robert Cecil, earl of Saliſbury. Hatfield church, a handſome fabric, conſiſts of a nave, chancel, aiſles, and embattled tower, with a chapel, or burial-place, of the earls of Saliſbury, on the north ſide of the chancel. This chapel was erected by Robert Cecil, the firſt earl of Saliſbury of that name, but contains neither monumental inſcription, nor other memorial, for any of the family, except the founder, who is repreſented in his robes, lying on a ſlab of black marble. On the ſouth ſide of the chancel is the chapel of the lords of the manor of Ponſburne, and in this are ſeveral monuments of the Brookets and Reads of Brooket-hall. Hatfield is 20 miles diſtant from London; has a market on Thurſdays, and two annual fairs. The population, as returned under the act of 1800, amounted to 2442, the number of houſes to 482.

Hatfield houſe, the principal reſidence of James Cecil, marquis of Saliſbury, occupies a beautiful ſituation in a finely diverſified park. This manſion, which is of brick, and of great extent, was erected by earl Robert, when the manor came into his poſſeſſion, by exchange with king James. Many of the apartments are large, and decorated with pictures of conſiderable merit. Chauncey's Hiſtory and Antiquities of Hertfordſhire, one vol. folio.

Hatfield Regis, or *Hatfield Broad Oak*, a pariſh in the hundred of Harlow, and county of Eſſex, England, was formerly a conſiderable market town, but is now only a ſcattered

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ſcattered village with very little trade. It was anciently part of the king's demeſne, whence it derived the name of Regis; as it did that of Broad-Oak, or Brad-Oak, from an oak of extraordinary ſize, ſuppoſed to have flouriſhed here in the Saxon era. In the church, a very ancient ſtructure, is the mutilated effigy, carved in wood, of Robert de Vere, third earl of Oxford, who was buried here in 1221. Near the eaſt end of the church, on a ſpot now converted into gardens, ſtood a Benedictine priory, founded about the year 1135, by Aubrey de Vere, father of the firſt earl of Oxford. After the diſſolution, the ſeite and revenues were purchaſed by Thomas Barrington, eſq., whoſe family were ſettled at Barrington-hall, in this pariſh, about a mile and a half north from the church, as early as the reign of Henry I. From this manſion, great part of which has been pulled down, and the remainder converted to a farm houſe, the Barringtons removed to the priory, where they reſided till the beginning of the laſt century, when it was taken down. The preſent Barrington-hall, a ſpacious brick manſion, at a little diſtance north from the ſeite of the priory, was erected by John Barrington Shales, eſq. The pariſh of Hatfield, which is diſtant 26 miles from London, was returned in the year 1801, as containing 271 houſes, inhabited by 1436 perſons. Morant's Hiſtory and Antiquities of Eſſex, two volumes folio.

Hatfield, a pleaſant town of America, in Hampſhire county, Maſſachuſetts, on the W. bank of an iſland of Connecticut river; 5 miles N. of Northampton, and 100 W. of Boſton; containing 103 houſes, and 809 inhabitants.

HATHERLEIGH, an ancient market and borough town in the hundred of Black Torrington, in the county of Devon, England, is a ſmall inconſiderable place, ſituated on a branch of the river Torridge, near its confluence with the Oke. The houſes are principally built with red earth, and thatched, and have a very mean appearance. The manor anciently belonged to the abbey of Taviſtock; by one of whoſe abbots, a large plot of common land was given about four hundred years ago, for the advantage of this borough. The town is governed by a portreeve and two conſtables, with other inferior officers, choſen annually at the court held by the lord of the manor. Though it bears the title of borough, Hatherleigh does not poſſeſs the privilege of ſending members to parliament. It is ſituated 200 miles diſtant from London, in a fertile neighbourhood; has a market on Fridays, and four yearly fairs, beſides a large annual cattle-market. The inhabitants are principally employed in agriculture, and the woollen manufacture: their number, as returned under the act of parliament of 1801, was 1218; that of houſes 219. Hiſtory of Devon, three vols. folio.

HATLEVEN, a ſmall iſland in the North ſea, near the coaſt of Norway. N. lat. 61° 20′.

HATLEY, a townſhip in Lower Canada, in which is lake Tomefobi, containing about 300 inhabitants.

HATTAN, a ſmall iſland on the W. ſide of the gulf of Bothnia. N lat. 61 37′. E. long. 17 30′.

HATTEM, a town of Holland, in the province of Guelderland, ſituated on the Iſſel; 13 miles N. of Deventer.

HATTEMISTS, in *Eccleſiaſtical Hiſtory*, the name of a modern Dutch ſect, ſo called from Pontian Van Hattem, a miniſter in the province of Zealand, towards the cloſe of the 17th century, who being addicted to the ſentiments of Spinoſa, was on that account degraded from his paſtoral office. The Verſchoriſts and Hattemiſts reſemble each other in their religious ſyſtems, though they never ſo entirely agreed as to form one communion. The founders of theſe ſects deduced from the doctrine of abſolute decrees, a ſyſtem of fatal and uncontroulable neceſſity; they denied the difference between moral good and evil, and the corruption of human nature; from hence they farther concluded, that mankind were under no ſort of obligation to correct their manners, to improve their minds, or to obey the divine laws; that the whole of religion conſiſted not in acting but in ſuffering; and that all the precepts of Jeſus Chriſt are reducible to this one, that we bear with cheerfulneſs and patience the events that happen to us through the divine will, and make it our conſtant and only ſtudy to maintain a permanent tranquillity of mind. Thus far they agreed; but the Hattemiſts farther affirmed, that Chriſt made no expiation for the ſins of men by his death, but had only ſuggeſted to us by his mediation, that there was nothing in us that could offend the deity; this, they ſay, was Chriſt's manner of juſtifying his ſervants, and preſenting them blameleſs before the tribunal of God. It was one of their diſtinguiſhed tenets, that God does not puniſh men for their ſins, but by their ſins. Theſe two ſects, ſays Moſheim, ſtill ſubſiſt, though they no longer bear the names of their founders. Moſh. Eccl. Hiſt. vol. iv.

HATTENHEIM, in *Geography*, a town of Germany, in the circle of the Lower Rhine, on the Rhine; 12 miles W. of Mentz.

HATTERAS, a very dangerous cape, on the coaſt of North America, extending far into the ocean from the coaſt of North Carolina, in N. lat. 35° 15′. During half the year it is remarkable for ſudden ſqualls of wind, and for very violent ſtorms of thunder, lightning, and rain.

HATTIAH, an iſland of Bengal, in the mouth of the Ganges, about 14 miles long, and 8 broad. N. lat. 22° 34′. E. long. 91°.

HATTINGEN, a town of Germany, in the county of Mark; 16 miles N.E. of Duſſeldorp. N. lat. 51° 18′. E long. 7° 8′.

HATTOCK, in *Rural Economy*, the common name of a ſtouk or ſhock of grain in ſome places, which is conſtituted of ſix, eight, ten, or twelve ſheaves, ſet up together in ſuch a manner, as to be capable of being protected, in ſome meaſure, from the effects of wet ſeaſons, by means of covering ſheaves. In this intention, two ſheaves are generally employed, which are denominated hooders, and which are opened in the middle and ſlid over the ſtandards, having their butt ends meeting at the top. In this way, they are as it were thatched. The method is common where grain is reaped by the ſickle, and ſometimes in all other caſes. See Stouk.

HATTUNUDDA, in *Geography*, a town of Hindooſtan, in Oriſſa; 32 miles S.E. of Boad.

HATVANY, a town of Hungary; 20 miles N.E. of Buda.

HATUN, a town of Peru, in the dioceſe of Cuſco; 85 miles S. of Cuſco.

HATZFELD, a town of Germany, in the principality of Upper Heſſe; 36 miles S.W. of Caſſel. N. lat. 50° 59′. E. long. 8° 36′.

HAVA, a town on the S. coaſt of the iſland of Ceram. S. lat. 3° 18′. E. long. 129° 48′.

HAVANNAH, a city and ſea-port on the N. coaſt of the iſland of Cuba, in the Weſt Indies, founded by Diego Velaſquez, who conquered the iſland at the commencement of the ſixteenth century. The harbour is very highly extolled, and is capable of containing 1000 ſhips, without cable or anchor, as there are generally ſix fathoms of water in the bay; and it is ſtrongly fortified by nature and art. Its en-

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New-ſtreet Square, London.

trance is a narrow channel of difficult acceſs, and guarded by platforms, various works, and artillery, for half a mile, which is the length of the paſſage. The mouth of the channel is ſecured by two ſtrong forts, one on the E. ſide called "Moro" fort, of a triangular form, fortified with baſtions, and 40 pieces of cannon, almoſt level with the water, and the other on the oppoſite ſide, called the "Puntal," joining to the town, which is ſituated to the weſtward of the entrance of the harbour, and ſurrounded by ramparts, baſtions, and ditches. It has likewiſe other forts and platforms, which render it almoſt invincible. In this harbour all the ſhips that come from the Spaniſh ſettlements, and formerly the galeons and flota, aſſemble on their voyage to Spain; and on this account Havannah is the richeſt and the moſt populous town poſſeſſed by the Spaniards in their Weſt India iſlands. It contains 11 handſome, and richly ornamented churches, two hoſpitals, and other public buildings, and, as it is ſaid, more than 2000 houſes. Its juriſdiction extends to half the iſland, and the other half belongs to St. Jago, which has been uſually reckoned the capital. On account of the great reſort of perſons to this town in the courſe of navigation and commerce, and alſo the indolence of the Spaniards in cultivating the ſoil of the iſland, proviſions are ſometimes ſcarce, and always dear. This town was taken by the Buccaneers under Capt. Morgan in 1669, and by the Engliſh under lord Albemarle and ſir George Pocock in 1762, fort Moro having been taken by ſtorm; but reſtored at the peace of Paris in 1763. N. lat. 23° 12′. W. long. 82° 14′.

HAVANT, a market-town and pariſh in the hundred of Boſmere, in the Portſdown diviſion of the county of Hants, England, is ſituated near the borders of Suſſex, and oppoſite the iſle of Hayling. It conſiſts principally of one long ſtreet, interſected by another at right angles. The number of houſes, as returned under the act of 1800, was 345; that of inhabitants 1670. The church ſtands in the centre of the town: it is built in the form of a croſs, with a tower ariſing from the interſection; and diſplays various ſpecimens of architecture of the ſtyle of very different periods. A market was granted to Havant by king John, probably through the interceſſion of the monks of Wincheſter, to whom the manor was given by Ethelred. This market is held on Saturdays, and is well ſupplied with all kinds of grain. Here are two annual fairs. This town experienced two ſhocks of an earthquake, October 25, 1734, each continuing two or three minutes; a great alarm was occaſioned, but no damage enſued. Havant is diſtant from London 66 miles.

About a mile diſtant from Havant are the ruins of Warblington caſtle. It appears to have been originally a ſquare pile, of about 200 feet, ſurrounding a quadrangular court: but the only part now ſtanding is the tower-gateway; and even this is verging to decay. The whole was ſurrounded by a foſſe, about ten feet deep, and including about an acre of ground. Before the northern angle appears to have been a ſort of entrenched camp, of five acres, now overgrown with wood, ſurrounded by a bank nearly eight feet high, and a ditch of a ſimilar depth to that round the caſtle. Warner's Collections for Hampſhire, ſix vols. 4to.

HAUARA, a town of Egypt; 8 miles S.E. of Fayoum.

HAVASH, or Hawasch, a river of Abyſſinia, which runs into the Arabian ſea. N. lat. 19°. E. long. 44° 55′.

HAUBERGETUM, in our *Old Writers*, the ſame with *halſberga* and *habergeon*, which all ſignify a coat of mail.

HAUBO, in *Geography*, a town of Sweden, in Weſt Gothland; 7 miles N.N.W. of Gotheborg.

HAUBOURDIN, a town of France, in the department of the North, and chief place of a canton in the diſtrict of Lille; 3 miles S.W. of it. The place contains 1809, and the canton 13,634 inhabitants, on a territory of 67½ kiliometres, in 15 communes.

HAUD, a town of Arabia, in the province of Yemen; 56 miles S. of Sâade.

HAUDIMONT, *the abbé* S. P. Meunier d', in *Biography*, a compoſer of Latin motets in the ancient church ſtyle, that were long performed at the Concert Spirituel at Paris with great applauſe, was a native of Burgundy, and of a noble family, ruined by Law's Miſſiſippi ſyſtem. The abbé was educated at Dijon, which he quitted at the age of 24, and was glad to accept of the chapel-maſter's place at Chalons-ſur-Saône, where he remained ſix years. From Chalons he went to the capital, ſeriouſly to apply himſelf to compoſition; where he became the diſciple and friend of the celebrated Rameau, his countryman.

In Auguſt 1764, the chapel-maſter of the Holy Innocents having died ſuddenly, he was appointed his ſucceſſor. It was then that he compoſed the chief part of the motets, which were ſo often heard at the concert ſpirituel, in the king's chapel, and on public feſtivals.

M. Laborde, in his "Eſſais ſur la Muſique," whence we have this article, laments that "the abbé Haudimont is only admired by the very ſmall number of lovers and preſervers of true muſic (meaning that of Lulli and Rameau,) ſo much depreciated by thoſe who are ignorant of its principles, and who find it eaſier to abuſe than to perform it. But their ſpleen is exerciſed in vain: taſtes are tranſient, and ſoon forgotten, and ſoon or late the true taſte returns; though its return is not very rapid, in muſic." And we believe that the ſtyle of compoſition of Lulli and Rameau, ſo univerſally admired in France during the reigns of Louis XIV. and XV., are not likely to be ſoon reſtored to favour.

HAVE, La, in *Geography*, a ſmall iſland, near the S.E. coaſt of Nova Scotia. N. lat. 44° 15′. W. long. 64° 10′.

HAVELANGE, a town of France, in the department of the Sambre and Meuſe, and chief place of a canton, in the diſtrict of Marche. The place contains 432, and the canton 6206 inhabitants, on a territory of 187½ kiliometres, in 23 communes.

HAVELBERG, a town of Brandenburg, in the mark of Pregnitz, almoſt ſurrounded and formed into an iſland by the river Havel, in its courſe from a lake in Mecklenburg to the Elbe, near Werben. The principal trade is that of diſtilling brandy, and alſo knitting ſtockings. Many ſhips are built here for the navigation of the Elbe, and great quantities of wood ſent from hence to Hamburg; 48 miles W.N.W. of Berlin. N. lat. 52° 51′. E. long. 12° 17′.

HAVEN, a ſea-port or harbour for ſhips. (See Harbour and Port.) The word is derived from the Saxon *havene*, or the German *hafen*, or the French *havre*; which all ſignify the ſame thing.

Haven, *Eaſt*, in *Geography*, a townſhip of New Haven county, in Connecticut, on the E. ſide of New Haven harbour; containing 1004 inhabitants.—Alſo, a townſhip in Eſſex county, Vermont, W. of Maidſtone; 11 miles S.E. of the ſouthern end of Willughby's lake.

Haven, *New*, a county in Connecticut, extending along the ſound between Middleſex county on the E. and Fairfield county on the W., about 30 miles in length from N. to S., and 28 from E. to W.; divided into 14 townſhips, and containing, in 1800, 31,926 free perſons, and 236 ſlaves.—Alſo, a city of the above county, a ſeat of juſtice, and the ſemi-metropolis of the ſtate. It lies round the head of a bay which extends about four miles N. from Long iſland ſound. The plain on which it ſtands is circumſcribed by high hills or mountains; and it is bounded E. and W. by two ſmall rivers. Four ſtreets run N.W. and S.E., and are croſſed by others at right angles. Near the centre is the public ſquare, where are the public buildings, *viz.* a ſtate-houſe, three college edifices, a chapel and edifice for the library, &c., three churches for Congregationaliſts, and one for Epiſcopalians. This ſquare is encircled with rows of trees, and many of the ſtreets are ornamented with rows of trees. The city contains between three and four hundred neat dwelling houſes, principally of wood. Within its limits there were, in 1798, 547 houſes and upwards of 400 perſons. About one in 70 dies annually. As to pleaſantneſs of ſituation and ſalubrity of air, this city is hardly exceeded by any in America. It carries on a conſiderable trade with New York and the Weſt India iſlands, but it has manufactures of cards, ſnuff, linen, buttons, cotton, and paper. This place and Hartford are alternately the ſeats of the legiſlature. For an account of Yale college in this city, ſee COLLEGE. It is 40 miles S.W. by S. from Hartford, 88 from New York, 152 from Boſton, and 183 N.E. of Philadelphia. N. lat. 41° 18′. W. long. 72° 56′.—Alſo, a poſt-town in Addiſon county, Vermont, on Otter creek, between Middleburg and Vergennes.

HAVER, in *Rural Economy*, a term applied to oats in ſome of the more northern diſtricts of the kingdom.

HAVER *Meal,* a name ſometimes uſed to ſignify the meal which is prepared from oats by grinding and ſifting through proper ſieves for the purpoſe. This ſort of meal is much uſed for bread in the northern diſtricts of England and ſome other parts.

HAVERA, in *Geography*, a town of Aſiatic Turkey, in Natolia; 18 miles N.E. of Iſbarteh.

HAVERFORD, a townſhip of America, in Delaware county, Pennſylvania, containing 605 inhabitants.

HAVERCAMP, SIEGBERT, in *Biography*, diſtinguiſhed for his great and extenſive knowledge in philology and the ſcience of medals, was born about the year 1683. He exerciſed the office of preacher many years, in a ſmall village, in the iſland of Overflacke, between Holland and Zealand; and he afterwards became profeſſor of hiſtory, the Greek language, and rhetoric at Leyden, where he died in 1742. His learning and induſtry were diſplayed by many editions of ancient authors, and by original works. The editions of the claſſics by Havercamp are ſtill in conſiderable repute. The Lucretius of this editor, publiſhed in two volumes 4to. 1725, is the moſt complete and ſplendid edition of this fine poet, excepting that of the late Gilbert Wakefield. His "Diſſertatio de Numiſmate Alexandri Magni, quo quatuor ſumma Orbis Terrarum Imperia continentur, et de Nummis contorniatis;" and "Introductio in Antiquitates Romanas; et Antiquitatum Græcarum precipue Atticarum Deſcriptio brevis," are highly eſteemed. Havercamp was author of "A General Hiſtory of the affairs of Aſia, Africa, and Europe, ſince the end of the Fabulous Ages." His edition of "Nummophylacium Reginæ Chriſtinæ," folio, 1742, is a very elegant work, and contains the rareſt coins of the Roman emperors, of the firſt, ſecond, and third ſize, which were collected by queen Chriſtina of Sweden, at a very great expence. They were engraved from originals by Bartolo, and a Latin explanation of them was added by Havercamp. This editor took a large ſhare in J. Poleni Supplementa nova utriuſque Theſauri Romanarum Græcarumque Antiquitatum." Gen. Biog.

HAVERFORDWEST, in *Geography*, is the principal town in the county of Pembroke, South Wales, as well on account of its ſuperior extent, population, and trade, as from its having lately become the place of the grand ſeſſion. It owes its advantages principally to the circumſtance of ſtanding on the banks of the Daugleddy river, which forms a bay or harbour for packets and veſſels. It is built on the ſteep ſide of a high hill, ſo as to be very inconvenient, if not dangerous, for carriages and horſes; and more ſo as the ſtreets are very ill-paved. There are ſome good houſes, chiefly in the upper part; but the irregularity of the avenues, and the narrowneſs of all but one or two ſtreets, with the houſes piled confuſedly on one another, the lower windows of ſome looking down upon the roofs of others, render it intricate and unſightly on the entrance, though the approach is ſtriking. The market is one of the largeſt and moſt abundant in Wales; particularly for fiſh, which are brought here in the greateſt plenty and variety. Here is alſo a very large corn-market, and alſo a great fair for horſes and cattle of all kinds, on the 7th of July. Among the public concerns of the town are a good quay, a cuſtom houſe, a free ſchool, a charity ſchool, an alms' houſe, and three pariſh churches, reſpectively named St. Mary's, St. Martin's, and St. Thomas's. The town was made a county of itſelf by a charter from Edward IV. and ſends one member to parliament, having obtained that privilege 17 Henry VIII. The civil government is veſted in a mayor, ſheriff, town-clerk, two bailiffs, and 24 common-council, from whom the mayor is choſen. The mayor is admiral, coroner, eſcheator, and clerk of the markets. The caſtle is a ſtately object from the bridge, though it is conſiderably disfigured by a part of it having been converted into a county goal. It is ſaid to have been built by Gilbert, earl of Clare, in the reign of king Stephen; but hiſtory is ſtrangely barren of events relating to it. The whole was well fortified with towers, and the walls are of great thickneſs. The ſect, calling itſelf the Unitas-Fratrum, but better known by the title of Moravians, is very numerous here. The Rev. John Gambold, one of their moſt eminent biſhops, was a native of Pembrokeſhire, and died in this town in 1771, aged 60. Haverfordweſt is 264 miles diſtant from London. The population, as returned in the year 1800, was 2880, inhabiting 613 houſes. Contiguous to the town is a cotton-mill, which employs about 150 perſons. At a ſhort diſtance to the ſouth are ſome remains of a priory of Black Canons, endowed, if not founded by Robert de Haverford, lord of this place. The walk to it from the town is a frequented promenade; and the ruins, if not highly picturesque, are at leaſt venerable. The chapel is the chief part remaining. Malkin's "Scenery, Antiquities, and Biography of ſouth Wales," 2 vols. 8vo. 1807.

HAVERHILL, a market-town and pariſh, ſituated partly in the hundred of Hinckford and partly in that of Riſbridge, in the county of Suffolk, England, is eight miles W. of the town of Clare, and 58 N.N.E. of London. It contained, in the year 1801, 152 houſes and 1104 inhabitants, but was formerly of much greater extent, as may be inferred from the ruins of a ſecond church, and of a caſtle now remaining. At preſent it conſiſts of one broad ſtreet. Its chief trade is in the manufacture of checks, fuſtians, and cottons. The church is a large ancient edifice; beſides which here are two chapels for diſſenters. The town has a weekly market on Wedneſdays, and two annual fairs.

HAVERHILL, a poſt-town of America, in New Hampſhire, and half-ſhire town of Grafton county, ſituated on the E. ſide of Connecticut river, in Lower Coos; incorporated in 1763, and containing 805 inhabitants. In it are a bed of iron ore, and a quarry of freeſtone, a fulling mill, oil mill, and other mill ſeats; 35 miles above Dartmouth college.—Alſo, a handſome poſt-town of Maſſachuſetts, in Eſſex county, ſituated on the N. ſide of Merrimack river, connected by an elegant bridge, 650 feet long and 34 wide, with Bradford. This town has a conſiderable trade, and veſſels of 100 tons burden have acceſs to it. It has diſtilleries and a brewery, a manufactory of ſail-cloth, and a number of neat, well-finiſhed houſes, diſpoſed principally in two ſtreets, the principal of which lies parallel with the river. Some veſſels are annually built here, and employed in the Weſt India trade. The whole townſhip contains 330 houſes, 2730 inhabitants, and four meeting-houſes, one for Baptiſts, and three for Congregationaliſts.

HAVERSACK, in *Military Language*, is a kind of bag, made of coarſe grey linen, in which the ſoldiers carry bread and proviſions on a march. They are only uſed in the field and in cantonments, each ſoldier having one.

HAVERSER, in *Geography*, a ſmall iſland of Scotland, near the W. coaſt of the iſland of Skye. N. lat. 57° 22'. W. long. 6° 30'.

HAVERSTRAW, a townſhip in Rockland county, New York, on the W. ſide of a bay of the ſame name, 10 miles long and about three wide; 35 miles N. of New York city, containing 1233 inhabitants.

HAVERY, two ſmall iſlands of Scotland, near the W. coaſt of Shetland. N. lat. 59° 59'. W. long. 1° 40'.

HAUGH, in *Agriculture*, is a name applied, in the northern parts of the iſland, to thoſe low, flat-lying tracts of land that extend on the ſides of rivers and brooks, in the vallies of mountains and other diſtricts, and which are liable to be frequently covered by them when in the ſtate of flood. They are generally of a rich quality, being conſtituted, in a great meaſure, by the depoſitions of the more fertile vegetable and animal matters which are let fall in ſuch circumſtances. See Soil.

Haugh-*land*, a name applied to that ſort of ground which is formed by a kind of depoſition from water, and which is commonly ſituated along the ſides of rivers and brooks. From its alluvial nature it is evidently of a rich fertile quality, and capable of producing almoſt every deſcription of grain crops, as well as thoſe of the graſs kind, when not liable to be overflowed by the waters of the rivers in the vicinity of ſuch lands. This ſort of land is, in many ſituations, capable of much improvement; but it has been ſuggeſted, in a late periodical work, that in ſome parts of Scotland theſe ſorts of lands are too frequently left either entirely, or in a great degree, to the mercy of the waters which paſs through them. In thoſe parts which are low and flat great loſs has been cauſed by this ſort of negligence; and a number of extenſive tracts, that lie on the banks of ſuch rivers and ſtreams, which might, with little trouble and expence, have been rendered extremely valuable, are, at this period, in a great meaſure uſeleſs to the community; and further, that in the more hilly and upland parts the loſs is ſtill greater; as in ſuch ſituations, the beſt ſoil, and that on which the chief dependence for grain is placed, is the haugh lands. In the whole of theſe tracts there are hollows between the different ranges of hills or highlands, through which various kinds of ſtreams take their courſe, upon the banks of which there is generally an extent of ſoil of good quality, conſiſting chiefly of the fineſt particles of earth that have been waſhed down by the rains from the high grounds, and which, by the accumulation of ages, have formed a bed of ſoil of ſuch depth and quality, as to be proper for the production of the moſt valuable kinds of crops. But in their preſent condition their value is conſidered as very ſmall in compariſon of what it might be under a different method of management, as, from the ſtagnation of water in ſome places, a very large portion is either covered with flags and ruſhes, or converted into a kind of moraſſes, and that which remains, in conſequence of the repeated inundations to which it is expoſed, partly from the overflowings of the rivers and ſtreamlets, and partly from the torrents which deſcend from the hills during heavy falls of rain, can never be cultivated with ſafety or advantage for grain crops. Even the ſmall ſpots which are reſerved for hay are far from yielding certain and profitable returns, the whole crop being, in numerous inſtances, either much damaged, or entirely carried off by the floods in a very few hours. On theſe accounts the cultivation of no inconſiderable extent of the beſt ſoils in the iſland has been abandoned; and the chief benefits which are at preſent derived from them are thoſe, in ſome inſtances, of bad paſtures, and in others of a quantity of coarſe ruſhy hay of but very little utility as the fodder of cattle. There are, however, ſituations in which theſe ſorts of land conſtitute ſome of the moſt rich feeding paſtures of this country, and are denominated holme lands. See Holme *Land*.

Haughs, in *Engineery*, are low flat meadows. Smeaton's Reports, vol. i. p. 381.

HAVIRAN, in *Geography*, a town of Aſiatic Turkey, in Natolia; 20 miles N.N.E. of Iſbartch.

HAUKADAL, a town of Norway, in the dioceſe of Bergen; 70 miles N. of Bergen.

To HAUL, in *Sea Language*, to pull a ſingle rope without the aſſiſtance of blocks, or other mechanical powers. See Bowse.

To Haul *the wind*, is to direct the ſhip's courſe nearer to that point of the compaſs from which the wind ariſes.

HAULING-WAY, or Towing-Path, in *Engineery*, is a path on one of the banks B C of a canal, *Plates* I. and IV. *of Canals*, or of a navigable river for the uſe of the men and horſes or mules, who haul or tow the barges or other craft along.

HAUM, Halm, or *Hawm*, among *Farmers*, denotes the ſtem or ſtalk of corn, peaſe, beans, &c. from the root to the ear.

HAULME, in *Mining*, ſignifies, in ſeveral diſtricts, the helve or handle of a pick or tool uſed in mines.

HAUNCH, or Hanch, the hip, or that part of the body between the laſt ribs and the thigh.

The haunches conſiſt of three bones, joined together by cartilages, which in courſe of time grow dry, hard, and bony, ſo that in adults, the three only ſeem to conſtitute one continued bone.

Haunches, or hips of a horſe, are thoſe parts of the hind-quarters which extend from the reins or back, to the hough or ham.

The haunches of a horſe are too long, if, when ſtanding in the ſtable, he limps with his hind legs farther than he ought to do; and when the top or onſet of his tail is not in a perpendicular line to the top of his hocks, as it always is in horſes whoſe haunches are of a juſt length.

One of the moſt neceſſary leſſons in managing the great horſe, is that of *putting him upon his haunches*; which, in other terms, is called to *couple* him well, or to put him well together, or make him compact.

A horſe that does not bend or lower his haunches, throws himſelf too much upon his ſhoulders, and is heavy upon the bridle. To *drag the haunches*, is to change the leading foot in galloping.

To make a horſe bend, or lower his *hips*, you muſt frequently make him go backwards, and make uſe of the aids of the hands, and of the calves of your legs, in giving good ſteps; and if that does not ſucceed, he muſt be tried upon a *calcade*, or ſloping ground, after the Italian faſhion.

Head in, and *hips in*.. See Head.

To gallop with the *haunch in*. See Gallop.

HAUNT, among *Sportſmen*, denotes the place to which game are accuſtomed to reſort; and among *Hunters*, it ſignifies the walk of a deer, or the place of his ordinary paſſages. See Hunting.

HAUR, in *Geography*, a town of Perſia, in the province of Mecran; 136 miles N.W. of Tatta. N. lat. 26 40′. E. long. 65′ 28′.

HAVRE, a French term, ſignifying the ſame with *haven* or *harbour*.

Havre, *Le*, or *Havre de Grace*, in *Geography*, a ſea-port town of France, principal place of a diſtrict, and ſeat of a tribunal, in the department of the Lower Seine, ſituated on a marſhy ſoil, interſected with creeks and ditches, at the mouth of the Seine. From being the mere habitation of fiſhermen, conſiſting of a few houſes, in 1509, it was erected into a town, with its preſent appellation, by Francis I. Its harbour, from which, and an adjoining chapel, it derived its name, has advantages peculiar to itſelf; as the water does not begin to ebb till three hours after the full tide, ſo that many ſhips may depart in the ſame time. The baſin, which is reſerved for ſhips of war, is ſufficiently capacious to accommodate 30, and depth of water enough for thoſe of 60 guns. Before the revolution it was a place of great importance; beſides being the ſeat of a governor general and other officers, a bailiwic, admiralty, &c. it contained two churches, three convents, an hoſpital, poor-houſe, arſenal, magazines, and ſtore houſes neceſſary for the conſtruction and manning of ſhips. It is defended by high walls, large ditches filled with water and furniſhed with ſluices, a regular citadel with baſtions, &c. It was put into the hands of the Engliſh by the Hugonots during the civil wars of France; but ſurrendered in 1563. It has been bombarded at different times by the Engliſh, and in 1759 a great number of flat-bottomed boats, conſtructed for the invaſion of England, were deſtroyed by rear-admiral Rodney. The place contains 16,000, and the canton the ſame number of inhabitants, on a territory of five kiliometres, in one commune. N. lat. 49 29′. E. long. 0 12.

Havre *de Grace*, or *Gras*, a poſt-town and port of Entry in Hartford county, Maryland, on the W. ſide of Suſquehannah river, at its mouth in Cheſapeak bay; containing about 40 houſes, and 250 inhabitants; 65 miles W.S.W. of Philadelphia. N. lat. 39 39′.

HAURIANT, in *Heraldry*, denotes the poſture of a fiſh when borne directly upright.

HAUSAY, in *Geography*, one of the ſmaller Shetland iſlands, among the Out-Skeries. N. lat. 60 42′. W. long. 0 46′.

HAUSEBECK, a town of Weſtphalia, in the principality of Minden; 10 miles S.W. of Minden.

HAUSEN, a lordſhip of Germany, belonging to the princes of Furſtenberg, in the Schwartzade.—Alſo, a town of this lordſhip, on the Kinzig; 26 miles S.E. of Straſburg.

HAUSRUCK, a diviſion of the archduchy of Auſtria, deriving its name from a large foreſt, and containing, among others, the following chief towns, *viz.* Lintz, Wels, Gemunden and Efferding.

HAUSTELLUM, in *Natural Hiſtory*, a name given by ſome authors to a peculiar kind of ſhell-fiſh, of the purpura kind, which the French have named the *becaſſe*, and we the woodcock-ſhell. It is remarkable for its extremely long and ſlender beak. There are a very elegant echinated or ſpinoſe kind, and two or three ſmooth ones.

HAUSTILIA Succina, a term uſed to expreſs that kind of amber, or more properly ſpeaking, thoſe maſſes of amber which are obtained by dragging the bottoms of the ſea near Pruſſia, or found on the ſhores, in diſtinction from thoſe pieces which are found foſſile in the ſame or other kingdoms.

The hauſtile amber is uſually found in irregular maſſes, for the moſt part wholly diveſted of its rough coat, and often broken, ſo that its original ſhape cannot well be aſcertained; but the foſſile amber generally carries the marks of its origin with it, and is either found in form of large drops of a roundiſh or oval figure, or elſe in flatted cakes, formed by the narrow ſpaces it is found in, between the layers of the matrix, which is always a kind of foliated or flakey ſubſtance, by ſome miſtaken for foſſile wood, or the barks of trees preſſed together, though, in reality, it is no other than a bituminous earth coagulated by ſalts, and hardened by the gradual evaporation of its ſuperfluous moiſture by the ſun's heat. Phil. Tranſ. N° 258. p. 18. See Amber and Matrix.

HAUT, Fr. in *Muſic*, equivalent to *Alto*, Ital., and *High* or *acute*, Engliſh.

Haut-*deſſus*, Fr. upper or firſt treble, Engliſh.

Haut *iſle*, or *iſle of Haut*, in *Geography*, the ſouthernmoſt of the large iſlands in Penobſcot bay, in Lincoln county and ſtate of Maine.

HAUTBOIS, in *Muſic*, a wind inſtrument, blown with a reed. It is the natural treble to the baſſoon, as their ſeveral names imply. *Haut-bois*, high wood, *Bas ſon*, low ſound.

The hautbois conſiſts of four pieces, or joints, the upper piece to which the reed is fixed is the narroweſt. The tube increaſes in diameter to the end, which terminates with a wide mouth like the trumpet.

The hautbois goes lower than the German flute one tone, that is, down to C natural, and ſeldom, in full pieces, mounts higher than d in alt. This ſeems to have been an inſtrument in common uſe in the time of Shakſpeare, and to have had a companion or baſſoon for its baſe. Falſtaff, in deſcribing the lank and meagre figure of juſtice Shallow in his juvenile days, ſays:

> "The caſe of a *treble hautbois* was a manſion for him——
> a court." Hen. IV. pt. 2.

Yriarte, in the notes to his Spaniſh poem, "La Muſic," regards its tone as nearer that of a human voice than any other wind inſtrument.

There is a ſpirit and hilarity in the tone of the hautbois which is gay and enlivening in allegros, and yet is not without expreſſion and complaint in pathetic ſtrains.

The moſt celebrated performers upon this inſtrument in this country during the laſt century, who are now no more, were San Martini, who arrived in England in 1723. His ſcholar Tommy Vincent, Fiſcher, and Simpſon, Martini and Fiſcher, were not only exquiſite performers on their inſtrument, but admirable compoſers. The concertos which Vincent uſed to play 50 years ago, which were known to be Martini's, were admirable, full of fire, taſte, and genius. They were never printed, nor did we ever know what became of them.

The concertos which Simpſon played were generally paſticcios, one movement from one compoſer, and one from another; but Fiſcher's, without being capricious, or *manieré*, were ſo much his own, that neither the compoſition nor performance reſembled any other.

HAUTE, in *Geography*, an iſland on the N E. part of the bay of Fundy. N. lat. 45 20′. W. long. 65.

Haute-*contre*, Fr. *Contralto*, Ital. and *Counter-tenor*, Engliſh, in *Muſic*, is the higheſt *natural* voice of a man.

In inſtrumental muſic, *Altus*, Lat. and *Alto Viola*, imply the tenor part for an inſtrument tuned an octave above the baſe; the tenor viol is frequently called by the Italians *viol da braccio*, on account of its reſting on the *arm*, in oppoſition to the *viol da gamba*, which reſts on the *leg*.

HAUTE-*taille*, Fr. *alto tenore*, Ital. is the voice-part which we ſimply call the *tenor*, written in the C clef, on the fourth line.

HAUTECOMBE, in *Geography*, a town of France, in the department of Mont Blanc, on the W. ſide of the lake Boargat; 12 miles N.N E. of Chambery.

HAUTE-FEUILLE, John, in *Biography*, known for his great genius and ſkill in mechanics, was born at Orleans in the year 1647. His father was a baker in that city, but was able, fortunately, to obtain for the youth the patronage of the ducheſs de Bouillon, who beſtowed on him the advantages of a liberal education. Having gone through the preparatory ſtudies with reputation, he embraced the eccleſiaſtical life, and was preſented, through the intereſt of the ducheſs, with ſeveral valuable benefices. He accompanied her in her travels through ſeveral countries on the continent and England, and upon her death ſhe left him an annuity for his life. His favourite ſtudy was the ſcience of mechanics, particularly its application to clock-work, in which he made many diſcoveries of ſingular uſe. He invented the method of moderating the vibration of the balance in watches by means of a ſmall ſteel ſpring, incloſed in a box which has ſince been made uſe of. This diſcovery was communicated by the author to the Royal Academy of Sciences in 1674, and the watches into which it was introduced were called, by way of eminence, "pendulum watches;" not that they really have pendulums, but becauſe they nearly approach in accuracy to the machines which are regulated by pendulums. This invention was perfected by Huygens, who claimed the merit of the original diſcovery, but Hautefeuille ſhewed, in a work which he publiſhed in 1675, that he was entitled to that merit. He was author of many other curious treatiſes, among which are "The Perpetual Pendulum:" "The art of breathing under water, &c.:" "Reflections on certain machines for raiſing water:" a treatiſe on the horizontal moon, another on the longitudes, and one on the tides, to prove the motion of the earth. He died at Orleans in the year 1724, when he was about ſeventy-ſeven years of age. Moreri.

HAUTEFORT, in *Geography*, a town of France, in the department of the Dordogne, and chief place of a canton, in the diſtrict of Périgueux; 18 miles N.E. of Périgueux. The place contains 889, and the canton 8261 inhabitants, on a territory of 195 kiliometres, in 17 communes.

HAUTEGOR, a town of Hindooſtan, in the circar of Cicacole; 22 miles N.W. of Ganjam.

HAUTELUCE, a town of France, in the department of Mont Blanc; 13 miles N.E. of Conflans.

HAUTERIVE, a town of France, in the department of the Drôme; 13 miles N. of Romans.

HAUTE-RIVIERE, a town of France, in the department of the Rhône and Loire; 18 miles W. of Lyons.

HAUTEVILLE, a town of France, in the department of the Ain, and chief place of a canton in the diſtrict of Belley; ſix miles E. of St. Rambert. The place contains 674, and the canton 4549 inhabitants, on a territory of 137½ kiliometres, in 10 communes.—Alſo, a town of France, in the department of the Marne; nine miles S.E. of Vitry.

HAUTIMABAD, a town of Hindooſtan, in the ſoubah of Delhi; 20 miles S. of Secundam.

HAUTINDAR, a town of Hindooſtan, in Lahore; 28 miles S.W. of Lahore.

HAW. A ſmall parcel of land is ſo called in Kent; as a *hemp-haw*, or *bean-haw*, lying near the houſe, and incloſed for thoſe uſes. But ſir Edward Coke, in an ancient plea concerning Feverſham in Kent, ſays, haws are houſes. See Haga.

Haw, Hawgh, or Howgh, is uſed, in the north of England, for a green plot in a valley.

Haw, among *Farriers*, &c. an excreſcence reſembling a griſtle growing between the nether eye-lid and the eye of a horſe, or other beaſt, and which will put the eye quite out, if not timely taken away.

It comes by groſs, tough, and phlegmatic humours, falling from the head, and knitting together, which in the end grow to this infirmity; the ſigns whereof are the watering of the eye, and involuntary opening of the nether ſide.

Every common farrier can cut it out: the affected beaſt is to be held faſt by the head, and with a ſtrong double thread, a needle is to be put in the midſt of the upper eye-lid, and tied, if it be a bullock, to his horn; then taking the needle again, with a long thread, and putting it through the griſtle of the haw, with a ſharp knife cut the ſkin finely round, and ſo pluck out the haw. That done, they dreſs the eye, take out the blood, waſh it with beer or ale, and caſt in a good deal of ſalt; then waſh it again, afterwards ſtroaking it down with their hands, and ſo let him go. To cure a ſheep of this malady, they drop into the eye the juice of chamomile, or crow's-foot.

Haw, a common name applied to the fruit of the white thorn. This kind of haw has been found uſeful as a food for ſome ſorts of animals, as the horſe, hog, &c. inſtead of grain.

HAWARDEN, in *Geography*, a market town and pariſh in the hundred of Mold, and county of Flint, North Wales, is a large town, having the ruins of a caſtle, and built in a ſituation which commands an extenſive view over a flat tract of marſh land towards the river Dee, to Cheſter, &c. It is about ſeven miles to the weſt of that city, and contained, in the year 1800, 769 houſes, and 4071 inhabitants. In the vicinity of the town are ſome manufactures of earthen ware, for the making of which the clays here are peculiarly adapted. Here is alſo an iron foundery for cannon, &c. But the place is more particularly diſtinguiſhed for its ancient caſtle, which has been a building of much ſtrength and note. It is ſaid to have been erected on the ſcite of a more ancient fortreſs, ſoon after the Norman conqueſt; for Roger Fitz-Walerin, ſon of one of king William's officers, is known to have poſſeſſed it. This manor was afterwards given by Llewellyn, prince of Wales, to Robert de Montalt, who was reſtrained from building a caſtle on it for 30 years after poſſeſſion, whereby it is inferred that the former building was deſtroyed. Henry VI. granted it to ſir Thomas Stanley, in whoſe family it continued till the civil wars, when it was purchaſed by ſerjeant Glynn. This fortreſs ſtands on a hill, and is now included within the ſcite of ſir William Glynn's park. To the weſt of the church is a mount called Trumons-hill, which has ſome traces of an encampment on its ſummit; and at about two miles diſtant is Eulo caſtle, conſiſting of a ſquare area, with two round towers. Theſe are ſeated on the edge of a deep wooded dingle, and are overgrown with ivy, &c. The ſituation is peculiarly romantic, and the ſcenery highly pictureſque. See Pennant's Tour in Wales, vol. ii. p. 88. 92, &c.

HAWES, William, M. D. in *Biography*, chiefly diſtinguiſhed as the founder of the Humane Society, was born at Iſlington in the year 1736, and was educated at St. Paul's ſchool. In 1759 he began to practice as an apothecary in the Strand; but for ſeveral years his practice was local and of ſmall extent, although he had been honoured with the friendſhip of ſome diſtinguiſhed literary characters. His firſt appearance as an author was in 1774, on the occaſion of the death of the celebrated Dr. Goldſmith, who, in ſpite of the remonſtrances of Mr. Hawes, had taken a large doſe of James's powder, which produced a violent effect, and was believed to have accelerated his death. Mr. Hawes, therefore, publiſhed "An Account of the late Dr. Goldſmith's illneſs, ſo far as relates to the exhibition of James's powders, together with Remarks on the Uſe and Abuſe of powerful Medicines in the beginning of acute Diſeaſes." In the year 1773, Dr. Cogan had tranſlated and publiſhed the memoirs of a ſociety, inſtituted at Amſterdam in 1767, for the purpoſe of recovering perſons apparently dead from drowning. This immediately excited the zeal of Mr. Hawes for the eſtabliſhment of a ſimilar inſtitution in the metropolis, which he had the ſatisfaction of ſeeing accompliſhed in 1775, in the formation of the Royal Humane Society, of which his majeſty became the patron. From the reports of the ſociety, which Dr. Hawes publiſhed at intervals, it appears that ſeveral thouſands of individuals have been ſaved to their friends and the community, moſt of whom would have inevitably periſhed, if the means recommended by the ſociety had not been enforced. He was appointed regiſter of the ſociety, and afterwards treaſurer. In the autumn of 1776, he commenced a courſe of lectures on the ſubject of ſuſpended animation, which he continued to deliver for ſeveral years with great intereſt and enthuſiaſm. In 1777, he publiſhed an "Addreſs to the Public on premature Death and premature Interment," of which, with his uſual liberality, he diſtributed ſeven thouſand copies in various parts of the kingdom. By theſe unwearied efforts in the cauſe of humanity, he had now acquired much public reputation and eſteem, and was induced to relinquiſh his practice as an apothecary; and in the year 1781, he obtained a diploma of doctor of medicine, and was elected, in a very honourable manner, one of the phyſicians to the Surrey diſpenſary. In the ſame year, he publiſhed "an Addreſs to the king and parliament of Great Britain, on preſerving the lives of the inhabitants, and on regulating the bills of mortality," which inculcated many uſeful regulations, and expoſed the groſs errors in the management of theſe records of death. Dr. Hawes continued active in his benevolent purſuits, until towards the cloſe of the year 1808, when a diſeaſe in the bladder, which had occaſioned ſeveral fits of ſevere illneſs for a few years preceding, terminated his exiſtence on the 6th of December, at the age of 73. See Ann. Med. Regiſter for 1808.

HAWFINCH, in *Ornithology*. See LOXIA *Coccothrauſtes*.

HAWICK, in *Geography*, an ancient baronial town in the county of Roxburgh, Scotland, was the chief and ſhire town during the thraldom of Roxburgh, and is ſeated at the confluence of the ſmall river Slitrigg with the Teviot. It is a burgh, or barony, independent of the lord; and had a charter granted it in 1545 by James Douglaſs, comes de Dramlanark. This was confirmed by queen Mary, and inveſts the inhabitants or burgeſſes with the privilege of electing two bailiffs, and two repreſentatives of each of the ſeven incorporations, which, with 15 counſellors elected for life, manage the civil polity of the town. Thus it poſſeſſes the ſame privileges and immunities, excepting that of ſending members to parliament, as a royal burgh. In the town is a conſiderable carpet manufactory, and lately the ſtocking trade has been introduced. Here are a weekly market and two annual fairs, beſides an annual mart, called a tryſt, for black cattle. A neat town-houſe has been built here, and the magiſtrates have ſupplied the town with water, by means of leaden pipes. As a border town, Hawick was frequently involved in ruin during the ages of hoſtility. Among other inſtances it is ſaid to have been wholly, or nearly conſumed by fire in April 1570. The church here, Mr. Chalmers ſtates to have been dedicated in 1214: it was long made uſe of as a court-houſe; and at one time, while the ſheriff of Roxburgh was holding his court here, he was ſeized by Wm. Douglaſs, the knight of Lidifdale, and carried off to Hermitage caſtle, where he was ſtarved by ſolitary confinement. (Sinclair's Statiſtical Account of Scotland, vol. viii.; alſo Chalmers's Caledonia, vol. ii. p. 115, 175.)

HAWK, in *Ornithology*. See FALCO.

The hawk makes the ſubject of a particular art, called *hawking*, or *falconry*; which ſee.

Naturaliſts diſagree about the number and diviſion of the hawk kind. The moſt commodious diſtribution is that into *long-winged*, and *ſhort-winged hawks*.

To the long-winged, which may be alſo called the *falcon* tribe, belong the falcon, haggard-falcon, jerfalcon, lanner, hobby, ſaker, merlin, and bawler; all which are reclaimed, manned, fed, and mewed, much after the ſame manner. Of the ſhort-winged ſpecies, or hawks properly ſo called, are the *gos-hawk* and *ſparrow-hawk*.

The former are generally brought to the lure, and ſeize their prey with the foot; breaking the neck-bone with their beak, before they proceed to plume or tire it; the latter are brought to the fiſt, and kill their game by ſtrength and force of wing, at random, and proceed immediately to plume them.

It is to be noted, that the female of all birds of prey is much larger, ſtronger, and more courageous, than the male; which is diſtinguiſhed from it by ſome diminutive name. Thoſe of the falcon and gos-hawk are called *tiercels*, or *tiercelets*; that of the jerfalcon, *jerkin*; that of the merlin, *jack*; that of the hobby, *robbin*; that of the ſparrow-hawk, *muſket*; and that of the lanner, *lanneret*.

The hawk has different names, according to their different ages. The firſt year ſhe is called a *ſoarage*; the ſecond, an *interview*; the third, a *white hawk*; the fourth, a *hawk of the firſt coat*.

Add, that they have different denominations, according to the different ſeaſons when they are taken. Thoſe taken in the ayrie, are called *eyeſſes* or *nyeſſes*; thoſe which had forſaken it, and were fed in ſome places not far off, by the old ones, *branchers*; thoſe which had begun to prey for themſelves, *ſoar-hawks*; thoſe which have changed their feathers once or more, *mewed hawks*; and thoſe which lived at large, and preyed for themſelves about the woods, *haggards*. For the ſeveral ſpecies of hawks formerly uſed in the art of *hawking*, we refer to the articles FALCO and FALCONRY. See alſo HAWKING.

The Engliſh legiſlature has thought theſe birds worthy of its protection: taking their eggs out of any man's ground, is puniſhable by impriſonment for a year and a day, and by a fine at the king's will; one half to him, and half to the owner of the ground. (Stat. 11 Hen. VII. cap. 17.) Stealing hawks, in diſobedience to the rules preſcribed by the ſtat. 37 Edw. III. cap. 19. is felony, 3 Inſt. 98. See FALCONRY.

HAWK, *Make*, in *Falconry*. a name given to an old ſtaunch hawk, which being uſed to fly, will teach a young one to fly.

HAWK-*weed*, in *Botany*. See HIERACIUM.

HAWK-*weed*, *Baſtard*, in *Botany*. See CREPIS.

HAWK-*weed*, *Trailing*, *crooked-ſeeded*. See HYOSERIS.

HAWK-*weed*, *Woolly*. See ANDRYALA.

Hawk-*moth*, in *Entomology*. See Sphinx.

Hawk-*owl*, in *Ornithology*, the Strix *Hudſonia*, which ſee.

Hawk-*owl*, *Little*. See Strix *Indica*.

Hawk's *Bay*, in *Geography*, a bay on the coaſt of W. Florida, W. of the mouth of Mobile harbour, between Pelican and Dauphin iſlands; part of which having good anchorage, is very convenient for ſmall veſſels.

HAWKE, Edward, *Lord*, in *Biography*, ſon of a bariſter of eminence, was regularly educated for the navy, paſſed through all the ſubordinate ſtations; and in 1734 he was made a poſt-captain. In an engagement between the combined fleets of France and Spain, and that of England, under admirals Matthews and Leſtock, captain Hawke was the only one to whom a Spaniſh ſhip of the line ſtruck. On this occaſion he broke the line of battle to ſuccour two Engliſh ſhips, for which act, committed by the ardour of heroiſm, he incurred the ſuſpenſion of his commiſſion, but it was honourably reſtored to him. This was in 1744, and in 1747 he was made rear admiral of the white, and ſhortly after, having the command of 14 ſhips, he fell in with a Weſt India fleet, convoyed by nine men of war, out of which he captured ſeven. For his valour he was rewarded with the knighthood of the Bath, and raiſed to the rank of vice-admiral of the blue. In the ſeven years' war ſir Edward Hawke performed many national and important exploits, which will long live in the naval records of our country. In 1759 the French threatened an invaſion of England, and a large fleet was collected for the purpoſe, which ſir Edward kept blocked up cloſe in Breſt for many months. In November a ſtorm drove him into Torbay, the enemy put to ſea, an engagement ſoon enſued, in which the approach of night alone ſaved the French from total deſtruction. The reſult was, that the French admiral-ſhip and another were burnt, two were ſunk, and one taken, all of the line; and ſeven more were obliged to take ſhelter in the mouth of a narrow river. Hawke was now rewarded with a penſion, and his name ſtood the very higheſt in his profeſſion in popular celebrity. He had not obtained theſe honours without riſk: the weather was rough and tempeſtuous, and the nature of the coaſt was not only hazardous by the number of its ſand-banks, ſhoals, &c. but unknown to the Britiſh ſailors, and it required the utmoſt reſolution in the commander to attempt an attack on this occaſion. But ſir Edward Hawke, ſteeled with the integrity and fortitude of his mind, animated with the love of his country, and well acquainted with the magnitude of the ſtake on which the ſafety of that country, in a great meaſure, depended, was reſolved to run extraordinary hazards to fruſtrate the project for annoying his fellow-ſubjects. When his pilot, an able and ſkilful man, remonſtrated that he could not obey his order, without the moſt imminent dangers, the admiral replied, "You have done your duty in pointing out the difficulties, you are now to comply with my order, and lay me along the Soleil Royal." Victory, as we have ſeen, enſued, which not only defeated the projected invaſion, but gave the finiſhing blow to the navy of France, which was unable to undertake any thing of conſequence during the remainder of the war. Sir Edward was in 1765 raiſed to the poſt of vice-admiral of Great-Britain; in the year 1770 he was placed at the head of the admiralty, and in 1776 created a peer of Great-Britain, with the title of baron Hawke. He died in 1781. Smollet's Continuation, vol. iv. and v.

Hawkes' *Temperaments of the Muſical Scale.* The Rev. William Hawkes in 1798 publiſhed an octavo pamphlet, entitled "A Treatiſe on the Theory and Practical Syſtem of Muſic," ſold by Cawthorn, and in 1805, a folio pamphlet with a ſimilar title, ſold by Clementi, the objects of which were, to recommend an irregular douzeave ſyſtem of temperament, which he ſaid (p. 7, of the firſt pamphlet) was *then practiſed*, wherein the progreſſion of eight-fifths upwards, *viz.* C, G, D, A, E, B, ※F, ※C, and ※G, are each flattened $\frac{1}{4}$th of a major comma, except the laſt, which is kept perfect: and the progreſſion of three-fifths downwards, *viz.* c, F, ♭B and ♭E, which are each alſo flattened $\frac{1}{5}$ c, except the laſt, which is kept perfect: whence it happens, that the reſulting fifth, between ※G and ♭E, preſents a *wolf* or fifth, *ſharpened* $7.8\,\Sigma + 8\,m$, or almoſt $\frac{3}{4}$ths of a comma; a circumſtance no where hinted at in the publications above quoted, nor did their author ſeem to underſtand or admit this or other facts, in a converſation with the writer of this, on the ſubject of this and other large wolves which would occur, in the application of this ſyſtem to practice. In the Philoſophical Magazine, vol. xxvi. p. 171, vol. xxviii. p. 304, vol. xxx. p. 5, and vol. xxxvi. p. 47, a good deal of information has been publiſhed reſpecting this ſyſtem, which we ſhall not repeat, but lay before our readers, all which ſeems further neceſſary to enable muſicians or theoriſts to judge for themſelves, of the merits and defects of this ſyſtem, formerly ſo much extolled by its author.

A Table of the Lengths of Strings and Vibrations in 1^{s}., made by each Note in Mr. Hawkes' Irregular Douzeave, above the Tenor clef C; with the beats per ſecond, made by every concord above theſe Notes.

1	2	3	4	5	6	7	8	9
C	.5000000	480.						
B	.5333333	450.	13.377	36.891	4.478	3.350	8.933	16.833
♭ B	.5597118	428.7922	54.049	5.333		3.192	63.712	10.680
A	.5970259	401.9925	11.956	5.000	4.000	2.993	7.981	10.012
※ G	.6352475	377.8055	16.833	30.972		※ 10.029	14.981	35.748
G	.6683250	359.1066	10.680	4.466	3.573	2.674	14.240	8.944
※ F	.7128801	336.6625	10.012	31.856	3.350	2.506	6.683	31.856
F	.7481390	320.7900	35.748	3.990	3.192	2.388	47.664	7.990
E	.7980149	300.7463	8.944	7.491	2.993	2.239	5.970	7.491
♭ E	.8395679	285.8614	31.856	7.120	♭ 10.029		36.891	10.693
D	.8933168	268.6623	7.990	3.341	2.674	2.000	5.333	6.689
※ C	.9528710	251.8704	7.491	23.832	2.506		5.000	27.024
C	1.0000000	240.	10.693	2.985	2.388	1.787	30.972	5.978
Notes	lengths of ſtring.	vibrations in one ſecond.	3ds ♭	IIIds ※	4ths ※	Vths ♭	6ths ♭	VIths ※
			Beats made in one ſecond.					

The beatings are all flat or ſharp, as expreſſed in the titles at the bottom of each column, except the 4th on ♭ E, and the Vth on ※ G, which are otherwiſe expreſſed.

The examination of the calculations of any of theſe beats is perfectly eaſy, by Mr. Farey's theorem for beats, given in our article *Grave* HARMONICS, by help of the vibrations in the 3d column; thus for the 3d, C ♭ E or $\frac{5}{6}$, at bottom of col. 4, we have, 6 × 240 — 5 × 285.8614 = 10.693 beats per ſecond, and ſo of others; doubling the vibrations for the notes in the ſuperior octave, wherever they are wanted. It may be proper here to obſerve, that the ſyſtem will not be correctly aſcertained by means of the beats in the above table, unleſs the pitch of C of the tenor clef line on the inſtrument give 240 vibrations, or very near it, aſcertained by the methods pointed out in our article CONCERT-PITCH.

In Auguſt 1807, the Rev. Mr. Hawkes iſſued printed propoſals for a ſubſcription of 60 guineas (to be made to Mr. Anderſon), for completing an inſtrument for the ſubſcribers, after a plan that had then lately occurred to him, "of a keyed inſtrument in which *true chords* are acquired *throughout the twenty-four keys*," without the addition of a ſingle finger key. It is probable that this propoſal produced no effect, for on the 25th of July 1808, Mr. Hawkes took out a patent for improvements on muſical keyed inſtruments of 12 fixed tones, the ſpecification of which may be ſeen in the Repertory, 2d ſeries, vol. xiii. p. 248; whence it ſeems, that Mr. Hawkes' invention conſiſts in doubling the uſual number of ſtrings or pipes, or extending them to 24 in the octave; twelve of which are to be tuned to a chromatic ſharp ſcale, and 12 to a chromatic flat ſcale, the natural notes or long keys in each ſcale being uniſons, and the whole key-board moves to the right or to the left by the action of a pedal, ſo that the keys act at the ſame time on all the five ſharps, or on all the five flats, without altering the pitch of the intermediate natural notes. And thus, with the help of 24 ſtrings or pipes, no more than 17 intervals are acquired in the octave on theſe patent inſtruments of Mr. Hawkes; the patentee having been entirely ſilent in this ſpecification, and in a controverſy in which he has been engaged with ſeveral, in Dr. Kemp's "Muſical Magazine," as to the preciſe mode or principles which he adopts in tuning, or adjuſting theſe 17 intervals, but contents himſelf on all occaſions with aſſerting, that on his organs and piano-fortes, "every common chord, major and minor, throughout the 24 keys, are perfect to the niceſt ear." It becomes neceſſary for us here to remark, that Mr. Hawkes having no ſounds for E ※ or F ♭, or for B ※ or C ♭, if in the table of conſonances in plate 19 of Dr. Smith's Harmonics, we draw other diagonal dotted lines, two notes higher, (ſo as to include D ※ and A ※) and other three notes lower, (ſo as to include A ♭, D ♭, and G ♭), which are Mr. Hawkes' five additional notes, (than thoſe which the Doctor has drawn, to repreſent the common or douzeave ſcale,) it will appear manifeſt that the nine middlemoſt keys B ♭, F, C, G, D, A, E, B, and F ※, only can be without *wolves* in their concords, with 17 notes; and that as we proceed to modulate from thence upwards by ſharps, C ※ has a falſe IIId (for want of E ※), G ※ has a falſe IIId and a falſe VIth (for want of B ※ and E ※), D ※ has a falſe IIId and a falſe VIth (for want of F ※ ※ and B ※), and A ※ has a falſe IIId, a falſe Vth, and a falſe VIth, (for want of C ※ ※, E ※ and F ※ ※): in like manner if we modulate downwards by flats, E ♭ has a falſe 6th, (for want of C ♭), A ♭ has a falſe 3d, and a falſe 6th (for want of C ♭ and F ♭), D ♭ has a falſe 3d, a falſe Vth, and a falſe 6th, (for want of F ♭, A ♭, and D ♭♭), and G ♭ has a falſe 3d, a falſe 4th, a falſe Vth, and a falſe 6th, (for want of B ♭♭, C ♭, D ♭, and E ♭♭). Giving ſix major common chords, *viz.* in the keys C ※, G ※, D ※, A ※, D ♭, and G ♭, and five minor common chords, *viz.* in the keys A ※, E ♭, A ♭, D ♭, and G ♭, in all of which falſe notes or wolves occur; and every three of theſe, *viz.* C ※ and G ※ major, and E ♭ minor, are eſſential to completing the number of 24 uſual keys, of whoſe *perfection* the patentee and his advocates boaſt.

We ſhould perhaps have ſpared ourſelves and our readers the pains of expoſing the fallacies in the puffs of this reverend patentee, were it not that a lecturer on muſic at the Royal Inſtitution, and at the Surrey Inſtitution, had made their defence, and the exhibition of theſe patent inſtruments with that view, parts of his lectures; the patentee, by oppoſing the obtaining of a ſubſequent patent by Mr. D Loeſchman for a vaſtly ſuperior invention, and his miſrepreſentations and that of his partizans ſince, rendered it a neceſſary piece of juſtice at our hands: and becauſe M. Loeſchman's inſtruments, containing *no more ſtrings than Mr. Hawkes'*, can render all the above chords true, according to any given ſyſtem of temperament, excepting only the minor key of G ♭, (he having no E ♭♭) or 33 keys in the whole, inſtead of the 23 keys which Mr. Hawkes' might be made to produce, including A ♭ major, and D ※ minor, which are unuſual keys, or coincident with G ※ and E ♭, on common inſtruments. Beſides all this, Mr. Hawkes' inſtruments are incapable of executing the multitude of paſſages in the beſt authors, ancient and modern, where both flats and ſharps occur in the ſame ſtrain, of which ample liſts have been given in the Muſical Magazine above quoted; but on D. Loeſchman's inſtruments, this can be done with the utmoſt facility, and as inſtantaneouſly as one of ſix pedals can be put down with the foot, placed ready above it, in moſt inſtances which can occur; while the perfection of his mechaniſm guards againſt both the flat and the ſharp of the ſame finger-key ſounding together, if the pedal is moved while the key is down, which it can be, without deranging any thing, and never more than one of his pedals require to be uſed at the ſame time.

HAWKE, in *Geography*, a townſhip of America, in Rockingham county, New Hampſhire, incorporated in 1760, and containing 389 inhabitants.

HAWKE *Bay*, a bay on the E. coaſt of Labrador. N. lat. 53° 10'. W. long. 55° 50'.

HAWKE'S *Bay*, a bay on the E. coaſt of the northernmoſt iſland of New Zealand, in the South Pacific ocean.

HAWKE, *Cape*, a cape on the coaſt of New Holland, ſo called by Cook in 1770. S lat. 32° 14'. W. long. 207° 30'.

HAWKE'S *Harbour*, an arm of Igornachoix bay, Newfoundland.

HAWKE *Iſland*, a ſmall iſland near the E. coaſt of Labrador. N. lat. 53° 10'. W. long. 55° 30'.

HAWKERS, anciently were fraudulent perſons, who went from place to place, buying and ſelling braſs, pewter, and other merchandize, which ought to be uttered in open market. In this ſenſe the word is mentioned, anno 25 Hen. VIII. cap. 6. and 33 ejuſdem, cap. 4.

The appellation hawkers ſeems to have ariſen from their uncertain wandering, like thoſe who, with hawks, ſeek their game where they can find it.

The term is now uſed as ſynonymous with pedlar; a perſon who travels about the country ſelling wares.

By 29 G. III. c. 26, and 35 G. III. c. 91, every hawker muſt take out an annual licence, for which he muſt pay 4*l.*, and if he travel with a horſe, aſs, or mule, for every one of them 8*l*. If he travels without a licence, or contrary to it, and has it not ready to be produced, he forfeits, for every offence, to the informer, and the poor of the pariſh where diſcovered, 10*l*. If he travels with a forged licence, he forfeits 50*l*.; and by 25 G. III. c. 78, 100*l*., half to the king and half to him that ſhall ſue, and be alſo liable to puniſhment for forgery: 9 and 10 W. c. 27. Hawkers refuſing to produce their licences, may be detained, and on proof of their trading without a licence, forfeit 40*l*.

The acts relating to hawkers do not extend to makers of goods, or their agents; or to thoſe who ſell goods in fairs or markets; to the ſellers of fiſh, fruit, or other victuals; nor to the venders of books and newſpapers. (9 and 10 W. cap. 27. 3 and 4 Anne, cap. 4. 29 G. III. c. 26.) But hawkers ſhall not, by virtue of their licence, ſell or offer to ſale, any tea, or ſpirituous liquors, though with a permit, under the penalty of having the ſame ſeized, and impriſonment and proſecution of the offender. (9 Geo. II. cap. 35.) And if any foreign cambrick or French lawn ſhall be found in the poſſeſſion of any hawker, &c. the ſame ſhall be forfeited together with all the goods in his pack; and he ſhall be adjudged to have forfeited his licence (7 Geo. III. cap. 43.) No hawker ſhall expoſe goods to ſale in any part of a market town, but the public market-place: nor ſhall he ſell any goods by auction, on pain of forfeiting 50*l*. 29 G. III. c. 26.

HAWKESBURY's ISLAND, in *Geography*, an iſland in an arm of the Pacific ocean, diſcovered by Vancouver; 33 miles long, and from four to 10 broad. N. lat. 53° 36′. W. long. 231° 4′.

HAWKESBURY's *River*, a river of New South Wales, that runs into Broken bay.

HAWKESBURY *Townſhip*, a townſhip in the county of Glengary, Upper Canada, on the Ottawa river, adjoining Lower Canada.

HAWKESWORTH, JOHN, in *Biography*, was born at Bromley, in Kent, in the year 1715, and bred to the trade of a watchmaker, or, according to ſir John Hawkins, he ſpent the early part of his youth in the office of an attorney. By his own talents he fitted himſelf for literary occupations, and in 1744 he became ſucceſſor to Dr. Johnſon, in compiling the parliamentary debates for the Gentleman's Magazine. For this he wrote many pieces of poetry, during ſeveral ſucceſſive years, under the ſignature of H. Greville. In 1752 he embarked in a periodical work under the title of "The Adventurer," which was continued to the 140th number, one half of the papers being of his own compoſition. Theſe eſſays were well received by the public, and highly merited the ſucceſs which they obtained by the purity of their morals, the elegance of their critical diſquiſitions, and the knowledge they diſplayed of life and manners. The papers which have moſt generally been admired, are thoſe containing eaſtern tales, or ſtories of domeſtic life, in the former of which is exhibited a fine imagination, and in the latter a very conſiderable knowledge of the human heart. They have been ſince reprinted in almoſt all ſizes and forms, and are deſervedly ranked among the beſt Engliſh claſſics. Their moral tendency was ſo excellent, that archbiſhop Herring ſpontaneouſly conferred on the author the degree of doctor of laws. Dr. Hawkeſworth appeared as writer for the ſtage, and was ſucceſsful in altering, at the deſire of Garrick, Dryden's comedy of Amphytrion; and alſo in the original pieces entitled "Zimri," an oratorio; "Edgar and Emmeline," a dramatic entertainment, and "A Fairy Tale," a very elegant fancy piece. In 1761 he publiſhed, in two volumes 12mo., an oriental tale, entitled "Almoran and Hamet," which poſſeſſes much merit as a romance of the ſerious and dignified claſs. He edited the works of Dean Swift, to which he prefixed a life of the author: alſo, the "Letters of Dean Swift and ſeveral of his friends," &c.: and in 1768 he gave the world an excellent tranſlation of Telemachus. In 1772 he was employed to compile into one narrative an account of all the voyages of diſcovery made by command of his preſent majeſty to that period of his reign. This work was printed in three volumes 4to. adorned with charts, maps, and views, and the editor was remunerated with the large ſum of 6000 pounds. He then became an Eaſt India director, and died in the year 1773. He was a man of irritable paſſions and exquiſite ſenſibility, but friendly, ſocial, and humane. He exhibited in converſation, and all the connections of life, the manners of a gentleman and ſcholar.

HAWKING, the art or exerciſe of chaſing and taking wild fowls, by means of hawks, or birds of prey.

Hawking is the ſame thing with what we otherwiſe call *falconry*; which ſee.

The word *hawking*, in its latitude, alſo includes the taming and diſciplining of hawks, and fitting them for the ſport.

Hawking, though an exerciſe now much diſuſed among us, in compariſon of what it anciently was, does yet furniſh a great variety of ſignificant terms, which ſtill obtain in our language. Thus the parts of a hawk have their proper names. The legs, from the thigh to the foot, are called *arms*; the toes, the *petty ſingles*; the claws, the *pounces*. The wings are called the *ſails*; the long feathers thereof, the *beams*; the two longeſt, the *principal feathers*; the next thereto, the *flags*. The tail is called the *train*; the breaſt-feathers, the *mails*; thoſe behind the thigh, the *pendant feathers*. When the feathers are not yet full grown, ſhe is ſaid to be *unſummed*; when they are complete, ſhe is *ſummed*. The craw, or crop, is called the *gorge*. The pipe next the fundament, where the fæces are drawn down, is called the *panel*; the ſlimy ſubſtance lying in the panel, is called the *glut*. The upper and crooked part of the bill is called the *beak*; the nether part, the *clap*; the yellow part between the beak and the eyes, the *ſear*, or *ſeer*; the two ſmall holes therein, the *nares*.

As to her furniture: the leathers, with bells buttoned on her legs, are called *bewits*. The leathern thong, whereby the falconer holds the hawk, is called the *leaſe* or *leaſh*; the little ſtraps, by which the leaſe is faſtened to the legs, *jeſſes*: and a line or packthread faſtened to the leaſe, in diſciplining her, a *creanſe*. A cover for her head to keep her in the dark, is called a *hood*: a large wide hood, open behind, to be worn at firſt, is called a *rufter hood*: to draw the ſtrings, that the hood may be in readineſs to be pulled off, is called *unſtriking the hood*. The blinding a hawk juſt taken, by running a thread through her eye-lids, and thus drawing them over the eyes, to prepare her for being hooded, is called *ſeeling*. A figure or reſemblance of a fowl, made of leather and feathers, is called a *lure*. Her reſting place, when off the falconer's fiſt, is called the *perch*. The place where her meat is laid is called the *hack*; and that wherein ſhe is ſet, while her feathers fall and come again, the *mew*.

Something given to a hawk, to cleanſe and purge her gorge, is called *caſting*. Small feathers given her to make her caſt, are called *plumage*. Gravel given her to help to bring down her ſtomach, is called a *rangle*. Her throwing up filth from the gorge after caſting, is called *gleaming*. The purging of her greaſe, &c. *enſeaming*. A being ſtuffed is called *gurgiting*. The inſerting a feather in her wing in lieu of a broken one, is called *imping*. The giving her a leg, wing, or pinion of a fowl to pull at, is called *tiring*. The neck of a bird the hawk preys on, is called the *inke*. What the hawk leaves of her prey is called the *pill*, or *pelf*.

There are alſo proper terms for her ſeveral actions. When ſhe flutters with her wings, as if ſtriving to get away, either from perch or fiſt, ſhe is ſaid to *bate*. When ſtanding too near, the fighting with each other, is called *crabbing*. When the young ones quiver, and ſhake their wings in obedience to the elder, it is called *cowring*. When ſhe wipes her beak after feeding, ſhe is ſaid to *ſeak*. When ſhe ſleeps, ſhe is ſaid to *jouk*. From the time of exchanging her coat till ſhe turn white again, is called her *intermewing*. Treading is called *cawking*. When ſhe ſtretches one of her wings after her legs, and then the other, it is called *mantling*. Her dung is called *muting*: when ſhe mutes a good way from her, ſhe is ſaid to *ſlice*; and when ſhe does it directly down, inſtead of yerking backwards, ſhe is ſaid to *ſlime*; and if it be in drops, it is called *dropping*. When ſhe, as it were, ſneezes, it is called *ſniting*. When ſhe raiſes and ſhakes herſelf, ſhe is ſaid to *rouſe*. When after mantling ſhe croſſes her wings together over her back, ſhe is ſaid to *warble*.

When a hawk ſeizes, ſhe is ſaid to *bind*. When, after ſeizing, ſhe pulls off the feathers, ſhe is ſaid to *plume*. When ſhe raiſes a fowl aloft, and at length deſcends with it to the ground, it is called *truſſing*. When, being aloft, ſhe deſcends to ſtrike her prey, it is called *ſtooping*. When ſhe flies out too far from the game, ſhe is ſaid to *rake*. When, forſaking her proper game, ſhe flies at pyes, crows, &c., that chance to croſs her, it is called a *check*. When, miſſing the fowl, ſhe betakes herſelf to the next check, ſhe is ſaid to *fly on head*. The fowl or game ſhe flies at is called the *quarry*. The dead body of a fowl, killed by the hawk, is called a *pelt*. When ſhe flies away with the quarry, ſhe is ſaid to *carry*. When, in ſtooping, ſhe turns two or three times on the wing, to recover herſelf before ſhe ſeizes, it is called *canceliering*. When ſhe hits the prey, yet does not truſs it, it is called *ruff*. The making a hawk tame and gentle, is called *reclaiming*. The bringing her to endure company, *manning* her. An old ſtaunch hawk, uſed to fly and ſet example to a young one, is called a *make hawk*.

The reclaiming, manning, and bringing up a hawk to the ſport, are not eaſily brought to any preciſe ſet of rules. They conſiſt in a number of little practices and obſervances, calculated to familiarize the falconer to his bird, to procure the love thereof, &c. The principal hold and foundation which the falconer has to work upon, is the bird's ſtomach. This great principle of appetite he is to make uſe of a hundred ways, to lead the bird obliquely to what he would have from her: all he can do is, to divert nature, and make her ſubſervient to his purpoſes, to make it the intereſt of the bird, either real or apparent, to do what the falconer requires of her. The courſe, it is evident, will be different, according to the ſtate and condition of the bird to be managed. An *eyeſs*, *e. g.* needs no reclaiming; ſhe is to be carefully nurſed and brought up in her natural tameneſs.

A *brancher*, *ſoar-hawk*, or *ramage-hawk*, needs no nurſing; ſhe is to be brought down from her wildneſs, and habituated to another courſe of life; and in purſuance of her own views and intereſts, ſhe is to be made ſubject to thoſe of her maſter.

To reclaim, *e. g.* a *haggard-falcon*, they begin with ſhutting her up from the light, by pulling a hood over her eyes and fixing her by a *creanſe*, which makes her more acceſſible.

The next thing is to handle her frequently; taking her up, often ſtroaking her, ſetting her on the hand, and carrying her about; unhooding, and preſently hooding her again; and this for eight or nine days, without ever ſuffering her to ſleep.

All the while ſhe is to be kept ſharp ſet, but to be frequently fed with a little at a time, unhooding her for the purpoſe; and, when unhooded, the voice is to be continually uſed to her, that ſhe may learn it; and that the hearing of the voice may naturally put her in hopes of being fed. This done, ſhe is to be invited to come from the perch to the fiſt, by unſtriking her hood, ſhewing her ſome meat, uſing the voice, and calling her till ſhe come to it, and feed thereon. If ſhe ſtill refuſe, keep her ſharp ſet till ſhe will do it. Proceed then to bring her to the lure, by giving her to ſome perſon to hold, and calling her with a lure, well garniſhed with meat on both ſides, and give her a bit: uſe her to this for ſix or ſeven days; after which, tempt her to come gradually farther and farther off to the lure, waving it, and caſting it round your head, &c. and if ſhe comes to it roundly, reward her: in three or four days more call her to your lure, well garniſhed as above, as far as it is poſſible for her to ſee or hear you; and ſet her looſe from all her furniture.

The hawk thus manned, reclaimed, and lured, you may go with her into the fields, and whiſtle her off your fiſt, to ſee whether ſhe will take out, or not: if ſhe mount and fly round you in circles, as a good hawk ought to do, after two or three turns call to her with your voice, and fling out the lure about your head, and upon her ſtooping or coming to it, give her a chicken, or pigeon, and let her kill and feed thereon. Being thus far initiated, give her firſt ſtones every evening, to prepare her body for caſtings; and then caſtings, to cleanſe and ſcour her body, and make her eager. This courſe continue, till ſhe have endewed and muted enough to enter upon buſineſs.

If the hawk be intended for ſome particular ſort of game, let her lure be a reſemblance of that ſort of game; and make a practice of frequently feeding and rewarding her thereon, or on a train of the ſame kind; calling her, when feeding, as if ſhe were called to the lure. Add, that it may be proper to feed her in ſuch ſorts of places as thoſe her game is chiefly to be found in.

To *enter a hawk*, it may be convenient to take a well-quarried hawk, and let her ſtoop a fowl, on brook or plaſh; this done, reward, hood, and ſet her; and taking the young hawk, go half a bow-ſhot up the wind, looſe her hood, and ſoftly whiſtle her off the fiſt, till ſhe have rouſed, or muted; then let her fly with her head into the wind, and when ſhe is at a proper height, let go a fowl for her to ſtoop and truſs. See FALCONRY.

HAWKINS, *Sir* JOHN, in *Biography*, a ſucceſsful naval commander, was born at Plymouth in 1520. While very young he made ſeveral voyages to Spain, Portugal, and the Canaries, and being an obſervant and very intelligent youth, he acquired a fund of knowledge both maritime and commercial. He is ſaid to have been the firſt perſon who ſet on foot the infamous traffic in ſlaves, which at that period does not ſeem to have militated againſt the feelings of the moſt enlightened and humane of our countrymen. He fitted out a ſmall ſquadron, aſſiſted by ſeveral merchants, with which he ſailed to the coaſt of Guinea, where, partly by money, but chiefly by force, he obtained a cargo of three hundred blacks, whom he carried to Hiſpaniola, and ſold in a contraband traffic. Succeſs in one inſtance induced him to continue the ſame piratical, and kidnapping trade, which, to the honour of our country, has been now aboliſhed with all the indignation it merited. It is the apology of our commander, that ſo far from its being regarded as a ſtain on his humanity, he even bore the badge of theſe exploits in a creſt of arms granted him by patent, conſiſting of a "demi-moor in his proper colour, bound with a cord." In returning from a third expedition of this kind he was attacked and defeated by a Spaniſh fleet. After undergoing many hardſhips, he reached home in Jan. 1568; and, it is ſaid, that his ill-ſucceſs, in this inſtance, damped his ardour for maritime enterpriſe, which he reſigned to younger men, many of whom, particularly the renowned Drake, his kinſman, had been brought up under himſelf. In 1573 he was appointed treaſurer of the navy, and in a few months he had nearly loſt his life, by a wound from an enthuſiaſtical aſſaſſin, who miſtook him for another perſon. He was now conſulted on every important occaſion, and, in 1588, was appointed rear-admiral on board the Victory, to confront the famous ARMADA (which ſee). His conduct on this occaſion, obtained for him the high commendations of his illuſtrious queen, the honour of knighthood, and other important commands in the navy. He died in 1595, it is ſaid, of vexation, on account of an unſucceſsful attempt on the enemies poſſeſſions in the Weſt Indies, and in the Canaries. He was a good mathematician, and underſtood every thing that related to his profeſſion as a ſeaman. He poſſeſſed much perſonal courage, and had a preſence of mind that ſet him above fear, and which enabled him frequently to deliver himſelf, and others, out of the reach of the moſt imminent dangers: he had great ſagacity, and formed his plans ſo judiciouſly, and executed the orders committed to him with ſo much punctuality and accuracy, that he ever obtained the applauſe of his ſuperiors. He was ſubmiſſive to thoſe above him, and courteous to his inferiors, extremely affable to his ſeamen, and much beloved by them. He ſat twice in parliament as burgeſs for Plymouth, and once for ſome other borough. He erected an hoſpital at Chatham for the relief of diſabled and diſeaſed ſeamen, and is highly applauded by his contemporaries, and by hiſtorians, who lived after him. Mr. Evelyn, in his diſcourſe on medals, mentions his name with thoſe of others, moſt reſpectfully: "I go on," ſays he, "to enquire, but without much ſatisfaction, I confeſs, what medals were ſtamped from the reign and revolutions of our ſeventh and eighth Henries' time, to almoſt this age of our's. Had ſuch actions and events happened among the reſt of the poliſhed world, we ſhould not be now to ſeek for the heads of ſir Francis Drake, Cavendiſh, Hawkins, Frobiſher, Greenvil, Fenton, Willoughby, and the reſt of the Engliſh argonauts; and ſurely they that firſt encircled this globe of earth and ſea, might, at leaſt, be thought worthy the honour of a copper medal, which yet I no where find." Like the writers of the Biographia Britannica, to which the reader is referred for more particulars, we by this article endeavour to ſupply the want of a medal.

HAWKINS, *Sir* RICHARD, ſon of the preceding, was brought up to a maritime life, and in 1582, when very young, he had the command of a veſſel, in an expedition, under his uncle, to the Weſt Indies: he alſo commanded a ſhip in the action againſt the Spaniſh Armada, in which he was greatly diſtinguiſhed. About the year 1593, he ſailed with three ſhips, his own property, to the coaſt of Brazil, at the commencement of a much longer voyage; but he was obliged to burn one of his little ſquadron, another deſerted their commander, ſo that he was under the neceſſity of ſailing alone through the ſtraits of Magellan. To ſatiſfy the deſires of his men, he made prizes of ſome veſſels, which drew upon him the whole force of a Spaniſh ſquadron, to which he was compelled to yield. After a confinement of two years in Peru and the adjacent provinces, he was ſent back to Europe. He died in 1622, as he was attending, on buſineſs, the privy council. He left behind him a work of conſiderable value, which was printed and ready for publication; it is entitled "The Obſervations of ſir Richard Hawkins, knight, into the ſouth-ſea, A. D. 1593." From this piece, which the author dedicated to prince Charles, afterwards king Charles I., it appears that the iſſue of his voyage to the South-ſeas, his long confinement, and the diſaſters which naturally attended it, brought him into great diſtreſs. His nautical obſervations; his deſcription of the paſſage through the Straits of Magellan, and his remarks on the ſea-ſcurvy, and on the beſt methods of preſerving his men in health, were conſidered, at that period, of very great importance. He intended to have publiſhed a ſecond part of his Obſervations, in which he meant to have given an account of what happened to him and his companions, during their ſtay in Peru, and in Terra Firma, but which death prevented him from accompliſhing. It has been ſaid of ſir John and ſir Richard Hawkins by an eminent writer, "Had fortune been as propitious to them both, as their virtue, valour, and knowledge were eminent; they might have equalled the choiceſt worthies of any age." Biog. Brit.

HAWKINS, in *Geography*, a county of America, in Waſhington county, Teneſſee, watered by the Holſton and Clinch rivers, bounded N. by Virginia, E. by Waſhington and Sullivan counties, and containing 6563 inhabitants, including 811 ſlaves. Its chief town is Rogerſville.

HAWKINS *Iſland*, an iſland in the E. part of Prince William's ſound, above 20 miles in length, from S. W. to N. E. and from one to five in breadth. N. lat. 60° 28', to 60° 40'. E. long. 214° 10', to 214° 38'.

HAWKSHEAD, a market-town in the hundred of Lonſdale and county of Lancaſter, England, is ſituated in a vale near the lake of Eſtwaite, at the northern extremity of this county, where it projects between thoſe of Weſtmoreland and Cumberland. Being the principal town of the diſtrict called Furneſs-Fells, Hawkſhead is the centre where all the buſineſs is tranſacted, and the produce diſpoſed of: and though it has no ſtaple manufacture, or trade, yet, from the concurrence of local circumſtances, it has a conſiderable market, held on Monday, by a charter granted by James I. who, by the ſame grant, eſtabliſhed four annual fairs. The church, which was formerly a chapel under Dalton, was made parochial towards the cloſe of the ſixteenth century, by Dr. Edwin Sandys, archbiſhop of York, who was a native of this town; he alſo founded a free grammar-ſchool here, and endowed it with a revenue of 30*l.* per annum, which is now increaſed to upwards of 100*l.* One hundred boys are educated in this ſchool, which is held in high eſtimation. A neat town-houſe was lately built by ſubſcription, towards which ſeveral merchants of London, who had received their education in this ſchool, were the chief contributors. At Gallow-barrow, an adjoining village, is a charity-ſchool, endowed in 1717, by the will of the Rev. Thomas Sandys, curate of St. Martin-in-the-Fields, London, for the maintenance of poor boys born in this town, who are to be educated in the free-ſchool. Hawkſhead, in 1801, contained 160 houſes and 634 inhabitants. Near this town are the remains of a houſe where one or more monks, as repreſentative of the abbot of Furneſs, reſided, and performed divine ſervice and other parochial duties; over the gateway is a court-room where the abbot's temporal rights and juriſdictions were exerciſed by the bailiff of Hawkſhead. Cloſe's "Antiquities, &c. of Furneſs," 8vo.

HAWLBOULING, a ſmall iſland in the harbour of Cork, nearly oppoſite to the town of Cove, on which there has long been a ſmall fort, and which has lately been fixed upon as a naval depôt for ſupplying the men of war and other veſſels on the Iriſh ſtation with every kind of neceſſary. Large warehouſes have been built, and other works are in contemplation.

HAWLEY, a townſhip of America, in Hampſhire county, Maſſachuſetts, 120 miles W. of Boſton; containing 878 inhabitants.

HAWLING Way, is the ſame with Towing-*path*, which ſee.

HAWSE, or Hause, denotes the ſituation of the cable before the ſhip's ſtem, when ſhe is moored with two anchors out from forward; *viz.* one on the ſtarboard, and the other on the larboard bow. *Hawſe* denotes alſo any ſmall diſtance a-head of a ſhip, or between her head and the anchors employed to ride her.

Hawse, *Burning in the*, is when the cable endures an extraordinary ſtreſs.

Hawse, *Bold*, is when the holes are high above the water.

Hawse, *Clearing the*, is untwiſting of two cables, which being let out at different hawſes, are entangled or twiſted about one another, or directing the cables to their anchors, without lying athwart the ſtern.

Hawse, *Foul*, implies that the cables lie acroſs the ſtern, or bear upon each other, ſo as to be rubbed or chafed by the motion of the veſſel.

Hawse-*full*, or *to ride hawſe-full*, at ſea. See Ride.

Hawse, *Freſh the*. When there is reaſon to ſuſpect the cable may be fretted in thoſe holes, they veer out a little, to let another part endure the ſtreſs. This they call to *freſh the hawſe*.

Freſhing the hawſe is alſo uſed when new pieces are laid upon the cable in the hawſe.

Hawse, *Riding upon the*, is when any weighty ſubſtance lies acroſs, or falls directly before the hawſe.

Hawse-*pieces*, denote the foremoſt timbers of a ſhip, whoſe lower ends reſt upon the knuckle-timber, or the foremoſt of the cant timbers. They are generally parallel to the ſtem, having their upper ends ſometimes terminated by the lower part of the beak-head; and otherwiſe, by the top of the bow, particularly in ſmall ſhips and merchantmen.

Hawses, or *Hawſe-holes*, are two round holes under her head, through which the cables paſs when ſhe lies at anchor.

HAWSER, or Halser, belonging to a ſhip, is a rope conſiſting of three ſtrands; being a kind of little cable, ſerving for many uſes on board; as to faſten the main and fore ſhrouds, to warp a ſhip over a bar, &c.

HAW's Water, in *Geography*, a lake of England, in the county of Weſtmoreland.

HAWTHORN, or Haw, in *Botany*. See Cratægus.

Hawthorn, the common name of the thorn plant, which is uſually employed in the forming of new hedge-fences. It is, likewiſe, ſometimes denominated the white thorn. See Fence.

Hawthorn, *Black American*. See Viburnum.

HAY, in *Agriculture*, a term generally applied to any ſort of graſs that is cut by the ſcythe, and dried in the ſun, ſo as to be preſerved as a fodder for any kind of live-ſtock. The varieties of hay are very different according to the nature of the land from which they are produced, and the deſcriptions of graſs from which they are made. Thus we have upland, orchard, and meadow hay as well as clover, ſaintfoin, lucern, rye-graſs, tare, and other ſorts of artificial graſs hay. It is alſo ſometimes further diſtinguiſhed into ley hay, or that which is raiſed from the uplands; and into rouen or after-graſs hay, which is that made from the ſecond cut of graſs in ſome ſituations.

It is ſufficiently evident that hay muſt be poſſeſſed of very different properties and qualities, according to the nature and ſituation of the land from which it is cut, as well as the peculiarities of the graſſes, conſequently, capable of being applied to different purpoſes of feeding and fattening various ſorts of domeſtic animals.

That ſort of hay which is derived from the higher grounds, and that which is prepared from the different ſorts of artificial graſs crops, are ſuppoſed in general to be the moſt beneficial in the foddering of team-horſes, and labouring cattle ſtock of different kinds, as affording to them a more durable and permanent kind of nouriſhment, as well as giving them greater power and better wind. But the low meadow, marſh, orchard, and ſome other of the ſofter deſcriptions of hay, are, from their poſſeſſing ſuch qualities, better ſuited as a fodder for milch cows, and other kinds of neat-cattle, as well as ſuch horſes as are not much employed in team labour. The rouen or after-graſs hay, as poſſeſſing a ſtill more ſoft quality, is the beſt ſuited as a food for ſheep and lambs in the winter and early ſpring ſeaſons. In thoſe ſituations where lamb-ſuckling is had recourſe to, the greeneſt, and that which retains the largeſt proportion of juicy material, is invariably made uſe of as a fodder for the ſuckling ewes. It may, likewiſe, be employed for milch cows with advantage in moſt caſes.

All the ſorts of hay are in general much too expenſive to be uſed with advantage as a fodder for ſtore ſtock, except in mixture with ſome kind of ſtraw.

In the diſpoſal of hay many different methods are followed, but which are generally regulated by the peculiar cuſtoms of the different places and markets. The ſtone, yard, and load, are, however, by far the moſt common. The laſt is that which prevails in the markets of the metropolis, and the hay is univerſally bound up into what are termed truſſes, which ſhould weigh fifty-ſix pounds, thirty-ſix of which conſtitute a load, being in the whole about eighteen hundred weight, when the hay is taken from the ſtack; but when taken from the field, or at a ſhort period after being put into the ſtack, twenty hundred weight is commonly conſidered as the quantity for the load.

The beſt hay is generally that which is made in due ſeaſon, and without any rain falling upon it.

Hay, in *Rural Economy*, a term frequently made uſe of, in particular diſtricts, to ſignify a clipped hedge.

Hay-*band*, a ſort of twiſted rope, formed from the more coarſe and long hay, and which is made uſe of for the purpoſes of binding up the truſſes, in order to the hay being ſold in ſome places. From the above kind of outſide hay being employed, there is but little loſs ſuſtained in this cuſtom of binding hay in truſſes. This practice prevails on all the London markets. See Truss.

Hay-*barn*, a name applied to that ſort of barn which is conſtructed for the particular purpoſes of containing hay. Barns of this deſcription are for the moſt part formed of wood in a very open manner at the upper parts in order that air may be admitted with freedom. They are conſtantly without any ſort of bays in them. It has been ſtated in the Survey of Middleſex, that in the vicinity of Harrow, Hendon, and Finchley, in that diſtrict, there are many hay-barns capable of holding from thirty to fifty, and ſome even a hundred loads of hay, and that they are found to be extremely beneficial and convenient in ſuch hay-ſeaſons as are catching and unſettled, as well as in other caſes, in conſequence of the ſtate of the weather. In the very uſual caſe of rain approaching, where the hay is ready to be carried, it is common to exert every nerve in order to ſecure as much as poſſible, which, without doubt, is beſt effected by having all the carts loaded and drawn into the barns, unloading them as quickly as poſſible on to the mows, being there left in the graſs until a more leiſure period offers for ſpreading the hay out; as many of the carts as the time and ſtate of the weather will admit of being again loaded, and drawn a ſecond time into the barns on rain falling when thus ſecured no danger need be apprehended; as by merely ſhutting the doors, the hay is completely preſerved againſt all ſorts of moiſture. Where the weather continues improper for other buſineſs, the carts that are loaded in the barns can be conveniently emptied upon the mows, and the laſt properly trimmed and put into order by the workmen, who would otherwiſe be, perhaps, unemployed. Beſides, ſuch barns at other periods of the year, afford the means of cutting and truſſing the hay for the market or otherwiſe, operations which could not be executed at ſuch periods out of doors where the hay is in ſtacks.

It is ſtated that the farmers there contend that the hay may be put together earlier even by a day, where barns are employed, than it would be ſafe to have the work done under the ſtacking ſyſtem. But they recommend that the ſides of the mows ſhould be pulled ſo as to become perfectly clear of the quarterings of the barns. In this management they are of opinion, that the hay will be as good in the barns as in the ſtacks. And it is further ſuggeſted, on experience, that "in the *drieſt ſeaſons*, barns are a ſaving of four or five ſhillings an acre, and in *wet* ſeaſons, the ready aſſiſtance which they afford in ſpeedily ſecuring the hay, has been known to make a difference of *twenty ſhillings* a load, on a ſmall number of loads." The increaſing expence of ſtraw likewiſe renders theſe kinds of buildings ſtill more deſirable. In many of the more northern diſtricts, but little of the hay is placed in ſtacks in the open air; but in the ſouthern hay diſtricts, notwithſtanding the above, it is hinted that many ſuppoſe "that hay put into barns is apt to be duſty on the ſides next the boards; and that, from the ſmallneſs of the quantity put together, it has too much outſide, and is conſequently ſubject to be over dry. That in this caſe it ſhould be ſold before Lady-day." It is, however, ſuggeſted by the author of the Survey of Middleſex, that theſe objections "are in a great meaſure unfounded. The ſecond can certainly only happen where the barns are too ſmall; and as to the others, he can anſwer that he has had three barns at a time full of hay: the boards and quarterings were ſwept clean immediately before depoſiting it; they were filled completely; and he had the hay trodden down as much as poſſible. The ſides of the mows were neither raked nor pulled, as he was of opinion that ſuch a meaſure would be an unneceſſary loſs of room. When this hay came to be bound out, the whole was found to be perfectly free from duſt, of good ſmell and colour, and ſold at as high a price as the beſt hay from the ſtack-yard. The ſmell of ſuch of the hay as lay againſt the weather boarding, muſt however be excepted, on the ſhady ſides of the barn, but even that was confined to the ſurface; it was without duſt, and no way injured in its colour. It was all made without receiving any rain, and that which was the leaſt prepared was put into the barns." The ſtacking of hay in the open air is, however, the practice which is the moſt predominant in the whole of the vicinity of the metropolis, where probably the beſt hay in the kingdom is met with. See BARN.

HAY-*binder*, a name applied to the perſon who is employed in binding up hay into truſſes for the market. Work of this ſort is moſtly performed by the load, the price of which varies conſiderably, being in ſome places 2*s.* in others, 2*s.* 6*d.* and occaſionally 3*s.* or more.

HAY-*binding*, the art or practice of tying up hay into truſſes of equal weights. This is a ſort of farm work, at which the labourer is capable of making much better wages than in moſt other kinds, and this alſo at a ſeaſon when other ſorts of workmen generally get the leaſt, as in the winter months. There are, however, not many that turn themſelves to this ſort of employment, and ſtill fewer who are capable of executing it in a proper manner. Such workmen as are expert in the buſineſs, are capable of judging by the appearance of the truſs, and the balancing of it in the hand, when it is of proper weight, frequently without having the neceſſity of making uſe of the ſteel yards; conſequently when they have opened their ſtacks, and cut out a few loads from the top, which is conſtantly the leaſt weighty, the work proceeds with great diſpatch, one perſon being employed in cutting, and the other in binding up the truſſes. It is beſt, however, conſtantly to weigh the truſſes. In caſes where the hay is good, and has ſuffered no injury from wet, or from heating in the ſtack, there is ſcarcely a particle loſt in the binding. The looſe locks are put in the middle of the truſs, ſo that it may have the more ſightly appearance on the outward ſurface; and the bands are made with the hay, there being a penalty inflicted by the act of parliament on the uſe of ſtraw bands. It is invariably the cuſtom for the binder to find the ſteel-yards, and the other implements that are required in performing the work.

The practice of binding hay is ſo neat, convenient, and economical a plan, that it ſhould be much more generally had recourſe to by farmers. See HAY.

HAY-*bote*, an ancient term applied to a ſort of feudal right, by which a tenant for life, or a term of years, has a liberty of taking buſhes, wood, &c. for the repairing of fences, gates, and other ſimilar uſes. It likewiſe ſignifies the liberty of cutting wood for making rake and fork handles, which are uſed in making hay and other fodder for cattle.

HAY-*brining*, or *Salting of*, the mode of ſprinkling hay with ſalt, in order to make it keep better, and render it more freely eaten by live ſtock. See SALTING *of Hay*.

HAY-*fork*, the name of the ſmall fork which is uſed in making hay, and pitching it to the cart, mow, ſtack, &c. In the firſt of theſe intentions the tines or prongs need not have any great length, but in the latter they ſhould have conſiderable length, and have a gentle curving inclination forward, in order that the hay may be taken up and held more perfectly by them.

HAY, *Burgundian*. See MEDICAGO.

HAY-*knife*, the name of a ſharp inſtrument made uſe of in cutting hay out of the ſtack or mow. This tool ſhould conſtantly be kept perfectly free from ruſt, and as ſharp as poſſible. An improvement is aſſerted to have been made in this implement by having it conſtructed in ſome manner in the form of the common garden ſpade, the edges being well ſteeled and rendered perfectly ſharp. In uſing this inſtrument, the workman cuts directly downwards, inſtead of that of the oblique direction, as is the caſe in employing the old tool.

HAY, *Laying up of*, the art of putting hay together in ſtacks, mows, or other forms, ſo as to preſerve it for future uſe. See STACKING *of Hay*, and STACK.

HAY-*maker*, a labourer or any other perſon who is employed in the work of converting cut graſs into hay. Such perſons as are engaged in this ſort of buſineſs, ſhould conſtantly, in order to execute it in a proper manner, be perfectly acquainted with the various operations and proceſſes which are neceſſary to be had recourſe to, ſuch as thoſe of ſpreading out, raking, tedding, turning, cocking, &c.; as where labourers who are unacquainted with theſe are provided, the proprietor muſt conſtantly ſuſtain great diſadvantage in conſequence of ſuch operations being performed in an improper manner. Beſides, there is much loſs in the quantity of work that is done.

It has been ſtated, that in Middleſex, as ſoon as the graſs appears nearly in a proper condition for being cut down, the farmers endeavour to procure the beſt mowers that can be had, in number proportioned to the extent of the crops, and the length of time they ſhould be under hand, after which, they are let out to be mown by the acre as piece work; each mower cutting from an acre and a half, to an acre and three quarters per day; and there are ſome who are capable of mowing two acres per day through the whole of the ſeaſon. It is uſual for theſe labourers to begin their work at three, four, or five o'clock in the morning, and continue their work till ſeven or eight at night, reſting an hour or two in the middle of the day, while the power of the ſun is the moſt conſiderable.

About the ſame period, five haymakers, conſiſting generally of a mixture of men and women, including loaders, pitchers, ſtackers, &c. are provided. Theſe are commonly paid by the day, the men attending from ſix in the morning to the ſame hour in the evening, but the women only from about eight in the morning to ſix in the evening. It is uſual for any extra diſpatch, for them to receive an additional allowance.

It is the univerſal cuſtom, that each hay-maker ſhould come provided with a fork, and moſtly a rake of his own; but it occaſionally happens when much of the graſs is ready, and labourers are ſcarce, that the farmer is under the neceſſity of providing both, though more generally the rake only. In the execution of the work, every part is carried on by means of forks, except that of clearing the ground, which is of courſe performed by rakes, and the loading the carts, which is done by hand labour. See Hay-*making*.

Hay-*making*, the art or operations by which cut graſs is converted into the ſtate of hay. In the execution of this kind of buſineſs, it is conſtantly neceſſary to have a regard to the nature of the graſs, the ſtate of the ſeaſon, and the ſituation of the ground on which it is grown. It is obvious that, in all deſcriptions of ſeaſons, ſuch graſs crops as are of the more dry and leſs juicy kinds, and where the expoſures are high and open, will require much leſs time in the proceſs of forming them into hay, than under the contrary circumſtances.

As hay is an article of food, which is not only of great conſequence to the farmer, from its being one of the principal products of land, as well as the chief fodder of moſt ſorts of live ſtock, but as that upon which their health and condition very greatly depends, it is natural to ſuppoſe that under ſuch circumſtances, experiments would have been made, and a proper attention have been beſtowed, in order to introduce a regular ſyſtem of management. But it muſt be confeſſed, that in various diſtricts of the kingdom, not any attention of this ſort has been paid to the ſubject, and that the mode of management, particularly in ſeveral of the more northern parts, is indeed extremely ſlovenly, and very badly calculated to preſerve and ſecure in the beſt ſtate of perfection, that flavour, and thoſe qualities which are indiſpenſible, in order to render hay and every other ſort of dried herbage valuable as cattle fodders.

It is ſuggeſted in an uſeful and periodical work upon this ſubject, that "the firſt conſideration in the treatment of hay is, the period at which the graſs ſhould be cut, and the weather moſt proper for that operation." And that, as "the time moſt proper for cutting the different kinds of grain, together with every ſtep of the after-management, are points well underſtood, and for the moſt part ſtrictly obſerved; every farmer, being ſenſible that any neglect of, or deviation from theſe rules will, by impairing the quality of both the grain and ſtraw, be productive of much trouble and loſs to himſelf, it is ſomewhat extraordinary, that the ſame kind of reaſoning ſhould not have been applied to the management of hay; as any diminution of its value, ariſing from improper treatment, muſt be equally prejudicial both to the grower and conſumer of that article, as to the grower and conſumer of grain."

It is ſtated that "the practice of many farmers in North Britain is to allow their hay, not only to attain its ultimate growth, but even to make ſome progreſs towards decay, before it is cut: To obtain a bulky crop being their chief object, every other conſideration is diſregarded; and neither the period of growth at which the cutting ought to commence, the weather moſt proper for that operation, nor indeed any ſtep of the after-management, are regulated by fixed rules. In place of cutting the crop during dry weather, and when it is free from every other but its own natural moiſture, it is very often cut in a wet ſtate, and on that account muſt remain in the ſwath a conſiderable time before it is fit for being put into cocks; during which, it requires to be frequently turned and expoſed to the ſun and atmoſphere, for the purpoſe of drying it: in that way, a conſiderable proportion of its natural juices is diſſipated; and, by the time it is dry enough for putting into the ſtack, it has loſt not only its flavour, but a great part of its moſt valuable properties; an evil that is farther increaſed, if much rain happen to fall either immediately after the cutting, or at any period before it is put into cocks: in that caſe, a ſtill greater loſs of its nouriſhing properties, and a conſequent diminution of its value, muſt happen." Hence "the conſequences of this management are felt in a variety of ſhapes, in every diſtrict where it prevails. In the lower diſtricts, the miſchief is comparatively ſmall, owing to the mildneſs of the winters, the great quantity of rich foggage every where to be met with, and the abundance of corn-ſtraw, and other wholeſome articles of food, with which theſe parts abound.

"In the hilly and upland diſtricts, however, the caſe is very different; and the loſs ariſing from the neglect and miſmanagement of their hay is great, almoſt beyond calculation. In theſe elevated regions, the winters are, for the moſt part, of uncommon length and ſeverity; little ſtraw is produced; ſown graſſes, turnips, and potatoes, are equally ſcarce. In that way, the chief dependence of the farmer, for winter-food to his ſtock, falls upon the hay, which, when the quality is bad, and other articles ſcarce, induces debility and diſeaſe to ſuch a degree, that a great part of the ſtock either die, or are reduced to a ſtate of extreme weakneſs during the winter; and when the ſpring arrives, the green food has ſuch an effect upon the bowels of thoſe who have ſurvived, that many of them die alſo." Further, "the greateſt part of the hay grown in theſe parts is the produce of the wet ſwampy grounds, and the plants, of which it conſiſts, are of a nature that requires much judgment and attention to cure, in ſuch a manner, as to unite every advantage that might be expected from their uſe." In reſpect to the period moſt proper for cutting hay, "experience proves, that the greateſt perfection of the herbage is met with, either immediately before it comes into flower, or as ſoon as the firſt flowers blow. At that period, it is in no ſhape exhauſted, either by blowing a multitude of flowers, or forming ſeeds, and contains all the uſeful qualities of which its nature is capable. After that period, it daily diminiſhes in value, becomes tough, ſapleſs, and unpalatable, and is not chewed without conſiderable difficulty. This rule applies to every ſpecies of herbage that is meant to be dried for winter food; but to coarſe hay, the produce of wet or marſhy grounds, it is ſtrongly applicable; for moſt of the plants which grow in theſe ſituations, when they are in full vigour, are as tender, and contain perhaps as great a proportion of nouriſhing juices, as any other deſcription of hay; and, when cut at that ſtage, and properly managed afterwards, form a valuable article of food both for ſheep and cattle; but when the cutting is delayed, as indeed it very often is, till an advanced period of the ſeaſon, when the plants have not only reached their ultimate growth, but begin to decay, this deſcription of herbage becomes at once the coarſeſt and leaſt nouriſhing of all food." And it is contended, that, "this opinion does not proceed upon theory, but upon the ſolid ground of experiments carefully made upon many different kinds of herbage, at different periods of their growth, the reſult of which eſtabliſhes a fact that cannot be too generally known, *viz.* that plants of all ſorts, if they are cut when in full vigour, and afterwards carefully dried, without any waſte of their natural juices, either by bleaching with rain, or exhalation, contain, weight for weight, a quantity of nouriſhing matter nearly double what they do, when allowed to attain their full growth, and make ſome progreſs towards decay." It is conſequently concluded, that graſs "of all kinds ſhould certainly be cut at the period mentioned, and, if poſſible, during dry weather."

In further confirmation of the truth of this opinion, it is ſtated in the Survey of Perthſhire, that, "as the great object in making hay is that of preſerving as much of the natural ſap as poſſible, the proper time for cutting is, when the crop of graſs has attained its higheſt degree of perfection; when the plants are in full blow, and before their flowers begin to fade. If cut too green, the hay ſhrivels and loſes much of its bulk; if allowed to ſtand till the ſeeds are ripe, the ſtem becomes hard and wiry, the roots loſe much of their natural ſap, the aftermath is leſs abundant, and the principal part of the hay is in danger of crumbling away into ſhort ſtumps, under the various operations which it muſt undergo. Better to be too ſoon than too late; eſpecially if the crop be heavy and in danger of lodging."

And with clover, that "the beſt time for cutting it is, when the flowers are all fully blown, and the earlieſt begin to turn brown. If allowed to ſtand longer, the roots of the ſtalks loſe their leaves, and become hard and ſticky; and the plant is ſo much exhauſted, that it takes a long time before it ſend up new ſhoots." See CLOVER.

Hence it is clear, that in converting cut graſs into hay, the great art conſiſts in rendering it ſufficiently dry to prevent its taking on too great a degree of heat in the ſtack or mow, and at the ſame time preſerving as great a portion of the natural juices of the plants, as the proceſs is capable of admitting of without danger. Where this medium can be attained in the moſt exact manner, the beſt and moſt nutritious hay will be produced; but it is a point of great difficulty, and which requires a great deal of care and attention in order to its attainment; the great danger in fine ſeaſons being that of not making it in a ſufficient manner, while in thoſe of the contrary deſcription, it is liable to be made in too high a degree, as is abundantly ſhown by the inconveniences which are often ſuſtained from the heating of the ricks in the former caſes, while it is ſeldom or never experienced in the latter.

It has been uſefully ſuggeſted in the excellent Survey of the County of Middleſex, after noticing the advantages of attending to the properties of the ſoil and the herbage it affords, in the proceſs of making hay, that "the hard benty hay of a poor ſoil, as it is in little or no danger of heating too much in the ſtack, ſhould, therefore, be put very early together, in order to promote a conſiderable ſweating, as the only means of imparting a flavour to it, which will make it agreeable to horſes and lean cattle, as it will be nearly unfit for every other ſort of ſtock. It is the ſucculent herbage of rich land, or land highly manured, that is moſt likely to generate too great a degree of heat: of courſe, graſs from ſuch land ſhould have more time allowed in making it into hay. In moderately hot ſeaſons, the proper point of drying may be eaſily judged of; but when they are very hot and ſcorching, it is eaſy to be miſtaken; as, in ſuch weather, the graſs becomes criſp, ruſtles, and handles like hay, before the moiſture or ſap is ſufficiently diſſipated for it to be in a ſtate fit to be laid up in large ſtacks. If that, however, be done when it is thus inſufficiently made, it moſtly heats too much, becoming mow-burnt in ſome caſes." And further that another point, which is often of much difficulty in the execution, but of much conſequence, is that of "carrying the whole of the hay juſt at the moment it is ſufficiently made; which is neceſſary, in order to its yielding the greateſt poſſible weight, and preſerving its beſt quality; as every minute after that preciſe time it continues to loſe, both in weight and in its nutritious properties, by evaporation." Even the difference of an hour, in a very hot drying day, is ſuppoſed to occaſion a loſs of 15 or 20 per cent. on the hay, by its being carried beyond the point of perfection, and frequently even a greater loſs is ſuſtained."

It is ſtated in the ſame intelligent work, that this branch of the rural art has, by the farmers of that county, been brought to a degree of perfection altogether unequalled by any other part of the kingdom. The neat huſbandry, and ſuperior ſkill and management, that are ſo much, and juſtly, admired in the *arable* farmers of the beſt cultivated diſtricts, may, with equal juſtice and propriety, be ſaid to belong, in a very eminent degree, to the hay-farmers of Middleſex: for, by them, may very fairly be claimed the merit of having reduced the art of making good hay to a regular ſyſtem; which, after having ſtood the teſt of long practice and experience, is found to be attended with the moſt deſirable ſucceſs. Even in the moſt unfavourable weather, the hay, made according to the Middleſex manner, is ſuperior to that made by any other method, under ſimilar circumſtances. It is to be regretted, that this very excellent practice has not yet, except in a very few inſtances, travelled beyond the borders of the county. But as it moſt juſtly deſerves the attention and imitation of farmers in other diſtricts, he ſhall, for their information, endeavour minutely to deſcribe the method in which the Middleſex farmers make their hay." And, "in order that the ſubject may be more clearly underſtood, he ſhall relate the particular operations of each day, during the whole proceſs, from the moment in which the mower firſt applies his ſcythe, to that in which the hay is ſecured, either in the barn or in the ſtack."

"*Firſt-day.*—All the graſs mown before nine o'clock in the morning, is tedded (or ſpread), and great care taken to ſhake it out of every lump, and to ſtrew it evenly over all the ground. Soon afterwards it is turned, with the ſame degree of care and attention; and if, from the number of hands, they are able to turn the whole again, they do ſo, or at leaſt as much of it as they can, till twelve or one o'clock, at which time they dine. The firſt thing to be done after dinner is, to rake it into what are called ſingle windrows, that is, they all rake in ſuch a manner, as that each perſon makes a row, which rows are three or four feet apart; and the laſt operation of this day is to put it into graſs-cocks.

“ *Second day.*—The buſineſs of this day commences with tedding all the graſs that was mown the firſt day after nine o'clock, and all that was mown this day before nine o'clock. Next, the graſs-cocks are to be well ſhaken out into ſtaddles (or ſeparate plats), of five or ſix yards diameter. If the crop ſhould be ſo thin and light as to leave the ſpaces between theſe ſtaddles rather large, ſuch ſpaces muſt be immediately raked clean, and the rakings mixed with the other hay, in order to its all drying of an uniform colour. The next buſineſs is to turn the ſtaddles, and, after that, to turn the graſs, that was tedded in the firſt part of the morning, once or twice, in the manner deſcribed for the firſt day. This ſhould all be done before twelve or one o'clock, ſo that the whole may lie to dry, while the work-people are at dinner. After dinner, the firſt thing to be done is, to rake the ſtaddles into double windrows; in doing which, every two perſons rake the hay in oppoſite directions, or towards each other, and by that means form a row between them of double the ſize of a ſingle windrow. Each of theſe double windrows are about ſix or eight feet diſtant from each other; next, to rake the graſs into ſingle windrows; then the double windrows are put into baſtard-cocks; and laſtly, the ſingle windrows are put into graſs-cocks. This completes the work of the ſecond day.

“ *Third day.*—The graſs mown and not ſpread on the ſecond day, and alſo that mown in the early part of this day, is firſt to be tedded in the morning; and then the graſs-cocks are to be ſpread into ſtaddles, as before, and the baſtard-cocks into ſtaddles of leſs extent. Theſe leſſer ſtaddles, though laſt ſpread, are firſt turned, then thoſe which were in graſs-cocks; and next the graſs is turned once or twice before twelve or one o'clock, when the people go to dinner as uſual. If the weather has proved ſunny and fine, the hay, which was laſt night in baſtard-cocks, will this afternoon be in a proper ſtate to be carried, as it ſeldom happens in dry weather but that it may be carried on the third day; but if the weather ſhould, on the contrary, have been cool and cloudy, no part of it probably will be fit to carry. In that caſe, the firſt thing ſet about after dinner is, to rake that which was in graſs-cocks laſt night into double windrows; then the graſs which was this morning ſpread from the ſwaths, into ſingle windrows. After this, the hay which was laſt night in baſtard cocks is made up into full-ſized cocks, and care taken to rake the hay up clean, and alſo to put the rakings upon the top of each cock. Next, the double windrows are put into baſtard cocks, and the ſingle windrows into graſs-cocks, as on the preceding days.

“ *Fourth day.*—On this day the great cocks, juſt mentioned, are uſually carried before dinner. The other operations of the day are ſuch, and in the ſame order, as before deſcribed, and are continued daily until the hay-harveſt is completed.”

The writer farther ſtates, that “ in the courſe of hay-making, the graſs ſhould, as much as poſſible, be protected, both day and night, againſt rain and dew, by cocking. Care ſhould alſo be taken to proportion the number of hay-makers to that of the mowers, ſo that there may not be more graſs in hand, at one time, than can be managed according to the foregoing proceſs. This proportion is about twenty hay-makers (of which number twelve may be women) to four mowers: the latter are ſometimes taken half a day, to aſſiſt the former. But in hot, windy, or very dry weather, a greater proportion of hay-makers will be required, than when the weather is cloudy and cool.

“ It is particularly neceſſary to guard againſt ſpreading more hay than the number of hands can get into cock the ſame day, or before rain. In ſhowery and uncertain weather, the graſs may ſometimes be ſuffered to lie three, four, or even five, days in ſwath. But before it has lain long enough to become yellow (which, if ſuffered to lie long, would be the caſe), particular care ſhould be taken to turn the ſwaths with the heads of the rakes. In this ſtate it will cure ſo much in about two days, as only to require being tedded a few hours, when the weather is fine, previous to its being put together and carried. In this manner, hay may be made and ſtacked at a ſmall expence, and of a good colour; but the tops and bottoms of the graſs are inſufficiently ſeparated by it.”

And the following is another method which has been adviſed for making hay in ſuch ſeaſons as are unfavourable to that buſineſs: this is, the firſt fine day that comes, to break out what graſs is cut, turn it, windrow it, and get it into ſmall cocks: the next fine day, as ſoon as the ground is dry, to break a few cocks out at a time, and keep them continually moving till they are quite dry; to put three or four of them into one cock. To proceed in this manner till they have been all broke out, and ſerved as above; and, ſhould the weather ſtill continue unfavourable for hay-making, never to venture to break thoſe cocks out again, but to take every opportunity of lightening them up with forks, to let the wind and air draw through them. This plan was purſued in the wet ſummer 1781, and by that means more good hay was made by the farmer who employed it that year, than by any perſon in the neighbourhood where he lived at the time. And he is thoroughly convinced, that graſs, cut full of ſap, is not likely to receive much damage from ſmall ſhowers of rain, till it is nearly made into hay; and, on the other hand, graſs cut when the bents are quite ripe, is liable to be damaged by every trifling ſhower that falls. When the graſs is thin, or ſtands to be quite ripe, it has been known to be only juſt broke out, raked together, cocked, and the next day put into a rick, without its being over-heated, or any way injured by ſuch haſty proceedings: were they to give ſuch hay much making, it is ſuppoſed that it would never ſettle in the rick.

In “ diſtricts where the hay ſeaſon is later, and the weather more changeable, it would often, it is ſuppoſed by Mr. Donaldſon, be dangerous to expoſe the hay ſo much abroad as in the firſt of the above proceſſes: a more cautious method ſhould be adopted. In ſuch caſes, inſtead of keeping the hay almoſt conſtantly ſpread out and expoſed to the atmoſphere, as in the preceding method, it may be better to put it into ſmall cocks ſoon after it has been cut down and become a little made; theſe ſhould then be frequently turned over, but not ſpread out, except when the weather is in ſuch a fine ſtate as to inſure their being put up again in the ſame ſtate, without injury from the falling of rain. But this mode is much more ſlow, though the hay is leſs expoſed to danger in wet weather, than in that; and, when there is much heat, it may be made with little trouble or expence, and without much expenditure of the nutritious juices which it contains.”

However, on the Middleſex method of hay-making, Mr. Bucknall obſerves, that "by the regular method of tedding graſs for hay, the hay will be of a more valuable quality, heat more equally in the ſtack, conſequently not ſo liable to damage, or fire: will be of greater quantity, when cut into truſſes, and ſell at a better price; for when the graſs is ſuffered to lie a day or two before it is tedded out of the ſwath, the upper ſurface is ſo dried by the ſun and winds, and the interior part is not dried, but withered; ſo that the herbs loſe much, both as to quality and quantity, which are very material circumſtances, at the price hay now fetches at market. An inſtance in point is, the phyſic-gardeners, who attend to their buſineſs, are very careful in the proper and equally drying their herbs, and they find their account in it."

It is ſuggeſted in a periodical work, that, "in place of being ſuffered to remain in the ſwath for ſome days, as is commonly done, women, with forks or rakes, ſhould follow the cutters, and ſpread it in ſuch a manner as to allow the ſun and air free acceſs to the whole. If this operation is properly performed, and the weather favourable, the hay that was cut in the morning will be ready to be put into ſmall cocks by mid-day, where it may remain for two or three days; and, at the end of which, if the weather is dry, they may be thrown down early in the morning, and, after being expoſed to the ſun and atmoſphere for a few hours, put up into ricks of at leaſt forty or fifty ſtones each, where it may remain with perfect ſafety, till it is convenient to ſtack it. By ſuch treatment, every valuable quality is preſerved, the hay is of a fine green colour, and poſſeſſes ſo agreeable a flavour, that the animals eat it with the greateſt reliſh. Before ſtacking, ſome attention will be neceſſary to render the whole as uniformly dry as poſſible, eſpecially if much rain has fallen, and the wind continued for any conſiderable time in one quarter after the hay has been put into ricks: when that is the caſe, one ſide will be found damp, while that which is expoſed to the wind is perfectly dry: the remedy conſiſts in turning the ricks round, which is done with great eaſe, by placing ſix or eight people, at equal diſtances, round the rick, with directions to thruſt their hands as far as they can under the bottom, at the ſame time graſping a handful of the hay: when the whole are ready, let them lift at once, and move round in the direction intended, till the damp ſide is oppoſed to the wind: in that way ricks of fifty or ſixty ſtones may be turned with eaſe and expedition, and the whole rendered uniformly dry in a ſhort time."

From the preſerving hay of a proper green colour being a point of ſome importance, it is neceſſary, in order to effect it, that the baſtard-cocks, previous to their being carried, ſhould be put up in the heat of the day, and remain in that condition till the following morning, when they may be turned and opened, ſo as to diſpel any damp that might induce it to heat in the ſtack, and in that way injure the colour. It is found that the acquiſition of a lightiſh brown colour in the ſtack is not injurious to hay; but where it becomes of a *dark* brown, from too much heat, it is ſaid to weaken and relax horſes that are fed upon it, by its powerful diuretic quality, conſequently to be of inferior value when expoſed at the market for ſale.

In Yorkſhire, according to Mr. Marſhall's account of "the beſt practice of that diſtrict, the graſs, in fine weather, is tedded after the mowers; or, in ſhowery weather, as ſoon as a fair opportunity offers. In the evening, unleſs due confidence can be placed in the weather, it is put into cocklets, provincially "hipples," made in different ways; ſome being ſet up hollow with the foot and the head of the rake; others, in the common way, with forks. As the hay has advanced in dryneſs, the hipples are increaſed in ſize.

"Where a fair opportunity offers, and the graſs is perfectly dry, the hipples are *ſundered;* that is, broken out into beds in the uſual manner, turned, and again got up into cocklets, of ſuch ſize as the ſtate of dryneſs requires. When ſufficiently dry, the hay is made into well-ſized cocks, namely, about eight or ten to the load.

"When the crop is intended to be ſtacked on the piece it grew on, the firſt made part generally ſtands in theſe cocks, until the whole, or the principal part of the remainder, be ready for the ſtack; which, by this means, is never expoſed abroad in its firſt ſtage, a circumſtance, however, which is too commonly ſuffered by leſs judicious hay-farmers."

But it is ſuppoſed, by a late philoſophical writer, that if the ſwath of mown graſs be turned over only *once* in the day, for three or four ſucceſſive days, the interior part of it will, in a manner, be dried in the ſhade; and, if it were ſpread over the ground for a few hours in the day, the hay would become dry enough for ſtacking. At night the forming the graſs into ſmall cocks is adviſed, particularly in damp weather, in order to ſecure it from being injured by the ſlime and excrements of the very numerous worms that riſe to the ſurface of the ground during moiſt warm nights. With this view, the cocks are to be made as high in proportion to their baſe as poſſible, that a ſmall ſurface may come in contact with the ground, while a broader top is expoſed to the air, and conſequently the exhalation of moiſture from the hay is promoted; while it is, at the ſame time, ſecured from accidental ſhowers. And, in wet weather, he is of opinion that it is beſt to turn the ſwaths every day, or every ſecond day, or to form them into ſmall cocks, with the view of ſheltering the whole from injury by long continued rains; and alſo of preventing the parts next the ground, as well as in the middle, from fermenting. But that when the weather is more favourable, the hay ſhould be made into large cocks, for the more ſpeedy exhalation of moiſture by the action of the air; while an incipient fermentation will evolve or diſcharge a portion of heat, and thus promote the drying of the hay, by increaſing the evaporation of the humid particles.

In making hay from the graſs of watered meadows, Mr. Boſwell directs, that a *confidential* perſon follow the mowers, ready to ted the graſs immediately after it is cut, in which ſtate it may remain all the firſt day. And, on the following morning, as ſoon as the dew is evaporated, it ſhould be repeatedly turned, and formed into ſmall cocks, the trenches and drains being raked clean out. The next day it is again tedded, and raked nearer together; the graſs occupying a leſs ſpace of ground in proportion as it withers: it is afterwards repeatedly turned in the courſe of the day, and, long before night, formed into *whales* or rows, afterwards into large cocks, and the ground again raked around them. On the ſucceeding day, theſe cocks are again ſpread and turned; when, if they be not ſufficiently dry, they are put into ſtill larger cocks; and, the following day they may be opened, and the graſs, after being turned, carried to the ſtacks in the yards.

It is evident, that the expences of making hay muſt be liable to much variation in different ſituations and circumſtances, in proportion as labourers are more ſcarce or plentiful, and as the ſeaſon may be fine or the contrary. In the beſt hay diſtricts in the county of Middleſex, they were ſome years ſince ſtated as below:

Hay-making Expences per Acre.

	£.	*s.*	*d.*
Mowing 3*s*. beer 6*d*. - - -	0	3	6
Making and ſtacking - - -	0	9	6
Pulling the ſtack, and laying the hay pulled out upon the ſtack - - -	0	0	6
Horſes, harneſs, and carts - - -	0	2	0
Straw for thatch 3*s*. thatcher and labourer 6*d*.	0	3	6
Total expence per acre in the ſtack-yard,	19 or 20*s*.		

At preſent it is more than double the ſum.

But it is obſerved, that " if the hay be put into barns, the laſt charge of 3*s*. 6*d*. will not, of courſe, be incurred; moſt of the third, and part of the ſecond, will alſo be ſaved; ſo that the whole expence in this caſe will not exceed 15*s*. per acre."

The nature of almoſt all ſorts of artificial graſſes, plainly ſhows, that, in making them into hay, the great object ſhould be that of preſerving their leaves or ſoliage as much as poſſible, as, upon this being done, much of their excellence depends. And of courſe, in order to effect it in the moſt perfect manner, a ſomewhat different practice ſhould be employed to that which is followed with the natural graſſes. After the crops have been cut down, they ſhould undergo much leſs making than with common hay, as too frequent ſtirring breaks off and diſplaces the leaves too much; by which great loſs is ſuſtained in their being left upon the ground. And as " clover begins to form its head for bloom towards the middle of June, and will continue in a growing ſtate till it becomes in full bloſſom: at which time it is in the higheſt perfection to mow for hay; and this graſs differs in this particular from ſaintfoin, that when its bloſſoms are fully expanded, they continue much longer in that ſtate than that graſs; ſo that if the weather ſhould prove wet and unkindly for the haying, the clovers will wait a fortnight after they become in bloſſom without ſuſtaining any material injury, either by the ſhedding of the leaf or bloom; for the ſame weather which renders it improper to mow this graſs, continues it in a growing ſtate, and prevents the bloſſom from dying away." Therefore " where the crops of clover are large and heavy, it is neceſſary that the ſwaths ſhould be turned over at the making, the ſtalks of this graſs being very replete with juices. This may be done the next day after the mowing, or the ſecond day after, as the weather is more or leſs favourable, obſerving that, as the chief virtue of this hay reſides in the leaf and bloſſom, the leſs they are diſturbed the more valuable will be the fodder: on which account the tedding of this hay abroad, as is practiſed by ſome people, cannot fail to be of the greateſt injury. From the windrows, it ſhould be made up into graſs-cocks, which, having enjoyed the influence of the ſun and air for a day or two, may be thrown into large cocks for carting. But, if wet weather prevail during the ſeaſon for making this hay, it cauſes an infinite deal of trouble to the farmer; and the clover, from having been frequently ſhaken abroad, is deprived of its moſt nutritious particles, namely, the bloſſom and the leaf."

In the Survey of the County of Perth it is ſtated, that, " in making hay of clover and ryegraſs, ſome farmers adviſe to allow the hay to lie in the ſwath for two or three days; and after the ſuperfluous moiſture and dew are evaporated, in a dry day, either to ted it a little or turn the ſwaths, and in the afternoon to make it up into ſmall cocks, ſuitable to the ſtate of the hay. The only objection to this management is, that the hay on the ſurface of the ſwath is apt to be blanched by the weather, the juices exhaled by the ſun, and the flavour of the hay leſſened. This diſadvantage is, in a great meaſure, only imaginary; becauſe, after the hay has lain a day or two in the cocks, the whole becomes ſo much alike, that the expoſed part can ſcarcely, if at all, be diſtinguiſhed from that which was in the bottom of the ſwath. The dried part imbibes the juices of the moiſt, and the moiſt is kept open and more acceſſible to the air by means of the dry." But " the practice of others is, to cut down their hay in a dry day, and in the afternoon of the ſame day to make up their hay into ſmall cocks, by which means the whole juices are preſerved, and the damage of blanching completely obviated. The objections to this mode are, that it occaſions unneceſſary labour; that, if rain happens to fall, the cocks are ſo moiſt, that the hay may ſpoil before it can be opened out; and that they are ſo ſmall, if wind blows, that they are in danger of being overturned. As a remedy againſt its being too moiſt, it is recommended to draw two handfuls of hay to be laid acroſs on the top, by way of a thatching to the cocks; and, in the laſt caſe, to preſs them down a little with the hand, will render them more firm." However, " Mr. Patterſon, of Caſtle-huntley, in the Carſe of Gowrie, makes his hay by employing a perſon to follow the mowers, who turns the hay over and over till it be completely *winn*. If the ſeaſon be favourable, it is put into the tramp-rick in the ſtack-yard." This is a ſort of large cock frequently uſed in the northern diſtricts. And " upon his farm 300 ſtones, of 22lb. Engliſh to each ſtone, is accounted a good crop from an acre of land; which is not uncommon in that diſtrict, and in ſeveral other parts of the county. In the year 1786, he had 6000 ſtones of hay from a field of 13 acres, ſown originally among wheat; and for the ſecond crop of the ſame field, that ſeaſon he received 2*l*. 13*s*. 4*d*. per acre." But it is added, that " one precaution in this ſort of hay-making is abſolutely neceſſary, never to make hay up into the firſt cock, when it is in the leaſt degree wet; otherwiſe it ſoon becomes mouldy, by ſitting ſo cloſe together, as to exclude the air." But that, " whether a farmer thinks proper to make up his hay into the firſt cocks in either of the two ways above-mentioned, or in any other, which he may prefer, when theſe cocks are to be turned, and two or three of them put into one, according to the condition of the hay, he ſhould not neglect to put the drieſt part of the old cocks next to the bottom of the new ones; and continue to do ſo every time the ricks are turned, until the hay be ready for the tramp-rick." Further, that " it is almoſt unneceſſary to adviſe a farmer of experience, that in making tramp-ricks, they ought to be ſecured, by one rope over the top, in the direction of that point from which the moſt violent winds are expected to blow at that ſeaſon, or by two tranſverſe ropes, which is the ſureſt way; and that the ropes ought to be ſo fixed at the ends, as to draw no rain into the hay. The tramp-ricks ſhould alſo be neatly raked down the ſides, and well drawn all round cloſe to the bottom, ſo that the rain may fall from the ſides into the earth; not leaving the hay in a flounce at the ſkirts, in a ſlovenly manner, which part of the hay is entirely ſpoilt, if it remain long in the field. If tramp-ricks are made where the hay grew, make them always on the crown of the ridge, that the water may run freely off in the furrows. But it is more adviſable to carry the hay to the place where the ſtack is to be made, than to make the tramp-ricks in the field, becauſe the ſecond crop of that year, and the growth even of the next year, is injured on the ſpot, where theſe ricks ſtand; and beſides, all the hay will be at hand, in making the ſtack, to get it cleverly finiſhed, in caſe of a change of weather. When hay has ſtood in the tramp-rick ſo long, but no longer, than is neceſſary to keep it from heating, becauſe the ſurface is often injured by the weather, the ſtack is frequently made in an oblong form, which is vulgularly called a *ſow*." And it is ſtated, that "it is computed that a ſtack of rye-graſs hay, which is a year old, weighs, for every cubic yard, ten or eleven ſtones of Dutch weight, *viz.* 17½lb. Engliſh, to the ſtone; clover and rye-graſs ſomewhat leſs, and clean clover ſtill leſs." And "it has been generally underſtood, but not examined with ſufficient accuracy, that four-pence is as good a price for hay weighed from the tramp-rick in Auguſt or September, as ſix-pence at Candlemas or March, *i. e.* that hay does decreaſe one-third in weight during that time. An experiment of Mr. Robert Webſter, at Mains of Errol in Scotland, will, it is ſuppoſed, throw ſome light on this matter. He weighed two ſtacks of hay from the tramp-rick, in Auguſt 1793, each conſiſting of 400 ſtones of ſimilar hay from the ſame field, and at the ſame time. Wiſhing to aſcertain how much the weight would decreaſe, he re-weighed the one upon the 17th of February 1794, which produced 372 ſtones; and the other being re-weighed upon the 26th of May 1794, produced 336. The firſt having only decreaſed at the rate of 7 *per cent.* inſtead of 33 *per cent.* as is commonly ſuppoſed; and the decreaſe of the ſecond being 16 *per cent.*" And, "by a ſimilar experiment with the crop of 1795, he found the decreaſe of the weight of hay about 16 ſtones more in every 400 ſtones, than it had been in the crop of 1793; but ſays that the hay was cut more green in the laſt, than in the firſt inſtance; which muſt always effect the decreaſe of weight for ſeveral months after hay is put into the ſtack." See Clover, Ryegrass, Saintfoin, &c.

It may be noticed, that rouen, or the ſecond crop of hay, whether of the natural or artificial graſſes, will require leſs time in making than thoſe that are firſt cut, as they are generally more ſlender, and contain leſs moiſture than the firſt crops. In getting this ſort of hay, care ſhould be taken that it be perfectly dry when carried, as, without attention in this reſpect, it will be extremely liable to grow mouldy and bad in the ſtack. In order to this, it muſt be frequently turned.

Hay-Firing.—It is noticed, that, from the great miſchief frequently accruing from ſtacking hay in a damp ſtate, and the injuries of this kind which perpetually happen, one ſhould ſuppoſe that the farmers would be on the watch, and attentive to make uſe of every precaution to guard againſt it; but the many ſtacks which are yearly fired in the neighbourhood of London, are a ſufficient proof of their want of care in this particular. To prevent the fatal effects from the firing of hay, it ought to be a primary caution that the fodder be thoroughly made; and that every lump of graſs be intimately broken and divided, and have an equal participation of the ſun and air; and that the operation be not hurried, either with a view to leſſen the expence in making, or from an apprehenſion that rain may fall before the buſineſs can be finiſhed; or from a preſumption that the hay will weigh heavier in the tufts, if the whole has been got together before it be fully made, that it may thereby have the better chance of ſweating in the ſtack. As to the firſt argument, namely ſaving ſome expence in the wages of the labourer, it is conceived ſo futile, as ſcarcely to deſerve a ſerious anſwer; ſince the extra charges on this occaſion can be but trifling, and are comparatively of no account, when ſet againſt the hazard of firing the ſtack; by which event, the owner may be involved in utter ruin. As to the ſecond, or the apprehenſion of rain, the reply is, that it will be far more eligible to let the crop be ſpoiled in the field, than to run any hazard of its firing in the ſtack. And to the laſt, it may be obſerved, that hay, from upland meadows more eſpecially, if put into a large ſtack, will be in little danger of loſing either colour or weight by not heating. As to the low meadow, or marſh-hay, it may be got together with great expedition, as will be ſhewn hereafter. In a wet ſeaſon, at which time hay is under the greateſt danger of firing in the ſtack, it ſeems the moſt eligible method to divide it into ſmall parcels, as twenty loads in a ſtack, there being leſs danger of firing theſe ſmall ſtacks, than when the hay is laid into thoſe of larger dimenſions.

In the buſineſs of putting the hay into ſtacks, the firſt thing is to ſelect a clear ſunny day for the purpoſe, and not to be ſparing of hands on the ſtack, who, though they may appear to ſtand over thick, will be all of them found of ſome utility, not only in keeping the ſtack well trodden in every part, but by ſhaking and toſſing the hay abroad; whereby every particle of it will be again divided, and thus by enjoying the benefit of the ſun, it in a manner undergoes a ſecond making. Theſe precautions of employing a number of hands on the ſtack, and making choice of a fine day for the buſineſs, will at all times be found highly beneficial; but more particularly after a wet ſeaſon, and which will, in ſome meaſure, contribute to revive the colour, and retrieve the ſmell of ſuch fodder as may have been waſhed by continual rains in the firſt part of the haying. And, therefore, a farmer, who attentively watches the mutations of the weather, will always find his account in waiting a few days, when there ſeems a probability of a favourable change, rather than to begin his ſtack in a hazy day, and under the auſpices of a cloudy atmoſphere ſurcharged with moiſture.

Theſe comprehend the moſt important methods that are practiſed in the making of hay in different parts of the country.

Hay-*rake*, a tool of the rake kind, of which there are different ſorts employed in the making of hay, ſuch as the ſmall, ſhort, well known wooden toothed rake, and the large horſe-rake with long tines, or teeth. This laſt ſort has lately been found extremely uſeful in producing great diſpatch. See Rake.

Hay-*ſow*, a name applied to a particular ſort of hay-rick.

Hay-*ſweep*, the name of an implement conſtructed for the purpoſe of collecting and conveying hay to the ſtack, or other place, in an eaſy and expeditious manner, as ſoon as it has been put up into rows. It is, conſequently, of much uſe where hay is to be ſtacked in the field, in ſaving a great deal of time and labour, as by ſuch a mode the hay may be got together with much fewer horſes, than where waggons or carts are made uſe of for the purpoſe.

There are implements of this nature conſtructed in very different forms and methods; but the ſledge uſed in Yorkſhire, and the ſweep invented and recommended by Mr. Middleton, in his "Survey of the County of Middleſex," are, perhaps, the moſt valuable. The former is ſhewn at *fig.* 1. *Plate Hay*; in which *a* diſplays a view of the whole ſledge, as deſcribed in the "Report for the North Riding of Yorkſhire;" *b*, the frame-work forming the bottom, which is boarded on the upper ſide in the manner ſeen at *a*; *c*, one of the ends having the top rail riſing from it; *d, d*, are two pieces of iron fixed on the frame *b*, by means of nuts and ſcrews; on each ſide is a ring, to which the horſes are attached, one horſe proceeding on each ſide of the row of hay, until the ſweep has become fully loaded; when one of the horſes croſſing the row the load is drawn to the ſtack. Upon its reaching which the horſes are turned about, when the rings run to the other end of the irons; the ſweep being drawn back from under the load, and returned, in order to collect another load in the ſame way as before.

The machine deſigned by Mr. Middleton operates in a ſomewhat different manner, though much on the ſame principle. It is drawn by four horſes, in pairs, having a boy to drive and manage each pair. Here alſo, before the work can take place, it is neceſſary that the hay ſhould be formed into rows, or ridges, as is commonly done before the loading of the carts or waggons, in the uſual mode of carrying this ſort of cattle-fodder. After which, in the view of ſweeping the hay together with more facility, a man with a fork muſt turn the ends of the rows up to the diſtance of two or three yards, in ſuch a manner as to form a kind of heap; then walking on ten, twenty, or forty paces, and breaking the rows, by turning the hay forward into another ſimilar heap; ſtill going on and repeating the ſame operation quite to the ends of the rows, which may be executed nearly as faſt as he can walk. The boy, who has the management of the pair of horſes to which the unloaded machine is attached, muſt then draw it acroſs the end of a row, and the inſtant the centre of the machine is at the middle of the row, his horſes muſt be turned ſhort about, to within a yard or two of the hay, ſo as to be in a proper poſition to ſet off, the other boy inſtantly placing his horſes on the other ſide of the row, and hooking the chain of his ſplinter-bar to the machine, pulling the gate-like ſide of it round, in order that it may claſp the hay. Every thing being prepared, the horſes ſhould be driven in a ſlow manner for the firſt twenty or forty yards; they may then, where the buſineſs requires diſpatch, increaſe their pace, they being urged on to their faſteſt walk; and from that into a ſlow ſort of trot, until as much hay be collected as the horſes can draw; then unhooking one end, the horſes at the other muſt be let turn from the hay, and brink out the machine from behind it; afterwards returning on the trot to the end of the next row, to repeat the ſame proceſs, care being taken to keep the horſes on each ſide of the row of hay at equal diſtances from it, and oppoſite to each other. In caſes in which the machine is loaded, and the intention is to draw the load to a diſtant place, the horſes cannot be kept too cloſe to each other. This machine is ſo generally known, that it is unneceſſary to give any repreſentation of it here.

HAY-*tea*, a ſort of infuſion prepared by pouring boiling water upon hay, after it has been cut into ſmall particles, the whole in ſome inſtances being then blended with ſome kind of ground or bruiſed. It has been aſſerted in the original ſurvey of Lancaſhire, that from two to three quarts of this mixture, when given to a cow every day, has been found to improve the flavour of the butter, and to bring it to its natural yellow colour. It has likewiſe been found beneficial in rearing young calves, when blended and incorporated with the milk, and exhibited to them as their food, being highly nutritious in its qualities.

In ſome late trials made by Mr. Saunders, and publiſhed in his treatiſe on the ſubject, it has alſo been conſidered as of great importance in the ſtore feeding of hogs even without the ground-meals, being in theſe caſes given in the form of ſoup, thickened a little with other ſort of cheap materials. Its cheapneſs and convenience are certainly greatly in its favour for this purpoſe. See HOG and SWINE.

HAY, WILLIAM, in *Biography*, was born in 1695 at Glynbourne in Suſſex, and by the death of his father was left heir to a ſmall eſtate. He received his grammatical learning in the country, after which he went to Oxford, where he remained till he was twenty years of age, when he removed to the Temple for the ſtudy of the law, which, owing to ill health, he was unable to purſue as a profeſſion. In 1728 he publiſhed "An Eſſay on Civil Government." In 1730 he deſcribed his own neighbourhood, and the hiſtorical events connected with that part of the country, in a poem entitled "Mount Caburn." In a ſhort time after this he engaged in public life, and was elected member of parliament for the borough of Seaford, which place he continued to repreſent till his death. He was a zealous whig, and for his ſervices in the cauſe he was made a commiſſioner of the victualling office; and when he reſigned this, he was appointed keeper of the records in the Tower. He died in 1755 of an apoplectic fit, which was ſuppoſed to be occaſioned by grief for the loſs of his youngeſt ſon juſt as he had paſſed through Weſtminſter ſchool with the higheſt reputation. Beſides thoſe already noticed, he was author of many other works on various ſubjects, which were collected in two volumes quarto, in the year 1794, to which a biographical account of the author is prefixed. His moſt popular piece was "An Eſſay on Deformity," which is a very ingenious collection of thoughts upon the bodily misfortune under which he laboured, and which he treats in a ſtrain of chearful philoſophy, proving, in the moſt ſatisfactory manner, how patiently he endured the circumſtances annexed to his condition.

HAY, in *Geography*, a market-town and pariſh in Brecknockſhire, Wales, is ſeated un the ſouthern bank of the river Wye; at the diſtance of 21 miles W. from Hereford. In the year 1800 the town conſiſted of 268 houſes, and 1170 inhabitants. Though conſidered a borough by preſcription, it has no privileges or civil immunities. The houſes, a few only excepted, are very indifferent, and are much ſcattered. The lord of the manor appoints a bailiff annually, to take the tolls of markets and fairs; and as his will or caprice was formerly the only law of the place, repeated inſtances of oppreſſive exactions have occurred. In the year 1576, Even ap David, a pedlar, by his will declared that his life was taken away by the cruelties of the bailiff, and requeſted his executors to proſecute the ſaid officer for murder. The attorney-general at length interfered; and at preſent the tolls are regularly and punctually paid to the lady of the manor, who holds an annual court-leet here. Leland deſcribes the town to conſiſt of "one poore paroche. In the ſuburb hard by Wy is a paroche church, meetely fair. There is alſo in the ſuburbe a chapel, where on Sunday I hard maſſe; not far from the paroche churche, in the ſuburb, is a great round hill of yerth, caſt up by mennes handes, other for a wynd-mille to ſtand upon, or rather for ſum fortreſs of bataille. The town, within the wealles, is wonderfully decayed. The ruine is aſcribed to Oen Glindour. The walle hathe 111 gates and a poſterne. There is alſo a caſtel, the which ſum time hath been right ſtately." The church, now uſed by the inhabitants, is ſituated in a romantic ſpot cloſe to the river, and on an eminence, which is nearly precipitous on one ſide. Here are a weekly market and four annual fairs. Jones's "Hiſtory of the County of Brecknock," 2 vols. 4to. 1809, in which work is a plate of one of the ancient gateways.

HAY *Creek*, a river of Pennſylvania, which runs into the Schuylkill. N. lat. 40° 16′. W. long. 76° 50′.

HAY'*s Iſland*, a ſmall iſland in the Mergui Archipelago. N. lat. 9° 5′.

HAY *Market.* Carts of hay which ſtand to be ſold in the hay-market, are to pay 3*d. per* load towards paving and repairing the ſtreet; and ſhall not ſtand loaded with hay after three o'clock in the afternoon, &c. on pain of forfeiting 5*s.* Hay ſold in London, &c. between the firſt of June and the laſt of Auguſt, being new hay, is to weigh ſixty pounds a truſs; and old hay, during the remainder of the year, fifty-ſix pounds, under the penalty of 2*s* 6*d.* for every truſs offered to ſale. 2 W. & M. cap. 6. 8 & 9 W. cap. 4. 31 Geo. II. cap. 40.

HAY *Worms.* Beſide the ſmall worms or animalcules bred in water, in which hay has been infuſed, which are only the objects of microſcopical obſervations, we find that it is a proper nidus of itſelf, ſometimes, for a much larger ſpecies of inſect called the hay-worm, whoſe origin and changes have not, as yet however, been properly obſerved. An animal which can be produced from the egg, and grow to its full ſize during the ſhort time that hay is left in the field in making, muſt be very quick in its growth; but yet it is found that multitudes of ſuch are produced, though probably few come to perfection, the removing of the hay naturally deſtroying many. In the Philoſophical Tranſactions we have an account of the ſame ſort of inſect breeding among cocks of barley while left in the field, many millions of them being diſcovered together, on ſtirring or lifting up the cocks with a cane. They are alſo found in the barns where barley is laid up, and are ſo numerous that they ſtrew the way the carts go that carry the barley home by the multitudes that are ſhook off. They are about half an inch long, as thick as a pigeon's feather, and of a whitiſh colour, ſhaded with faint ſtripes of a yellowiſh brown. They have fourteen feet, and ſeem evidently by all their marks to be true caterpillars. They are of an offenſive ſmell; and their excrements are hard white pellets of pure flower, like that of barley; whence it is plain that they eat the grain.

HAY, *Haya*, or *Haye*, a fence or incloſure, formed of rails; wherewith ſome foreſts, parks, &c. were anciently ſurounded. See FENCE.

HAY is ſometimes alſo uſed for the park itſelf; and ſometimes for a hedge, or a place hedged round.

HAYS alſo denote a particular kind of nets, for the taking of rabbits, hares, &c.

HAYBOTE, HEDGBOTE, in our *Ancient Cuſtoms*, a mulct or recompence for hedge-breaking: or rather, a right to take wood neceſſary for making hedges, either by a tenant for life, or for years, though not expreſſed in the grant or leaſe.

It is mentioned in the Monaſt. tom. ii. p. 134. "Et concedo ei, ut de boſco meo heybot, &c." In the ſame place, huſbote ſignifies a right to take timber, to repair the houſe. See BOTE.

HAYCOCK, in *Geography*, a ſmall iſland in the Indian ſea, near the coaſt of Madagaſcar. S. lat. 13° 35′. E. long. 48 30′.—Alſo, a ſmall iſland in the Chineſe ſea. N. lat. 3° 27′. E. long. 107° 48′.

HAYCOCKS, a ſmall iſle in Delaware river, about 7 miles below Eaſton, in Northampton county, Pennſylvania.

HAYD, a town of Bohemia, in the circle of Pilſen; 24 miles W. of Pilſen.

HAYDEN, GEORGE, in *Biography*, organiſt of the church of St. Mary Magdalen, Bermondſey, acquired a reputation as a compoſer, without being previouſly noticed in the capital, a circumſtance which rarely happens.

In 1724 he publiſhed cantatas, one of which, ſung by Bat Platt, a popular ſinger at Sadler's Wells, called notice on the reſt, and they became in general favour with the lovers of pure and genuine Engliſh muſic, all over the kingdom. And, indeed, they ſeem the beſt which had been produced ſince Purcell's time. His two part ſong, "As I ſaw fair Chlora walk alone," and ſeveral ſingle ſongs by this obſcure muſician, enjoyed a laſting fame at clubs and feſtive meetings.

HAYDENHEIM, in *Geography*, a town of Wurtemberg, ſeated on the Brenz, famous for its pottery; 18 miles N.N.W. of Ulm.

HAYDN, JOSEPH, in *Biography*, maeſtro di capella to his ſerene highneſs, prince Eſterhazi, was born at Rhorau, in Lower Auſtria, in 1733. His father, a wheelwright by trade, played upon the harp without the leaſt knowledge of muſic, which, however, excited the attention of his ſon, and firſt gave birth to his paſſion for muſic. In his early childhood he uſed to ſing to his father's harp the ſimple tunes which he was able to play, and being ſent to a ſmall ſchool in the neighbourhood, he there began to learn muſic regularly: after which he was placed under Reuter, maeſtro di capella of the cathedral at Vienna: and, having a voice of great compaſs, was received into the choir, where he was well taught, not only to ſing, but to play on the harpſichord and violin. At the age of eighteen, on the breaking of his voice, he was diſmiſſed from the cathedral. After this, he ſupported himſelf during eight years as well as he could by his talents, and began to ſtudy more ſeriouſly than ever. He read the works of Mattheſon, Heinichen, and others, on the theory of muſic; and for the practice, ſtudied with particular attention, the pieces of Emanuel Bach, whom he made his model in writing for keyed inſtruments, as he candidly confeſſed to us when in England, in the ſame manner as Pope had formed himſelf upon Dryden.

At length he met with Porpora, who was at this time in Vienna, and, during five months, was ſo happy as to receive his counſel and inſtructions in ſinging and the compoſition of vocal muſic.

About this time he reſided in the houſe with the abate Metaſtaſio three years, as muſic maſter to mademoiſelle Martinetz, who owed to his inſtructions as well as to nature, thoſe talents which Haſſe, Jomelli, and all the great maſters of Metaſtaſio's acquaintance honoured with their approbation. During this time, Haydn had the great advantage of hearing the Italian language ſpoken with purity, and of receiving the imperial laureat's counſel, as to cloathing the fineſt lyric compoſitions with the moſt appropriate and expreſſive melodies. In 1759 he was received into the ſervice of count Marzin, as director of his muſic, whence, in 1761, he paſſed to the palace of prince Eſterhazi, to whoſe ſervice he was afterwards conſtantly attached.

All this information concerning Haydn's early life was procured before his arrival in England; but it is well known how much he contributed to our delight, to the advancement of his art, and to his own fame, by his numerous productions in this country; and how much his natural, unaſſuming and pleaſing character, excluſive of his productions, endeared him to his acquaintance and to the nation at large. It ought to be recorded, that twelve of his noble and matchleſs ſymphonies were compoſed here expreſsly for Salmon's concerts, and that it was from his ſpirit of enterpriſe and enthuſiaſtic admiration of Haydn, and love of his art, that we were indebted for his viſit to this country; beſides theſe ſublime ſymphonies, his piano forte ſonatas, his quartets and ſongs, were ſufficient to eſtabliſh his reputation as a great and original compoſer upon a laſting foundation, if only what he produced during the few years which he remained among us was known. He arrived here in 1791, and returned to Germany in 1796.

The firſt time we meet with his name in the German catalogues of muſic, is in that of Breitkopf of Leipſic, 1763, to a "Divertimento à Cembalo, 3 Concerti à Cembalo, 6 Trios, 8 Quadros or quartets, and 6 ſymphonies in four and eight parts." The chief of his early muſic was for the chamber. He is ſaid at Vienna to have compoſed, before 1782, a hundred and twenty-four pieces for the bariton, for the uſe of his prince, who was partial to that inſtrument, and a great performer upon it. It is the ſame kind of viol di gamba as that upon which Lidl performed ſome years ago. See Lidl.

Beſides his numerous productions for inſtruments, he has compoſed many operas for the Eſterhazi theatre, and church muſic that has eſtabliſhed his reputation as a deep contrapuntiſt. His "Stabat Mater" has been performed and printed in England, but his oratorio of "Il Ritorno di Tobia," compoſed in 1775, for the benefit of the widows of muſicians, has been annually performed at Vienna ever ſince, and is as high in favour there, as Handel's "Meſſiah" in England. His inſtrumental "Paſſione," in ſixteen or eighteen parts, was among his later and moſt exquiſite productions, previous to his arrival in England. It entirely conſiſts of ſlow movements, on the ſubject of the laſt ſeven ſentences of our Saviour, as recorded in the Evangeliſts. Theſe ſtrains are ſo truly impaſſioned and full of heart-felt grief and dignified ſorrow, that though the movements are all ſlow, the ſubjects, treatment and effects are ſo new and ſo different, that a real lover of muſic will feel no laſſitude, or wiſh for lighter ſtrains to ſtimulate attention.

His innumerable ſymphonies, quartets, and other inſtrumental pieces, which are ſo original and ſo difficult, have the advantage of being rehearſed and performed at Eſterhazi under his own direction, by a band of his own forming, who have apartments in the palace, and practiſe from morning to night, in the ſame room, according to Fiſcher's account, like the ſtudents in the conſervatorios of Naples. Ideas ſo new and ſo varied were not at firſt ſo univerſally admired in Germany as at preſent. The critics in the northern parts of the empire were up in arms. And a friend at Hamburgh wrote us word in 1772, that, "the genius, fine ideas, and fancy of Haydn, Ditters, and Filtz, were praiſed, but their mixture of ſerious and comic was diſliked, particularly as there is more of the latter than the former in their works; and as for rules, they know but little of them." This was a cenſure which the admirable Haydn ſilenced long ago: for before his deceaſe he was as much reſpected all over Europe, by profeſſors, for his ſcience as invention. And the extent of his fame may be imagined, from his being made the hero of a poem on muſic, in Spaniſh, written and publiſhed at Madrid thirty years ago, entitled "La Muſica Poema, par D. Tomas de Yarte." (See Spanish *Muſic*, article Yriarte.) This ſublime work was produced for Cadiz. He has, not long ſince, publiſhed it in ſcore with German and Italian words, ſo that it may be performed as an oratorio.

The laſt of his compoſitions which were received in England ſubſequent to the "Creation," were two ſets of quartets, of which the firſt violin, calculated to diſplay Salomon's powers of execution and expreſſion, is very difficult, and his "Seaſons." See Song.

But it may be laid down as an axiom in muſic, that "whatever is *eaſy* is *old*, and what the hand, eye, and ear are accuſtomed to; and, on the contrary, what is *new* is of courſe *difficult*, and not only ſcholars but profeſſors have it to learn. The firſt exclamation of an embarraſſed performer and a bewildered hearer is, that the muſic is very *odd*, or very *comical*; but the queerneſs and comicality ceaſe, when, by frequent repetition, the performer and hearer are at their eaſe. There is a general cheerfulneſs and good humour in Haydn's allegros, which exhilarate every hearer. But his adagios are often ſo ſublime in ideas and the harmony in which they are clad, that though played by inarticulate inſtruments, thay have a more pathetic effect on our feelings than the fineſt opera air united with the moſt exquiſite poetry. He has likewiſe movements and paſſages that are ſportive, playful, and even groteſque, for the ſake of variety; but they are often ſo ſtriking and pleaſant, that they have the effect of *bon mots* in ſpeaking or writing.

His grand and ſublime oratorio of the "Creation," and his picturesque and deſcriptive "Seaſons," compoſed ſince his departure from England, if muſic were a language as intelligible and durable as the Greek, would live and be admired as long as the Iliad and Odyſſey of Homer. And we cannot help thinking that future ages will be as curious to know when and where he flouriſhed, as the country and chronology of Orpheus and Amphion.

HAYE, John de la, was born at Paris in the year 1593, became a Franciſcan friar, and was appointed preacher in ordinary to queen Anne of Auſtria. He died at Paris in 1661. He publiſhed, in 1643, a collection of Commentaries on the Scriptures, in five volumes folio; and in 1660 another work of the ſame kind, in nineteen immenſe folios, entitled "Biblia maxima, cum Annotationibus diverſorum." On this compilation father Simon beſtows much praiſe. Another perſon of the ſame name, a Jeſuit, died in 1614, and was author of a "Harmony of the Evangeliſts," in two volumes folio, and other works. Moreri.

Haye, *La*, in *Geography*, a town of France, in the department of the Indre and Loire, and chief place of a canton, in the diſtrict of Loches; 26 miles S. of Tours. The place contains 850, and the canton 5648 inhabitants, on a territory of 190 kiliometres, in 10 communes.

Haye-*Dupuits, La*, a town of France, in the department of the Channel, and chief place of a canton, in the diſtrict of Coutances; 15 miles N. of it. The place contains 986, and the canton 14,403 inhabitants, on a territory of 205 kiliometres, in 25 communes.

Haye-*Peſnal, La*, a town of France, in the department of the Channel, and chief place of a canton, in the diſtrict of Avranches; ſix miles N. of it. The place contains 957, and the canton 9356 inhabitants, on a territory of 127½ kiliometres, in 20 communes.

Haye's *Iſland*, a ſmall iſland of New South Wales, formed by the rivers Nelſon and Hays.

HAYES, Charles, in *Biography*, a mathematician and chronologiſt, little known to the literary world, though he was author of many excellent works. He was born in the year 1678, and entered while he was young into the Royal African Company, ſpent ſome time on the continent of Africa, and from the knowledge which he obtained of their affairs, roſe to the chief management of them at home, and was for many years annually choſen deputy governor of the company. In 1704 he diſtinguiſhed himſelf by a "Treatiſe on Fluxions," the only work to which he put his name. In 1710 he publiſhed a ſmall pamphlet, entitled "A new and eaſy Method to find out the Longitude from obſerving the Altitudes of the Celeſtial Bodies;" and in 1723 "The Moon, a philoſophical Dialogue," intended to ſhew that the moon poſſeſſes a native light of her own. Mr. Hayes was a good linguiſt, as well in the Hebrew as in the Greek and Latin, was a great admirer of the Septuagint verſion of the Old Teſtament, and publiſhed, in 1736, "A Vindication of the Hiſtory of the Septuagint." His next piece, intended to aſcertain the true year of Chriſt's nativity, was "A Critical Examination of the Goſpels of Matthew and Luke," &c. In 1753, on the diſſolution of the Royal African Company, he retired to Down in Kent, when he undertook the vaſt labour of compiling a work under the title of "Chronographia Aſiatica et Ægyptiaca ab orbe condito ad Chriſtum natum per Annos 5500, ad fidem Scripturorum Vetuſtiſſimorum reſtituta et illuſtrata." This work he did not live to print, though it was finiſhed when he died in 1760: and in the preceding year he appriſed the world of the employment in which he had been engaged by publiſhing a ſpecimen of it.

HAYES, WILLIAM, Dr. in muſic, who began his career early in life, as organiſt of St. Mary's in Shrewſbury, being the firſt appointment to the office, after the erection of an inſtrument, in that church, by Harris and Byfield. We believe that he quitted Shrewſbury on the death of Goodſon, organiſt of Chriſt-church, Oxon, where he ſettled, and was ſucceſſively graduated, appointed profeſſor of muſic, organiſt of ſeveral colleges, and ſole director of the choral meetings, concerts, and encænia, and every muſical exhibition in that univerſity to the time of his death, about 1779.

Dr. William Hayes was a ſtudious and active profeſſor; a great collector of curious and old compoſitions, and poſſeſſed of conſiderable genius and abilities for producing new. He publiſhed, while at Shrewſbury, a collection of Engliſh ballads, his maiden compoſition. But at Oxford his eccleſiaſtical compoſitions for different colleges were innumerable; yet, being local, they were never printed, and but little known out of Oxford. Thoſe productions which gained him the moſt general celebrity were his canons, catches, and glees, for the Catch-club, in London, during the firſt years of its inſtitution; ſeveral of which were juſtly crowned. His canon of "Let's drink and let's ſing together," is perhaps the moſt pleaſant of all thoſe laboured compoſitions which go under the name of canons.

He was a very good organ-player, and at the inſtallation of lord North as chancellor of the univerſity of Oxford, played the organ in the theatre, in a full and maſterly manner.

He had a true ſenſe of Handel's ſuperior merit, over all contemporary compoſers; and on the publication of Mr. Aviſon's well-written "Eſſay on Muſical Expreſſion," in which it is perpetually inſinuated that Geminiani, Rameau, and Marcello, were greatly his ſuperiors, Dr. Hayes took fire, and produced a pamphlet, intitled "Remarks on the Eſſay of Muſical Expreſſion," written with much more knowledge of the ſubject than temper: he felt ſo indignant at Aviſon's treatment of Handel, that he not only points out the falſe reaſoning in his eſſay, but falſe compoſition in his own works.

HAYES, *Dr.* PHILLIP, ſon, and ſucceſſor to the preceding muſic profeſſor at Oxford, was regularly educated by his father, in the ſame art. When grown up, after he had loſt his treble voice, which dropped into a tolerable tenor, he was admitted one of the gentlemen of the king's chapel, and reſided chiefly in London, till the deceaſe of his worthy father; who having eſtabliſhed a family intereſt in the univerſity, ſucceeded to all his honours and appointments; but not talents, temper, or importance. With a very limited genius for compoſition, and unlimited vanity, envy and ſpleen, he was always on the fret; and, by his ſituation, had a power, which he never ſpared, to render all other muſicians uncomfortable. No one entered the univerſity occaſionally, or from curioſity, that did not alarm him. His extreme corpulency will be longer remembered than his abilities, of which he has left no example that we can recollect worthy to be recorded.

HAYES, *The*, in *Geography*, rocks near the N.E. coaſt of the iſland of Guernſey, between the ſmall iſlands of Harnit and Hummet.

HAYLING, ISLE OF, in the hundred of Boſmere and Portſdown diviſion of the county of Hants, England, includes about 5000 acres of land, is completely ſurrounded by the ſea, and divided into the pariſhes of North Hayling and South Hayling, in each of which is a ſmall church. The houſes, which are principally conſtructed of brick, were returned, in the year 1801, as 102, inhabited by 578 perſons. The chief branch of trade carried on in this iſland is the making of *ſalt*, which has been an article of manufacture here from time immemorial. One ſaltern is recorded in the Domeſday ſurvey, which paid ſix ſhillings and eight-pence: at preſent there are five. Two fiſheries are alſo mentioned in the ſame record, as being then exiſting here. A priory was founded on the iſland previous to the Norman conqueſt; to which Henry I. granted the manor of Hayling. After the diſſolution, the priory lands were regranted to Henry earl of Arundel, and now belong to his deſcendant, the duke of Norfolk. Warner's Collection for Hampſhire, 6 vols. 4to.

HAYM, NICOLA FRACESCO, in *Biography*, born at Rome, but deſcended from a German family. This ingenious and accompliſhed man merits a place in all biographical dictionaries, on various accounts. Firſt, as a practical muſician and compoſer; 2dly, as a poet; and 3dly, as a medaliſt and antiquarian, though his name is only to be found in Apoſtolo Zeno's annotations to the Bibliotheca Italiana. But as he reſided long in England, where he ended his days, we are able to ſupply biographical deficiencies concerning him.

He arrived in England, ſeemingly on ſpeculation, in 1705, and we hear of him firſt as a ſinging-maſter; the Daily Courant informing us, that on the opening of the queen's theatre in the Hay-market (built by ſir John Vanburgh, and before it was called an opera houſe) "there would be ſinging between the acts of Vanburgh's comedy of the "Confederacy," by Signora Maria, as lately taught by Nicola Haym. Soon after he is mentioned as the principal performer on the violoncello in Clayton's opera of "Arſinoe," which he aſſiſted in bringing on the ſtage in the Italian manner. He muſt have been a ſuperior performer on the violoncello to be aſſigned the principal part, on that inſtrument, which during this early attempt at a muſical drama in the Italian manner, was the chief and almoſt ſole accompaniment to cantatas and opera ſongs. In 1707, he compoſed ſeveral airs to Engliſh words, and an overture for Pyrrhus and Demetrius. After Handel's arrival, and the performance of Rinaldo, which diſgraced all attempts at Engliſh operas, and operas half Engliſh and half Italian; he aſſociated with Dieupart and Clayton in eſtabliſhing a concert at York buildings. In 1710 he wrote the operas of "Etearco" and "Coriolanus," before the arrival of Rolli as opera poet.

In 1712, he entered the opera band, as a performer on the violoncello; and was opera poet in the following dramas ſet by Handel: Flavius, Rodelinda, Tamerlano, Ptolemy, Siroe, Radamiſtus, Otho, Veſpaſian, Artaxerxes, and Julius Cæſar. He likewiſe wrote the drama of Aſtyanax, for Bononcini, the moſt celebrated of all the operas which he compoſed while he reſided in England.

During all theſe muſical and poetical occupations, he compoſed and publiſhed a work on medals, which is ſtill held in high eſtimation by the curious, entitled "Il Teſoro Britannico,"

tannico," containing the delineation and deſcription of all the Greek and Roman medals in every form and metal, which had not been previouſly publiſhed, 2 vols. 4to. 1719 and 1720, a work of immenſe labour and erudition. He likewiſe wrote two tragedies, "La Merope," and "La Demodice," and in the laſt years of his active life, he drew up and publiſhed propoſals for a hiſtory of muſic, upon an admirable plan; but it was not encouraged, which is much to be lamented, as far as Italy was concerned; as he was not only a good practical muſician, but a man of extenſive learning, and perfectly acquainted with the hiſtory of the art in his own country, and its progreſs in England during his reſidence there.

He had not only knowledge in counterpoint, but genius for compoſition, as he publiſhed at Amſterdam, in 1713, two ſets of ſonatas for two violins and a baſe, which are little inferior to the ſonatas of Corelli. There is more variety in them, though leſs grace.

He died in March 1730, and his effects were ſold by auction ſoon after his deceaſe. Apoſtola Zeno, a man of great learning and critical ſagacity, ſpeaks highly of the accuracy of Haym's, medallic delineations in his "Teſoro Britannico," and in his poſthumous work, La Bibl. Ital. We have conſtantly found him (Haym) faithful in his account of books, particularly in his liſt of *Librarii*, as far as his own exiſtence reaches; but in the enlarged edition, publiſhed at Milan 1771, the liſt is extended to the time of Tartini, whoſe "Trattato di Muſica," publiſhed in 1754, is included.

HAYMAN, Francis, an hiſtorical painter, who was a native of Devonſhire, and pupil of Brown. He was principally employed in making deſigns for frontiſpieces, &c. to books, in which he rarely well ſucceeded. He is mentioned here, becauſe in the former part of his time he was the beſt this country could boaſt of, and was the painter of thoſe pictures relative to lord Clive's conqueſts in India, which are in the Rotunda at Vauxhall, and which are by far his very beſt performances. He was a rough mannered man, and a humouriſt, with good natural parts; a character often taſted by contemporaries, but which ſeldom aſſimulates with, or forgives the riſing generation. He uſed to delight in relating a circumſtance, which occurred to himſelf, of a whimſical nature. Paſſing along a ſtreet he obſerved a porter carrying a hare in a careleſs manner, dragging it on the ground, which a dog taking a fancy to, now and then made a ſnap at. At length the porter ſtopping to drink laid down the hare, and the dog taking advantage of that nearly tore it to pieces. Hayman, enjoying the joke, left his buſineſs neglected to watch its progreſs, and ſee to whom a hare ſo treated was directed. After loſing a conſiderable time he found the porter turn into the ſtreet where he himſelf lived, and rap at his own door, when he had the mortification to find that he had been enjoying, heedleſsly, his own misfortune. He had much ſucceſs in his practice, and lived to the age of 68, dying in 1776.

HAYN, in *Agriculture*, an old term employed to ſignify the operation of incloſing graſs lands with a hedge or ſome other means, in order to preſerve them from being paſtured with neat cattle or other ſorts of animals; conſequently, to *hayn up* implies the ſhutting up ſuch graſs grounds as are intended for being mown or fed off afterwards by live ſtock.

Hayn, or *Groſenhayn*, in *Geography*, a town in Saxony, in the margraviate of Meiſſen, containing three churches. This town is famous for having been the place in which the art of dyeing Saxon green and blue was firſt diſcovered; 16 miles N.N.W. of Dreſden. N. lat. 51° 18'. E. long. 13° 29'. —Alſo, a town of Germany, in the county of Stolberg; 6 miles E. of Stolberg.

HAYNDORF, a town of Bohemia, in the circle of Boleſlau; 13 miles E. of Krottau.

HAYNEA, in *Botany*, ſo named by Willdenow, in honour of Frederick Theophilus Hayne, a German botaniſt, author of an elegant work entitled *Termini Botanici*, publiſhed by the former at Berlin, in quarto, with coloured plates. Willd. Sp. Pl. v. 3. 1787. (Paeourina; Aubl. Guian. 800. Juſſ. 174. Lamarck. Illuſtr. t. 665. Savigny in Lam. Dict. v. 4. 691) Claſs and order, *Syngeneſia Polygamia-æqualis*. Nat. Ord. *Compoſitæ capitatæ*, Linn. *Cinarocephalæ*, Juſſ.

Gen. Ch. *Common Calyx* globoſe, imbricated; with numerous, elliptic-oblong, upright, acute, ſpinous ſcales. *Cor.* compound, tubular, uniform, florets all equal, perfect, fertile, monopetalous, funnel-ſhaped, with a regular, five-cleft, acute, ſpreading limb. *Stam.* Filaments five, capillary, the length of the tube; anthers acute, the length of the limb, united into a cylinder. *Piſt.* Germen obovate; ſtyle thread-ſhaped, the length of the ſtamens, very ſlender; ſtigmas two, acute, reflexed. *Per.* none, except the permanent calyx. *Seeds* ſolitary, obovate; down ſimple, ſeſſile, ſhort, ſpreading. *Recept.* fleſhy, chaffy; its ſcales roundiſh, concave, longer than the ſeeds, which they ſeparate from each other.

Eſſ. Ch. Receptacle fleſhy, chaffy. Down ſimple, ſhort. Calyx ovate, with imbricated, ſtraight, ſpinous ſcales.

1. H. *edulis*. (Paeourina edulis; Aubl. Guian. 800. t. 316.)—Found flowering in the month of June, on the banks of a river expoſed to the influx of the ſea, near Courou, in Guiana, by Aublet, from whoſe herbarium we have ſpecimens communicated by ſir Joſeph Banks. No other botaniſt, as far as we know, has ever gathered this plant. No account is given of the original generic name, which has the appearance of being French, and therefore in honour of ſome perſon; but Willdenow has thought proper to change it, and we follow his determination. The ſpecific name, *edulis*, is meant to expreſs that the receptacle is eatable, as well as the whole plant, according to Aublet, but he does not ſay whether recent or boiled. Its habit is that of a *Cnicus* or *Sonchus*. *Root* perennial. *Stems* ſeveral, ſomewhat branched, leafy, round, ſmooth, often zigzag, three feet high. *Leaves* alternate, large, ovate-oblong, greyiſh, ſmooth, veiny, fringed with little irregular, ſpinous teeth, their baſe running down into a winged footſtalk, which embraces the ſtem. *Flowers* ſolitary, oppoſite to each leaf, ſeſſile, ſcarcely an inch in diameter, blueiſh. The young foliage is ſlightly downy.— Juſſieu has erroneouſly placed this genus in a ſection whoſe calyx-ſcales are unarmed, probably from not having ſeen a ſpecimen. They are decidedly ſpinous, and the ſpines are yellowiſh, like thoſe on the leaves, ſo that it ought to be removed next to *Cnicus*, both in the natural and artificial ſyſtem, having indeed many characters in its habit like the alpine *Cnicus*, *ſpinoſiſſimus* and *oleraceus*.

HAYNES, Hopton, in *Biography*, was born in the year 1672, but nothing more ſeems to be known of him till about the year 1696, when he entered into the ſervice of his majeſty's mint; and by degrees he roſe, in 1723, to the office of the king's aſſay-maſter. In the year 1748 he reſigned the duties of his office; but, in conſideration of his long and faithful ſervices, his ſalary was continued him till he died in November 1749. He was the intimate friend of ſir Iſaac Newton and was employed to tranſlate into the Latin language the two letters of that great man, on the true reading of the two texts, 1 John, v. 7. and 8, and 1 Tim. iii. 16. with a view, probably, to their circulation in foreign countries; but this object was not accompliſhed. At the time of his death, Mr. Haynes had in the preſs a work entitled "The Scripture Account of the Attributes and Worſhip of God, and of the Character and Offices of Jeſus Chriſt;" which was the reſult of much inquiry into the meaning of the holy ſcriptures, without any guides, or the expoſitions of fallible commentators; and in ſpeaking of the ſubject, when he came to make known his own opinions, he ſays, "I think, I write, I ſpeak upon this important article, *viz.* that the God and Father of Jeſus Chriſt is the the only true God, with a clear underſtanding and a clear conſcience. I have no doubts, no ſcruples; no fear of offending God, or diſpleaſing Chriſt; no ſecret miſgivings that I am, or may be miſtaken; but a full and entire perſuaſion, that this foundation is moſt certain and infallible. I doubted early of the vulgar ſcheme [the Trinity]. To ſolve my doubts I read the holy ſcriptures, and them alone, for many years, with the greateſt attention and caution, with all earneſt deſire of finding the truth, without any bias, prejudice, or prepoſſeſſion." Speaking of the ancient fathers, and of the more modern reformers, Luther, Melancthon, &c. he ſays, "They can no longer impoſe on me with their authority: Chriſt is my maſter, and the holy ſcriptures my rule, and the only ſtandard of divine truth," &c. It is believed that ſome pains were taken to ſuppreſs this work after the author's death. It is almoſt certain that it was never publiſhed, in the ordinary acceptation of the word, till the year 1790, when an impreſſion of it was given to the world by the late Rev. Theophilus Lindſey. This was publiſhed in 8vo; and, in 1797, another edition in 12mo. with indices, and ſome account of the author in the preface, was printed at the expence of a ſociety "for promoting religious knowledge," &c. The work is now very rare; and notwithſtanding its excellence, and evident utility to biblical ſtudents, would ſcarcely repay a bookſeller the charges of a new impreſſion. See preface to "The Scripture Account," &c. "Sequel to Lindſey's Apology," p. 18, &c. Mr. Haynes left a ſon, named Samuel, in the church, who, on account of his ſervices as tutor to the earl of Saliſbury, was preſented by that nobleman to the rectory of Hatfield, in Hertfordſhire. He was author of "A Collection of State Papers, from the year 1542 to 1570, tranſcribed from Original Letters and other Memorials, never before publiſhed, left by William Cecil, lord Burleigh," &c. &c.

HAYNICHEN, in *Geography*, a town of Saxony, in the circle of Erzgeburg; 25 miles W. of Dreſden. N. lat. 50° 57′. E. long. 13° 3′.

HAYOBAYO, a town of Peru, in the dioceſe of La Paz; 25 miles W.S.W. of La Paz.

HAYWARD, or HAWARD, a keeper of the common herd of cattle of a town; who is to look that they neither break nor crop the hedges of incloſed grounds, and is ſworn in the lord's court for the due performance of his office. See AGILLARIUS.

HAYWARD, *Sir* JOHN, in *Biography*, a writer of Engliſh hiſtory, was probably educated for the profeſſion of the law, and took his degree of L.L.D. In 1599 he publiſhed "The firſt Part of the Life and Reign of king Henry IV." for which, on account of ſome things advanced in it, he was impriſoned by order of queen Elizabeth. She applied to Bacon to ſee if he could diſcover any paſſages that were treaſonable, but his reply was, that "for treaſon he found none, but for felony very many," which he explained by ſaying that the author had ſtolen many ſentences from Tacitus and tranſlated them into Engliſh. The queen, ſuſpecting that more perſons were employed in the work, would have extorted the ſecret by means of the rack, if ſhe had not been prevented by Bacon. In the reign of James I. he came into favour, and received the honour of knighthood. He now publiſhed the lives of the three Norman kings, and a tract "Of Supremacy in Affairs of Religion." He died in 1627, after which was publiſhed his "Life and Reign of king Edward VI." &c. The work for which, as a hiſtorian, he is moſt praiſed, is his "Life of Henry IV." Gen. Biog.

HAYWOODSBORO, in *Geography*, a poſt-town of Chatham county, in North Carolina; 305 miles from Waſhington.

HAZARD, a game on dice, without tables, is very properly ſo called, ſince it ſpeedily makes a man, or undoes him.

It is played with only two dice; and as many may play at it as can ſtand round the largeſt round table.

Two things are chiefly to be obſerved, *viz.* main and chance; the latter belonging to the caſter, and the former, or main, to the other gameſters. There can be no main thrown above nine nor under five; ſo that five, ſix, ſeven, eight, and nine, are the only mains flung at hazard. Chances and nicks are from four to ten: thus four is a chance to nine, five to eight, ſix to ſeven, ſeven to ſix, eight to five; and nine and ten a chance to five, ſix, ſeven, and eight: in ſhort, four, five, ſix, ſeven, eight, nine, and ten, are chances to any main, if any of theſe nick it not. Now nicks are either when the chance is the ſame with the main, as five and five, or the like; or ſix and twelve, ſeven and eleven, eight and twelve. Here obſerve, that twelve is out to nine, ſeven, and five; eleven is out to nine, eight, ſix, and five; and ames-ace and duce-ace, are out to all mains whatever.

But to illuſtrate this game by a few examples: ſuppoſe the main to be ſeven, and the caſter throws five, which is his chance; he then throws again, and if five turn up, he wins all the money ſet him; but if ſeven is thrown, he muſt pay as much money as there is on the board: again, if ſeven be the main, and the caſter throws eleven, or a nick, he ſweeps away all the money on the table; but if he throws a chance, as in the firſt caſe, he muſt throw again: laſtly, if ſeven be the main, and the caſter throws ames-ace, duce-ace, or twelve, he is out; but if he throws from four to ten, he hath a chance; though they are accounted the worſt chances on the dice, as ſeven is reputed the beſt and eaſieſt main to be flung. Four and five are bad throws (the former of which being called by the tribe of nickers, little dick-fiſher) as having only two chances, *viz.* trey-ace, and two duces, or trey-duce and quater-ace; whereas ſeven hath three chances, *viz.* cinque-duce, ſize-ace, and quater-trey. Nine and ten are in the like condition with four and five; having only two chances. Six and eight have indeed the ſame number of chances with ſeven, *viz.* three; but experienced gameſters nevertheleſs prefer the ſeven, on account of the difficulty to throw the doublets, two quaters, or two treys. It is alſo the opinion of moſt, that at the firſt throw the caſter hath the worſt of it. On the whole, hazard is certainly one of the moſt bewitching and ruinous games played on the dice. Happy, therefore, the man who either never heard of it, or who has reſolution enough to leave it off in time. See De Moivre's Doct. of Chances, p. 160, &c. See CHANCE and GAMING.

HAZARD, or *Richmond bay*, in *Geography*, a bay in Hudſon's bay, on the weſt coaſt of Labrador, with a great number of ſmall iſlands, called "Archiwinipick" by the Indians of the country. N. lat. 56° 35′. W. long. 75° 50′.

HAZEL, HAZLE, or HAZLE-*nut*, in *Agriculture*, the name of a ſmall tree, of the nut kind, ſometimes made uſe of in the forming of hedges. It is not, however, well ſuited for this purpoſe, from the ſmoothneſs of its ſtem. But it is extremely uſeful and proper in conſtructing hurdles, and other ſimilar ſorts of wattled work. See Corylus and Filbert.

Hazel-*mould*, a term applied to a yellowiſh kind of mould or ſoil, which has an extremely friable quality, being of the dry loamy deſcription. It is conſtantly met with where the ground is naturally of a good ſort. See Soil.

Hazel, *Witch*. See Hamamelis and Ulmus.

HAZELROUCH, in *Geography*, a town of France, in the department of the North, and the principal place of a diſtrict; 19 miles S. of Dunkirk. The place contains 6611, and the north and ſouth cantons 13,296 each, inhabitants, on a territory of 240 kiliometres, in 17 communes. N. lat. 50° 43′. E. long. 2° 37′.

HAZERYHUTTY, a town of Bengal, 15 miles S. W. of Nattore. N. lat. 24° 14′. E. long. 84° 44′.

HAZIR, a town of Curdiſtan, on a river of the ſame name, at its union with the Aras; 33 miles S. W. of Erbil.

HAZIRA, a town of Arabia, in the province of Hedsjas; 25 miles S. of Haura

HAZLE. See Hazel.

Hazle, in *Mining*, is uſed in Cumberland and ſome other diſtricts, to expreſs grit-ſtone, free-ſtone, and what is called poſt, in ſome diſtricts.

Hazle-*nuts*, *petrified*, in *Natural Hiſtory*, as alſo the trees, branches, juli or catkins, chivers or huſks, and leaves of the hazle, are very commonly found in peat moſſes, and in the alluvial accumulations in the bottoms of vallies, having but little fall, and on the flat ſhores of lakes and of the ocean, of which numerous inſtances are quoted in Parkinſon's "Organic Remains," vol. i. pages 61 to 68, and 94 to 97. In the alluvial flats, in the vallies in Derbyſhire, as at Matlock Bridge, the Buts' Paſtures in Aſhover, near Alport, &c., hazle-nuts, &c. are very common in layers, between the ſilt and gravel. Dr. Woodward, in his "Catalogue of Foſſils," vol. i. p. 21*, mentions nuts being found in Milnecloſe mine, which doubtleſs fell or were waſhed into opens from the ſurface; and on the whole it ſeems clear, that all theſe belong to the claſs of peat foſſils, and are preſerved in the moſt modern of the earthy depoſits or accumulations; and that hazle wood, where truly aſcertained to be ſuch, muſt never be claſſed with the primitive ligneous foſſils found in the Bath free-ſtone, (Parkinſon's Organic Remains, vol. i. p. 68.) in the Woburn ſand, and in numerous other ſtrata in all parts of the world. Dr. Grew figures what he calls a hazle catkin, and deſcribes it, p. 267, of his "Rarities at Greſham College."

Hazle-*hen*, in *Ornithology*, the name of a bird of the gallinaceous kind, common in the woods of Germany, and ſuppoſed by many to be the attagen of the ancients. See Tetrao *Bonaſia*.

HAZ-OGHU-BAZARZICH, or Agioi-Baſſordſeik, in *Geography*, a commercial town of European Turkey, in Bulgaria, inhabited by many rich Armenians; 38 miles S. of Driſtra.

HAZY Islands, a cluſter of ſmall iſlands, in the North Pacific ocean. N. lat. 55° 55′. E. long. 225° 42′.

HEA, a maritime province of the kingdom of Morocco, bounded N. by the river Tauſif, E. by the province of Sherma, on Cherma, W. by the ocean, and S. by the province of Sus. The inhabitants of Hea are a trading people, but reſtleſs and little civilized; they are perpetually diſtracted by inteſtine broils. The province of Sherma, which lies between this and that of Morocco, has been diſmembered from that of Hea.

Head, *caput*, the uppermoſt or foremoſt part of the body of an animal.

Pliny, and other of the ancient naturaliſts, ſpeak of a nation of people without heads, called Blemmyes.

We have accounts, in modern geographers and travellers, of people whoſe heads are as flat as the hand; it being the cuſtom among them to flatten the childrens' heads, when new-born, by paſſing them through a preſs, or laying them between two planks with a conſiderable weight thereon. Theſe are ſaid to be the inhabitants of the province of Coſaquas, on the river Amazons, in South America.

For an account of the various ſhapes of the head, and of the methods employed in producing them, among people of different nations, ſee Cranium.

Head, in *Anatomy*, that diviſion of the body, which is placed at the upper extremity of the vertebral column. We may conſider this in two different points of view: 1ſt. As a bony ſtructure, formed into cavities, which contain and protect the brain, the principal organs of ſenſe, and the inſtruments of maſtication; and, 2dly. As a more or leſs heavy maſs, articulated with the neck, and capable of being moved on it in various directions.

The upper two-thirds of the head form a large oval cavity, in which the brain is lodged, and towards the inferior and lateral parts of which the organs of hearing are placed; under the front of this is placed an aſſemblage of bones of an irregular figure, compoſing the face, and forming the orbits, the noſe, and the mouth, which contain the organs of ſeeing, ſmelling, and taſting, as well as thoſe of maſtication, and a part of ſuch as are concerned in ſwallowing.

The oſteology of theſe parts is conſidered under Cranium; together with the figure, dimenſions, and relative proportions of the component parts, the national differences in the form of the head, the ſtructure and formation of the teeth, &c. The contents of the cranium are deſcribed in the article Brain; the organ of hearing under Ear; the contents of the orbit and naſal cavities under Eye and Noſe; the organ of taſte under Tongue; thoſe of maſtication and deglutition, excepting the jaws and teeth, which are deſcribed with the oſteology, under Deglutition.

The external ſurface of the head preſents very different outlines in different parts of its circumference. On the upper part of its front aſpect, on the ſuperior portion, the ſides and back part, the forms are all convex or rounded, but do not exhibit the regular curves, and preciſe dimenſions, which are the attributes of geometrical figures. The aſpects, which we have now indicated, are all parts of the oval caſe, in which the brain is lodged. The integuments are covered, except on the forehead, by hair; and they are called altogether the hairy ſcalp. (See Integuments.) In deſcending from the forehead we come to the face, of which the outline is very irregular, but ſo well known, that we ſhall be excuſed from particularly deſcribing it. The parts of this diviſion, which in common language are termed the features, are connected with the organs already alluded to; the eye-brow and eye-lids are deſcribed with the eye; the noſe with that organ; the lips and cheeks, the boundaries of the cavity, in which maſtication is carried on, under the article Deglutition. The inferior ſurface of the head, which is its broadeſt and moſt extenſive aſpect, reſts upon the neck, and affords attachment to the muſcles, by which the former is moved upon the latter organ. The external view preſents to us the head, as extending, both in front and behind, beyond the out-line of the neck: the poſterior projection, which conſiſts of the convexity of the occiput, is the leaſt conſiderable; the anterior is compoſed of the front end of the lower jawbone called the chin. The lateral convexities of the head are gently continued by a gradual ſlope into the ſides of the neck.

The head is articulated with the firſt vertebra of the neck, in ſuch a manner, that the canal of the ſpine correſponds to the foramen magnum of the occipital bone. And the ſituation of this articulation is nearly in the centre of the baſis cranii; nearly in the middle of a line, drawn between the moſt prominent points of the inciſor teeth and occiput. The place of the great occipital foramen, and of the condyles placed towards its front, is nearly parallel to the horizon; coincides nearly with that of the palate; while that of the eyes and mouth is nearly vertical. Hence, in the erect attitude of the body, the former organs are directed forwards.

In conſequence of the articulation between the head and the vertebral column being placed nearly in the centre of the baſis of the ſkull, ſo that the ſpine is placed perpendicularly under the head, the weight of the latter is ſuſtained almoſt entirely by the former. The head would be in a ſtate of perfect equilibrium on the ſpine, in the erect attitude of the body, if the parts in front of this point exactly counterbalanced thoſe which are behind it. But the centre of gravity of the whole head falls in front of the articulation; ſo that it would incline forwards on the atlas, if all extraneous ſupport were ſuddenly removed. This tendency of the parts is reſiſted partly by a ligament, which paſſes from the vertebra of the neck to the occiput, and partly by the muſcles, which are placed at the back of the articulations.

The ligamentum nuchæ, or cervical ligament, (ligament ſurépineux cervical of Bichat,) is a thin fibrous ſtratum, attached to the ſpines of the cervical vertebra on one ſide, and to the occiput on the other, and affording attachment to various muſcles at the back of the neck. It has two flat ſurfaces, which are turned towards the right and left cervical muſcles; an anterior, a ſuperior, and a poſterior margin. The former of theſe is affixed to the ſpinous proceſſes; the ſecond to the external perpendicular ridge, and to the tuberoſity of the occipital bone; and the third is extended in a ſtraight line from the occipital tuberoſity to the laſt cervical ſpine. The compoſition of the ligament is of a fibrous nature, and generally very thin: the poſterior margin in general is its thickeſt part. In ſome ſubjects it is very weak. Its uſe ſeems to be that of affording ſome ſupport to the head, and preventing it from inclining forwards. We ſhall be able to underſtand the anatomy and uſe of this ligament beſt by obſerving it in quadrupeds, where the ſituation of the occipital condyles, and the principles on which the head is maintained in its poſition, with reſpect to the vertebral column, are ſo different from what we obſerve in the human ſubject.

The former ſubject is conſidered in the article Cranium, under the head of *the compariſon of the human ſkull to that of animals*. In conſequence of the occipital condyles being placed ſo far back in the head, as we ſee them to be in animals, where, in moſt inſtances, they are at its poſterior ſurface, the whole maſs of the head, inſtead of being in equilibrio on a perpendicular column placed under it, is in front of that column; and requires for its ſupport a cervical ligament of enormous thickneſs and ſtrength, of which we can form no adequate notion from the inconſiderable analogous part in the human ſubject. If the ſpine were placed perpendicularly in a quadruped, and the head thrown into the attitude, in which it would be in equilibrio on the ſpine, the eyes would be turned backwards, and the mouth directly upwards.

For the form of the bones, which conſtitute the groundwork of this articulation, we muſt refer to the articles Cranium and Spine. Thoſe articulations of the latter, which deviate from the general diſpoſition, and conſequently require ſeparate notice, are eſpecially concerned in the motions of the head: they are, that of the occiput with the atlas, of the ſame bone with the axis, and that of theſe two vertebræ with each other: for, although the latter have no connection with the occiput, it is entirely ſubſervient to the rotation of the head, which moves in this caſe with the atlas. Each of theſe three articulations muſt be particularly deſcribed.

Articulation of the occiput with the atlas (articulation occipito-altoïdienne). The condyles of the former bone are received in the ſuperior articular cavities of the latter; the reſpective ſurfaces being covered by cartilaginous ſtrata. They are both directed obliquely inwards and forwards, ſo that the two joints approach each on the front, and recede behind. An anterior and a poſterior ligament, and a ſynovial membrane at each condyle, ſerve to maintain the bones in their proper relations to each other, and to facilitate their motion.

The anterior ligament is compoſed of two faſciculi: a ſuperficial one, narrow, thick, and rounded, deſcending from the baſilary proceſs to the tubercle of the anterior arch of the atlas; a broader, thin, and flattened one, attached to the occiput between the condyles, and to the atlas between its articular hollows. The firſt is made up of parallel fibres; the ſecond, of which the fibrous ſtructure is not ſo diſtinct, of threads which purſue various directions. The ligament formed by their juxtapoſition correſponds to the recti muſcles in front, and behind to the odontoid proceſs and its ligaments.

The poſterior ligament, broader than the former, conſiſts alſo of two portions, which are attached above to the poſterior ſemi-circle of the foramen magnum, and divide below. The poſterior is fixed to the arch of the atlas; and the anterior is loſt upon the dura mater, the fibrous compoſition of which it reſembles, while the other has a looſer texture. This ligament, taken altogether, is broad, and very diſtinctly marked; it correſponds in front to the dura mater, behind to the poſterior recti muſcles, and the ſuperior oblique; on the ſides to the vertebral arteries, and ſub-occipital nerves.

The ſynovial membrane covers the condyle, and a ſmall part of the bone in front, on one ſide, and, on the other, the correſponding hollows of the atlas. As it paſſes between theſe, it lines, in front, a fibrous faſciculus, behind, a conſiderable portion of cellular ſubſtance, on the inſide, the extremity of the tranſverſe ligament, which thereby acquires a ſmooth ſurface, and a part of the odontoid ligament; moreover, ſome ſmall portions of fat projecting towards the joints, and formerly conſidered as glands.

Connection of the occiput with the axis (articulation occipito-axoïdienne). There are not here, as in the preceding articulation, any contiguous ſurfaces covered with cartilage, and conſequently moving on each other; the two bones are held together merely by two ſtrong lateral or odontoid ligaments, and by a poſterior ligament.

The lateral, or odontoid ligaments, are two in number, attached to the apex and ſides of the odontoid proceſs, continued upwards and outwards in a diverging manner, and inſerted in the inner part of the anterior end of each condyle. Their fibres are parallel, and united by a very cloſe tiſſue, and they form two thick, rounded and ſhort faſciculi. They correſpond behind to the next ligament, above and in front to cellular tiſſue, which ſurrounds the odontoid proceſs and favours its motions.

The poſterior ligament (apparatus colli ligamentoſus, or occipito-axoïdien,) is a broad flattened faſciculus, thin at its middle, and thicker on the ſides. Above it is attached to the baſilary ſurface of the occiput, it deſcends over the odontoid proceſs, and has the following terminations below. In front it is attached to the upper edge of the tranſverſe ligament, the ſucceeding or middle fibres are inſerted into the body of the axis, and the poſterior are confounded with the poſterior ligament of the vertebræ, of which they may be ſaid to be the ſuperior origin. It will be obvious from this deſcription that its fibres are of unequal lengths; they are diſpoſed in a parallel manner, and are cloſely arranged. Behind it correſponds to the dura mater, to which it adheres above; the baſilary proceſs of the occiput, the odontoid proceſs, the tranſverſe ligament, and the poſterior ſurface of the axis are covered by it on the front connection of the atlas with the axis (articulation atiloïdo-axoïdienne). Here there are two modes of attachment: the odontoid proceſs is confined in a peculiar manner, and the body, the plates, and the articular proceſſes of the two vertebræ are joined together.

The odontoid proceſs poſſeſſes, for its articulation, two convex ſurfaces, an anterior and a poſterior, both covered by a thin ſtratum of cartilage. The former correſponds to a cartilaginous ſurface on the back of the anterior arch of the atlas; the latter moves againſt the tranſverſe ligament. The joint poſſeſſes two ſynovial membranes and a tranſverſe ligament.

The tranſverſe ligament is a thick and flattened fibrous faſciculus, rather broader in the middle than at the extremities, which are inſerted in the internal ſides of the upper hollows of the atlas. The ligament is extended behind the odontoid proceſs, deſcribes in its courſe about the fourth of a circle, and thus forms, with the anterior arch of the atlas, a kind of ring, in which the odontoid turns, or which turns upon it. It is contiguous, behind, to the ligament laſt deſcribed, in front, to the odontoid proceſs and its ligaments. Its fibres are parallel and very cloſe. A ſmall faſciculus, detached from its lower edge, is fixed to the body of the axis, and holds the ligament in its proper ſituation. The upper edge is ſometimes ſurmounted by a ſmaller tranſverſe band, having the ſame direction as the larger one, and ſeparated from it by cellular tiſſue.

The anterior ſynovial membrane covers the ſmooth ſurface of the atlas in front, and the anterior one of the odontoid behind. Where it is continued between theſe it is looſe, and ſurrounded by much cellular tiſſue.

The poſterior ſynovial membrane covers the poſterior ſurface, and a little of the ſides of the odontoid proceſs, and the front of the tranſverſe ligament. It is ſurrounded by much cellular ſubſtance, and allows a free motion of the parts.

The general conection of the atlas with the axis is effected by the two articular ſurfaces of theſe vertebræ, which, when compared to the correſponding proceſſes of the ſucceeding bones, are diſtinguiſhed by their horizontal diſpoſition and very great breadth. They are covered by thin cartilages, furniſhed with ſynovial membranes, and tied together by an anterior and a poſterior ligament.

The fibres of the anterior ligament ariſe from the inferior edge of the front arch of the atlas, deſcend, and are inſerted into the baſis of the odontoid proceſs and into the body of the vertebra. The recti majores partly cover this ligament.

The poſterior ligament is thin and very looſe, to permit the rotatory motions of the atlas on the axis, it ariſes from the poſterior arch of the former, and is inſerted into the laminæ of the latter. Its texture, which is almoſt cellular, has no analogy to the yellowiſh ligaments, of which it fills the ſituation. It correſponds in front to the dura mater, behind to the inferior oblique muſcles, and much cellular ſubſtance.

The ſynovial membrane is remarkable for its great laxity, which permits a correſponding extent of motion. It covers the articular ſurface, and a little of the neighbouring bony part of the atlas, then deſcends upon the axis, and covers its ſurface. Its looſe portion, continued between theſe two parts, is ſurrounded by much cellular tiſſue, on the inſide by the interior ligaments of the vertebral canal, and externally by the vertebral artery. This ſynovial membrane is rather ſtronger than the preceding ones.

Motions of the Head.—Theſe are of two kinds: 1ſt, thoſe in which the head is carried directly forwards, backwards, or in any other direction; and 2dly, rotation, in which it moves on its own axis. Two ſeparate articulations are provided for theſe movements: the former are effected by the joints compoſed of the occipital condyles, and the ſuperior hollows of the atlas; the latter by the connection of the atlas with the axis.

The motions of the head upon the atlas, are thoſe of flexion (in which the head is carried towards the front of the trunk, or forwards), extenſion (where it is moved in the oppoſite direction), and inclination to either ſide. In all theſe, the cervical region of the vertebral column muſt be previouſly fixed to afford a point of ſupport. The head repreſents in all a lever of the firſt kind, in which the fulcrum is at the joint, and the power and reſiſtance vary according to the kind of motion. The lateral inclination is very limited. Beſides theſe, Bichat mentions circumduction, or the ſucceſſive performance of the different kinds of motion juſt enumerated; but adds that it is very obſcure.

The motions forwards and backwards, although the moſt extenſive belonging to this joint, are ſtill very limited; and amount merely to a ſlight nodding in either direction. However, the narrow limits of flexion, extenſion, and lateral inclination, are compenſated by the movements of the cervical vertebræ; which carry the head with them. Whenever the latter part is moved in any conſiderable degree, the effect is produced by a general motion of the cervical vertebræ. Flexion of the occipito-atloidal articulation is attended with a motion of the chin downwards and backwards, a diminution of the ſpace between the lower and the vertebral column, and a conſequent relaxation and folding of the ſkin on the front of the neck. On the contrary, when the cervical region of the ſpine is moved forwards, the relation between it and the jaw continues nearly the ſame, and the ſkin is, conſequently, not affected. Moreover, in the former caſe, the head turns on itſelf; in the latter, where the cervical vertebræ communicate their motion to the head, a much larger arc of a circle is deſcribed by the latter.

The ligaments, which tie the odontoid proceſs to the occiput, limit the motion of the head in the cavities of the atlas. Luxation cannot be produced in theſe motions; the articular ſurfaces are held together too firmly, the motions are too obſcure, and the odontoid ligaments reſiſt too effectually.

The muſcles, producing theſe motions, may be divided into two claſſes; *viz.* thoſe which affect the articulation between the occipital bone and the atlas only, and thoſe which are calculated to affect others as well as that articulation. Of the ſecond claſs ſome are attached to the lower jaw, and others to the bones of the cranium. The former are: 1, recti capitis interni minores; 2, recti capitis laterales; 3, recti capitis poſtici minores; 4, obliqui capitis ſuperiores. The latter form two claſſes, of which one conſiſts of muſcles attached to the lower jaw, or os hyoides, and includes; 1, latiſſimi colli; 2, biventres maxillæ; 3, mylohyoidei; 4, geniohyoidei; 5, geniohyogloſſi; 6, omohyoidei; 7, ſternohyoidei; 8, ſternothyroidei; 9, thyrohyoidei. The ſecond claſs contains muſcles attached to the bones of the cranium, and conſiſts of: 1, ſternomaſtoidei; 2, recti capitis interni majores; 3, certain fibres of the trapezii; 4, ſplenii capitis; 5, complexi; 6, recti capitis poſtici majores; 7, trachelo-maſtoidei. We obſerve, from this enumeration, that the motions of the head are provided for by very numerous muſcles. "In their general directions they are ſeen," ſays Dr. Barclay, "like all other muſcles, where motions in various directions are required, to differ conſiderably as to obliquity; and by their decuſſations at various angles, not only to ſtrengthen the connections of the bones, but to multiply the natural diagonals of their fibres. By this arrangement they combine their forces in ſuch an infinite number of ways, and with ſuch facility, that the parts, which they move, are all moved, directed, and moderated, with but little change in the relative poſition of their muſcular fibres, and yet, at the ſame time, with a rapidity, minuteneſs, ſteadineſs, and accuracy, that exceed comprehenſion." On the muſcular Motions of the Body, p. 319.

The greateſt number, and by far the moſt powerful muſcles, are placed at the back of the head, and paſs between the poſterior ſurface of the vertebral column and the occiput. Their action, in the erect ſtate of the body, counteracts the tendency, which the head has to fall forwards, derived from what we have already explained concerning the poſition of the occipito-atloidal articulation. Place the occipital condyles on any point of ſupport, and the head will incline forwards, unleſs it be held in equilibrio by a force applied behind; the extenſor muſcles, in the living body, have that power, and their conſtant exertion is neceſſary to the maintaining the head in equilibrio on the vertebral column. Hence, if their contraction be ſuddenly ſuſpended, as when a perſon falls aſleep in the ſitting poſition, with his head unſupported, that part does immediately incline forwards on the ſpine.

Motions of the atloido-axoidal articulation.—The head accompanies the firſt vertebra in all the motions of that bone upon the ſecond. Theſe are performed in a horizontal plane, and conſiſt of rotation to the right and left. The tranſverſe ligament behind, and the anterior arch of the atlas in front, manifeſtly oppoſe the ſmalleſt attempts at flexion and extenſion, becauſe they meet immediately in the odontoid proceſs with an inſurmountable obſtacle. Lateral inclination is equally prevented by the odontoid ligaments, which alſo ſerve to limit the rotations of the atlas on the axis. The looſeneſs of the ſynovial membrane admits the greateſt latitude of motion in the inferior horizontal planes of the atlas on the ſuperior ones of the axis; and this kind of rotation is limited merely by the odontoid ligaments. Beſides the breadth of the horizontal planes, and the laxity of the ſynovial membrane, which ſo greatly favour extenſive motion in this articulation; we obſerve, as a further diſpoſition calculated to ſecure the ſame object, that there are no lateral riſings that can in any way check the rotatory motion. The ſtate of the articulation, in this motion, is as follows: the arch of the atlas, and the tranſverſe ligament roll againſt the odontoid proceſs; the inferior horizontal planes of the former move over thoſe of the latter, and paſs conſiderably over their edges, in oppoſite directions on the right and left ſides. The ſynovial membranes, the anterior and poſterior ligaments, and the odontoid ligaments are ſtretched.

Probably luxation may occur, when this motion is carried beyond a certain extent with conſiderable force.

In the rotatory motions, the head and atlas are firmly held together by the muſcles, which paſs between thoſe parts; in this way they are fixed and prevented from obeying any forces that might incline them in any direction. The muſcles, which rotate, are the following: *viz.* 1, latiſſimi colli; 2, obliqui capitis inferiores; 3, a part of the ſplenii colli, and all the muſcles enumerated laſt, except the interni capitis majores.

"During theſe motions," ſays Dr. Barclay, "the muſcles peculiar to the head and atlas, and the muſcles of the neck, from the vertebra dentata downwards, become fixors; and thus the inclinations of the head and neck, ariſing from the action of the rotatory muſcles being every where prevented, the only directions, in which they can ſenſibly exert their forces, muſt be horizontal; in which directions, if they act alternately, the head muſt move, without inclination, towards the right or left, on the vertebra dentata. But, as in theſe motions the two halves of the ſecond pair cannot co-operate, the muſcles employed to roll the head, ſo as to turn the face to the right, are: 1, the right latiſſimus colli; 2, left ſternomaſtoideus; 3, part of the left trapezius; 4, 5, right ſplenius capitis and colli; 6, left complexus; 7, right rectus capitis poſticus major; 8, right obliquus capitis inferior; 9, right trachelo-maſtoideus. The remaining halves of the ſame pairs will roll it to the left; and the two halves of the ſame pairs act alternately as moderators and motors." On the muſcular Motions, p. 321.

HEAD, *water in the*, and *dropſy in the*. See HYDROCEPHALUS and DROPSY.

HEAD, *Injuries of*. See INJURIES *of the Head*.

HEAD, *Ulcers of the*. See PORRIGO.

HEAD *of Birds*. See BIRDS.

HEAD *of Fiſh*. See FISH.

HEAD is alſo applied in a general ſenſe, by analogy, to the uppermoſt or principal extremity of any thing; or figuratively, when ſpeaking of communities, to the ſuperior; and, when referred to place or priority, is that ſtation or poſition which is moſt honourable.

HEAD, in *Architecture*. Heads are uſed as an ornament of ſculpture or carved work, frequently ſerving as the key of an arch or plat-band, and other occaſions.

Theſe heads uſually repreſent ſome of the heathen divinities, virtues, ſeaſons, ages, &c. with their attributes. The heads of beaſts are alſo uſed in places ſuitable thereto: as a bullock's or ſheep's head, for a ſhambles or a market-houſe; a dog's for a kennel; a deer's or a boar's, for a park or foreſt; or a horſe's, for a ſtable, &c.

In the metopes of the friezes, and other parts of certain antique Doric temples, we meet with repreſentations of bullocks' or rams' heads flayed, as a ſymbol of the ſacrifices offered there.

In *Heraldry*, the heads of men, beaſts, birds, &c. are borne in armoury, either full-faced and in front, or ſide-faced and in profile, which muſt be diſtinguiſhed in blazoning.

Among *Medalliſts*, the different heads on ancient coins are diſtinguiſhed by the different dreſſes thereof. See MEDAL.

In the imperial medals, where the head is quite bare, it is uſually a ſign the perſon was not an emperor, but one of the children of one, or the preſumptive heir of the empire. Though we have inſtances of thoſe who were only Cæſars, and never reigned, being crowned with laurel or adorned with a diadem ; as, on the contrary, we have ſome emperors heads entirely bare. The heads which are covered, are either covered with a diadem or a crown, or a ſimple caſk, or a veil, or with ſome other foreign covering ; whereof the diadem is the moſt ancient. The ſenate firſt granted it to Julius Cæſar to wear the laurel crown, which his ſucceſſors took after him. The heads of deities are frequently diſtinguiſhed by ſome ſpecial ſymbol thereof.

HEAD is alſo uſed for the horns of a deer, as a hart, buck, &c.

Harts mew, or caſt their heads, every year, and get new ones.

The old hart or buck caſts his head ſooner than the young ; and the time is about the month of February or March. Having caſt their heads, they inſtantly withdraw into the thickets, hiding themſelves in convenient places near good water, &c. and far from the annoyance of flies.

After they have mewed, they begin to *button* again in March, or April, *i. e.* to ſhoot out new horns, which at firſt appear like little branches.

Note, if a hart be gelt before he have a head, he will never bear any ; and if he be gelt when he has a head, he will never after mew or caſt it. If only one of his teſticles be taken out, it is ſaid, he will want a horn on that ſide ; and that, if one of the teſticles be only tied up, he will want the horn of the oppoſite ſide.

The age of a hart or deer is uſually reckoned by the number of heads. A deer of the firſt head, of the ſecond head, &c.

At one year they have nothing but bunches, called *ſignificators*, of horns to come. The ſecond year they appear more perfectly, but ſtraight and ſimple ; this makes the firſt head, properly called *broches*, and in a fallow deer *pricks*. The third year they grow into two *ſpears*, or four, ſix, or eight ſmall branches. At the fourth, they bear eight or ten. At the fifth, ten or twelve. At the ſixth, fourteen or ſixteen. At the ſeventh year they bear their heads beamed, branched, and ſummed, as much as they will bear, never multiplying farther, but only growing in magnitude.

The names and diverſities of heads, in the hunting language, are as follow :

The part that bears the antlers, royals, and tops, is called the *beam*, and the little ſtreaks therein are *glitters* : that which is about the cruſt of the beam is termed *pearls* ; and that which is about the bur itſelf, formed like little pearls, is called *pearls bigger than the reſt* ; the *bur* is next the head, and that which is about the bur is called *pearls* ; the firſt branch is called *antler*, the ſecond *ſur-antler* ; all the reſt which grow afterwards, till you come to the crown, palm, or croche, are called *royals*, or *ſur-royals* ; the little buds or broches, about the tops, are called *croches*.

The heads alſo go by ſeveral names. The firſt head is called a *crown top*, becauſe the croches are ranged in form of a crown ; the ſecond is called a *palmed top*, becauſe the croches are formed like a man's hand. In all heads which bear not above three or four, the croches, being placed aloft, all of one height, in form of a cluſter of nuts, are called *heads of ſo many croches*. All heads which bear two on the top, and have their croches doubling, are called *forked heads*. All heads which have double burrs, or the antlers, royals, and croches, turned downwards contrary to the other heads, are called *ſimple heads*. See HUNTING.

HEAD is ſometimes alſo uſed for the whole man.

In this ſenſe we ſay, to offer a reward for a man's head.

In proſcriptions, there is a price ſet on a man's head.

Capitation denotes a tax laid upon each head, called alſo *poll* and *head-money*.

HEAD, in the *Military Art*. *Head of the camp* is the front or foremoſt part of the ground an army is encamped on, or that which advances moſt towards the field or enemy. The head of the camp is always to be the beſt fortified.

In the like ſenſe we ſay, the *head of the trenches*, the *head of the ſap*, *of the works*, &c. meaning the *fronts*, or *thoſe* parts next the enemy, and fartheſt from the body of the place. See TRENCH and ATTACK.

The *head of a horn-work* is that part contained between the flanked angles of the two demi-baſtions.

HEAD alſo denotes an ornamental figure erected on the continuation of a ſhip's ſtem, as being expreſſive of her name, and emblematic of war, navigation, commerce, &c.

HEAD-*ledges* are the thwartſhip pieces which frame the openings in the decks.

HEAD, in the *Manege*. The perfections required to the head of a horſe are, that it be ſmall, narrow, lean, and dry. Horſes with a big groſs head are apt, by their weight, to reſt and loll upon the bridle, and ſo to incommode the rider's hand. A horſe with a large head can never look ſtately, unleſs he have a long and very well-turned neck, and place his head well. Horſes with groſs, fat heads, much charged with fleſh, are too often ſubject to infirmities of the eyes.

But the chief things in a horſe's head is a good *onſet*, ſo as he may be able to bring his head into its natural ſituation ; which is, that all the fore-part, from the brow to the noſe, be perpendicular to the ground ; ſo that if a plummet were applied thereto, it would but juſt raze or ſhave it. See HORSE.

The head of a horſe is alſo uſed to import the action of his neck, and the effect of the bridle and wriſt.

To give a horſe the head, ſee ECHAPPER.

HEAD *in, and likewiſe the hips*, is a phraſe importing that you muſt paſſage your horſe with his *head and croupe in*, *i. e.* work him ſide-ways upon two parallel lines, of a ſtep or trot, ſo that when the horſe make the ſtep or volt, his ſhoulders make a *piſte* or tread, at the ſame time that his haunches give the tract of another ; and the horſe plying or bending his neck, turns his head a little within the volt, and ſo looks upon the ground he is to go over.

HEAD, *Moors*, is underſtood of a horſe with a black head and feet, the body being uſually of a roan colour. It is alſo uſed by engineers for a kind of boom or grenade ſhot out of a cannon ; in *Heraldry*, for a repreſentation, uſually in profile, of a *blackmoor's head*, ſwathed or rolled about with a bandage ; frequently borne as a creſt ; in *Chemiſtry*, as a cover or capital of an alembic, having a long neck, to convey the vapours raiſed by the fire into a veſſel, which ſerves as a refrigeratory. In *Muſic*, the head of a lute, theorbo, or the like, is the place where the pins or pegs are ſcrewed, to ſtretch or ſlacken the ſtrings.

HEAD, *Dragon's*, in *Aſtronomy*, &c. is the aſcending node of the moon or other planet.

HEAD-*ache*, in *Medicine*. See CEPHALALGIA and HEMICRANIA.

HEAD, in *Rural Economy*, that part of an animal by which the food is taken into the ſtomach, and which in all domeſtic quadrupeds ſhould be ſmall in proportion, well formed, and well connected with the neck and ſhoulders. See BREEDING and LIVE *Stock*.

HEAD, a term not unfrequently made uſe of by graziers to ſignify the firſt bite of graſs, eſpecially when fattening bullocks are concerned, in which caſe they are ſaid to *go a* *head* in oppoſition to the *followers*, or thoſe which come after them.

Head, *Ill*, a diſeaſe in ſheep, of the jaundice kind. See Yellows.

Head *Keep*, a term which is frequently employed by graziers to denote the firſt *bite* of paſture lands, or the beſt *keep* that is afforded by the farm for the ſupport of cattle ſtock, ſheep, &c.

Head-*land*, a name moſtly made uſe of to ſignify the land or ridge which runs croſſways at the top and bottom of a field, and which ſerves for the purpoſe of turning the plough upon, in its cultivation. As much mould or ſoil is conſtantly accumulating upon them, in conſequence of the plough ſo frequently turning upon them, they become proper in ſome caſes to be formed into compoſts with lime or manures of ſome other kind. The work may in ſome inſtances be executed by means of the plough, but ſeldom in ſo complete a manner as by the uſe of the ſpade. In the former mode there is, however, a great ſaving of expence as well as time. The moſt proper manner of forming the ſuperficial materials of head-lands into compoſts, where plough-labour is wholly employed, is that of frequently ploughing over ſuch lands during the ſummer months, in order to break down and clean them well from all ſorts of weeds, and likewiſe to incorporate the lime or other matters very intimately with the particles of the mould ; in which intention the lime, dung, or other manure ſhould previouſly be ſpread out in a thin even manner over every part, beginning the work of ploughing in the middle of the head-land. As ſoon as the calcareous ſubſtances have been well intermixed with the earthy materials, dung may be ſpread out, and be well blended with the other matters.

But where the ſoil of head-lands of this kind is of the more ſtiff clayey deſcription, it will be neceſſary to lay the earth up in high ridges for the winter ſeaſon, in order that it may be well broken down and mellowed by the froſt, harrowing it well in the ſpring with a heavy harrow, and afterwards incorporating the lime, dung, &c. in the manner that has been already adviſed.

In caſes where lime is the only ſubſtance made uſe of, the intermixture may be very completely formed by the plough and the harrow, care being taken not to apply the whole of the lime on at once, but at different times, ploughing and harrowing the land over well after each application of the lime. Even where dung is employed in this mode, it may be blended with the ſoil in the ſame method, as ſoon as the lime has become perfectly effete in the ſoil.

In theſe ways very good earthy compoſts may be formed with but little trouble or expence. See Compost and Manure.

Head-*ſtock*, a term frequently applied to the beſt or leading ſtock by graziers.

Head is applied to the bank or principal ground of a reſervoir ; alſo to the top water line of a mill or dam, or other variable pen of water.

Head *of Ayr*, in *Geography*, a cape on the W. coaſt of Scotland, in the county of Ayr. N. lat. 55 30′. W. long. 4° 38′.

Head *of Elk*, a town of Maryland, at the head of Cheſapeak bay.

Head *of May*, a cape of South Wales, in the county of Pembroke ; ſix miles W.S.W. of Pembroke.

Head-*borow*, or Head-*borough*, ſignifies the perſon who is the chief of the frank-pledge, and had anciently the principal direction of thoſe within his own pledge.

He was alſo called *burrow-head*, *bur-ſhoulder*, now *bolſholder*, *third-borow*, *tything-man*, *chief-pledge*, and *borow-elder*, according to the diverſity of ſpeech in divers places.

This office is now uſually called a *high-conſtable*.

The head-borow, was the chief of ten pledges ; the other nine were called *hand-borows*, or *plegii manuales*, &c.

Head, *by the*, in *Sea Language*, denotes the ſtate of a ſhip which is laden deeper at the fore-end than the after-end.

Head-*farcin*. See Farcin.

Head-*faſt*, in *Sea Language*, ſignifies a rope employed to faſten a ſhip to a wharf, chain, or buoy, or to ſome other veſſel along-ſide.

Head-*land*. See Land.

Head-*lines*, in a *Ship*, thoſe ropes of all ſails which are next to the yards, and by which the ſails are made faſt to the yards.

Head-*moſt*, in *Sea Language*, denotes the ſituation of any ſhip or ſhips, which are the moſt advanced in a fleet or line of battle.

Head-*mould-ſhot*, a diſeaſe in children, wherein the ſutures of the ſkull, generally the coronal, *ride* ; that is, have their edges ſhot over one another ; and are ſo cloſe locked together, as to compreſs the internal parts, the meninges, or even the brain itſelf.

The diſeaſe uſually occaſions convulſions, and is ſuppoſed to admit of no cure from medicine, unleſs room could be given by manual operation or a divulſion of the ſutures.

The head-mould-ſhot is the diſorder oppoſite to the horſe-ſhoe-head.

Head-*pence*, an exaction of a certain ſum formerly collected by the ſheriff of Northumberland from the inhabitants of that county, without any account to be made to the king. This was aboliſhed by the ſtatute 23 Hen. VI. cap. 7. Blount.

Heads, a term uſed by builders for that kind of tile which they uſed to lay at the eaves of a houſe, being the full breadth of a common tile, and but half a tile in length.

Head-*rope*, in a *Ship*, is that part of the bolt-rope which terminates any of the principal ſails on the upper edge, which is accordingly ſewed to it.

Head-*ſails* are thoſe which belong to the fore-maſt and bowſprit ; for it is by theſe that the head of the ſhip is governed, and by which it is made to fall off and keep out of the wind ; ſuch are the fore-ſail, fore-top-ſail, fore-top-gallant-ſail, jib, fore-ſtay-ſail, and the ſprit-ſail, with its top-ſail : and theſe in quarter-winds are the chief drawing-ſails.

Head-*ſea* is when a great wave or billow of the ſea comes right a-head of the ſhip as ſhe is in her courſe.

Head-*ſtall*, in the *Manege*. See Caveson.

Head-*ſtall*, among *Ancient Muſicians*. See Phorbæa.

Head-*tin*, in *Metallurgy*, is a preparation of tin-ore toward the fitting it for working into metal. When the ore has been pounded and twice waſhed, that part of it which lies uppermoſt, or makes the ſurface of the maſs in the tub, is called the head-tin ; this is ſeparated from the reſt, and after a little more waſhing, becomes fit for the blowing-houſe.

Head-*to-wind*, in *Sea Language*, denotes the ſituation of a ſhip or boat when her head is turned to windward.

Head-*way* ſignifies the motion of advancing at ſea, and is generally uſed when a ſhip firſt begins to advance, or, in calm weather, when it is doubtful whether ſhe be in a ſtate of reſt or motion.

HEADFORD, in *Geography*, a ſmall poſt-town in the county of Galway, and province of Connaught, Ireland ; 103 miles N. by W. from Dublin.

HEADINGS, are ſmall ſoughs or tunnels driven under ground to collect and draw off the ſprings of water from any tunnel, deep-cutting, or other large work.

HEALFANG, Healsfang, or *Halsfang*, in our *Ancient Cuſtoms*, ſignifies *colliſtrigium*, or the puniſhment of the pillory.

The word is compounded of two Saxon words; *halp*, *neck*, and *pangen*, *to contain*: "Pæna ſcilicet qua alicui collum ſtringatur." The healfang, however, cannot ſignify a pillory in the charter of Canutus, De Foreſtis, cap. xiv. "Et pro culpa ſolvat regi duos ſolidos, quos Dani vocant halfehang."

Healfang is alſo taken for a pecuniary puniſhment or mulct to commute for ſtanding in the pillory; and is to be paid either to the king or to the chief lord.

"Qui falſum teſtimonium dedit, reddat regi, vel terræ domino healfang." Leg. Hen. I.

HEALING, in its general ſenſe, includes the whole proceſs of curing or removing a diſorder, and recovering health.

In this ſenſe, medicine is defined the art of healing.

In its more reſtrained ſenſe, as uſed in ſurgery, &c. healing denotes the uniting or conſolidating the lips of a wound or ulcer.

The medicines proper for this intention, are called *incarnatives*, *agglutinatives*, *vulneraries*, &c.

Dr. Beal has a diſcourſe of ſanative or healing ſprings and waters, in the Philoſophical Tranſactions, N 20.

Healing, in *Architecture*, denotes the covering the roof of a building.

The healing is various; as of lead, tiles, ſlate, Horſham-ſtone, ſhingles, or reed and ſtraw.

HEALTH, may be defined that condition of the living body, in which all its functions are performed without impediment or pain.

The animal machine conſiſts of a bony frame, connected by muſcles and ligaments, and including a variety of organs, which are deſtined to perform certain offices or functions. Thoſe offices immediately neceſſary to its exiſtence, which have therefore been called *vital* functions, and which cannot be interrupted without danger to life, are the functions of the circulation of the blood, of breathing, and of the irritability connected with the influence of the nervous ſyſtem. Poſſeſſing theſe powers alone, however, the machine would ſoon periſh, for its ſolids would be worn down, and its fluids diſſipated by the inceſſant motion, or they would be ſpontaneouſly corrupted. But the intelligent conſtructor of the machine has endowed it with powers of repairing its loſſes, and of counteracting its tendency to deſtruction. Hence the *natural* functions, as they have been called, of digeſtion, ſecretion, and excretion or diſcharge, were ſuperadded; organs were formed for the reception and tranſmutation of food and drink, for its conveyance into the blood-veſſels, for its appoſition to the different decaying parts, and for the diſcharge of that which was ſuperfluous or noxious; and other fluids, ſerving ſome uſeful purpoſe in the economy, were deſtined to be formed, by organs of ſecretion, from the general maſs. Thus conſtituted, the vital machine would be devoid of connection with the external world, had not the *animal* functions, the ſenſes, the powers of volition, and of locomotion, and the mental faculties been ſuperadded, by which we are enabled to acquire a knowledge of the phyſical circumſtances of the world, and to modify them according to our neceſſities and pleaſures. We learn from experience, however, that a being, thus endowed, is ſtill liable to decay, and to diſſolve into his priſtine elements; but againſt this contingency alſo an ample proviſion is made, in the generative faculties or functions, the diviſion of the ſexes, and the inſtinctive appetites connected with them. See Function, and Life.

While each and all of theſe operations of the living ſyſtem are performed with regularity, freedom, and eaſe, the body is ſaid to be in *health*. This ſtate of health, however, is compatible with conſiderable variety in the ſtate of the functions, both corporeal and mental; whence we ſee the various temperaments and conſtitutions of individuals, which often deſcend from one generation to another; the various degrees of talent and diſpoſition; of ſtrength, magnitude, and ſymmetry in the corporeal ſtructure, and even varieties of the particular functions, ſuch as digeſtion, reſpiration, &c. Health therefore, and diſeaſe, as we have before remarked, (ſee Disease,) are to be conſidered in ſome degree as relative terms, regarding the individual, as compared with the generality of men, and alſo with himſelf at different times.

The moſt perfect health, however, is generally connected with a certain ſtructure of the corporeal organs, and is marked by certain ſigns and qualities of the ſyſtem. Thus the ſtrongeſt conſtitution, in which the functions are uſually carried on in the moſt healthy manner, is found in a well-formed and proportioned body, which is neither very tall nor very ſhort, neither lean nor loaded with fat; which is rather ſtout than ſlender, and is eſpecially endowed with an open full cheſt, and a breadth of ſhoulders. The bones, in ſuch a frame, are ſomewhat large, the muſcles fleſhy, well marked, firm, and ſtrong; the ſkin ſoft, never dry, but with a ſlight tendency to moiſture, and its colour, eſpecially in the face, ſteady and not variable, whether verging towards the fair or the brown, provided it neither approximate to paleneſs on the one hand, nor to yellowneſs on the other. The countenance is open and cheerful, with bright and quick eyes; and the teeth ſound and ſtrong. The ſtep is firm, the limbs giving a perfect ſupport to the body; the walk erect; all exerciſe is performed with eaſe and freedom, and even labour, although ſevere and long continued, does not exhauſt or derange the ſyſtem. All the organs of the external ſenſes are capable of performing their functions, being neither dull on the one hand, nor too acutely ſenſible on the other; the ſleep is calm and continued, not eaſily diſturbed, refreſhing to the frame, and devoid, if not of all dreams, at leaſt of thoſe that are frightful; a ſleep which lays to reſt all the cares of life in a calm and grateful oblivion, or at leaſt ſoothes the mind with the agreeable phantoms of the imagination.

Among the ſigns of health may be alſo enumerated, a calm and regular circulation of the blood, the pulſe of the arteries being ſtrong, full, ſoft, and equal, neither too frequent nor too ſlow, nor eaſily excited to unuſual quickneſs; a full, free, ſlow, and almoſt imperceptible reſpiration, which is not greatly accelerated by exerciſe; a ſtrong and ſonorous voice, of a grave tone in men, and not eaſily rendered hoarſe; the halitus from the lungs agreeable, or at leaſt deſtitute of fætor; the mouth moiſt, and the tongue without fur, but not too red; the appetite good, and not requiring the aid of condiments, and the thirſt moderate; the digeſtion of all aliment eaſy and good, without eructation, or any uneaſineſs in the ſtomach; the diſcharge from the bowels of natural form, odour, and conſiſtence, and occurring daily; and the urine eaſily retained during a proper length of time, and then paſſed with facility; and though various in quantity, colour, and tranſparency, (according to the quantity of food, drink, exerciſe, &c.) depoſiting a proper ſediment on ſtanding, and the ſlower this depoſition is made the better; the perſpiration from the ſkin free and regular, but not amounting to ſweating, except when powerful cauſes concur to excite it; and the internal ſecretions equally free and regular, and neither too copious or too ſcanty. "Sani denique hominis eſt, venerem appetere, et ad eam valere, et ſobolem procreare."

There are ſome peculiarities in the ſigns of health in the female conſtitution, connected with the organs and functions belonging to the ſex. Among theſe ſigns are a free and regular diſcharge of the catamenia, without pain, neither too copiouſly, nor in too ſmall quantity;—a regular period of utero-geſtation, an eaſy parturition, at the proper period, and a copious ſecretion of milk, for the ſupport of the offspring.

Good health, moreover, in both ſexes, conſiſts not only in the proper performance of the functions, mental and corporeal, when no impediment is applied; but alſo, in a tenacity, as it were, of this regularity, and in an accommodation of the habit to many variations in the weather and ſeaſons, the diet, and mode of life; and thus, in bearing with impunity many cauſes of diſeaſe, which would altogether deſtroy the weaker or leſs healthy ſyſtem, or at leaſt endanger its falling into a ſevere diſeaſe. The health of the ſame individual, though it continue good, is not always the ſame; for many great changes occur in the animal economy during life; ſo that one man ſcarcely differs ſo much from others, of the ſame age with himſelf, as he differs from himſelf at different periods of his life, whether we conſider his form, the ſtrength of his body, or the qualities of his mind, or the internal ſtructure and functions depending upon them. Whence it happens, that the moſt perfect health, which firſt conducted the tender infantile frame to its vigour and perfection, and long ſuſtained the man in that condition, afterwards by degrees diminiſhes the ſtrength of the ſyſtem, and at length wears it out. (Gregory, Conſpect. Med. Theoret.)

> "Naſcentes morimur, finiſque ab origine pendet."

The *preſervation of health*, then, muſt conſiſt in avoiding all injuries to the organs of the body, and all derangements of the functions, which they perform, as far as lies in our power, conſiſtently with the exertions and expoſures which the duties of humanity require: in other words, in avoiding the exciting cauſes of diſeaſe, which have already been pointed out. (See DISEASE.) In a conſtitution, formed like that above deſcribed, with all the qualities conducive to the healthy performance of its functions, ſuch precaution indeed may ſeem almoſt ſuperfluous: but ſuch conſtitutions are not the lot of the majority of mankind; the majority have ſome weak part, ſome hereditary or conſtitutional prediſpoſition to certain maladies, or ſome acquired tendency to particular diſorders, from their education, profeſſion, and mode of life. It is to theſe more eſpecially, that the preſervation of health becomes an object of care, and by whom the precepts of the moraliſt and of the phyſician are not to be ſcorned with impunity. For with theſe perſons ſome one function or other is readily diſturbed or impeded; and ſuch is the general connection or ſympathy between the functions and organs of the body, that the whole ſyſtem is thus readily diſordered.

There are two circumſtances in the habits of life, by which the regularity of the functions is eſpecially maintained; namely, temperance in the gratification of the appetites, particularly the appetite for food; and exerciſe. Moderation in the uſe of food, while it does not overload the ſtomach, nor diſturb the proceſs of digeſtion, nor irritate the alimentary canal to inordinate action, ſupplies a good and ſufficient nutriment to the body, without incumbering any of its organs with a load of fat: and moderation in drink, while it contributes to perfect digeſtion, does not exhauſt the excitability of the ſtomach, and the ſyſtem at large, by its ſtimulus, nor produce thoſe derangements of the liver and other viſcera, with which ſickneſs, gout, dropſy, apoplexy, madneſs, and numerous other maladies are connected. (See DIET and DRUNKENNESS.) In a word, temperance is itſelf the act of avoiding the cauſes of half the diſeaſes to which the organs and functions of the human frame are liable. And exerciſe, again, as we have already fully explained, by exciting a free circulation in the moſt minute ramifications of the vaſcular ſyſtem, in every organ of the body, contributes to the more perfect performance of all their reſpective functions; or, in other words, directly conduces to the healthful condition of the whole frame. (See EXERCISE.) When, in addition to theſe precautions, the influence of cold is guarded againſt by proper clothing; the proper recruiting of the exhauſted powers is effected by regular ſleep; and all exceſſive play of the paſſions and emotions of the mind is avoided by ſhunning the cauſes of their excitement; when, in ſhort, every exceſſive ſtimulus which can exhauſt the vital powers, or prevent their recruital, is moderated or avoided, even the delicate frame may be ſupported, through a long and not unhealthful life, and that with fewer chances of ſuffering great and dangerous diſeaſe, than the robuſt individual, who is altogether negligent of ſuch precautions.

It were altogether ſuperfluous to attempt any minute detail of the circumſtances neceſſary to be attended to, with a view to the preſervation of health. Theſe differ ſo much according to the peculiarities of individual conſtitution, the various modes of life, the differences of climate, &c. that it muſt be left in a great meaſure to individual experience and obſervation to aſcertain the *juvantia* and *lædentia*, as the medical phraſe is; or, in other words, to acquire a knowledge of what is beneficial or injurious to the habit under every circumſtance. For, in reſpect to the preſervation of health, the individual "muſt miniſter to himſelf:" and there is much juſtice in the homely adage, "every man is either a fool or a phyſician at forty," when applied in this ſenſe; although, when conſidered as applying to the cure of diſeaſes, it is an obvious abſurdity. Nothing is more common, than to hear numerous inquiries made of medical men about the *wholeſome* or *unwholeſome* qualities of this or that ſpecies of food; inquiries which muſt be deemed frivolous and uſeleſs, and which can only be anſwered by the interrogatories which were commonly uſed on ſuch occaſions by an eminent phyſician. "Doctor, is this wholeſome?"—"Do you like it?" ſays the doctor. "Yes."—"*Does it agree with you?*"—"Yes."—"Why then it is wholeſome." But the truth is, there is no defect of information upon this ſubject; moſt perſons well know, for inſtance, what are the properties, in reſpect to their own conſtitution, of the ſubſtances uſed as food and drink; but they *will* not make uſe of that knowledge. It is not from ignorance, but from want of controul over the appetites, that men are in the conſtant habit of deranging the functions of the body. And as we have already ſtated, it is not ſo much from the pernicious *qualities* of the ſubſtances employed, as from exceſs in the *quantity* of all, that the health is injured, and the conſtitution deranged. (See DIET.) The ſame obſervation will apply to the neglect of the other ordinary exciting cauſes of diſeaſe; the certainty of ſome preſent gratification is not to be foregone from the mere probability of future ſuffering.

Of the Public Health.

The preceding obſervations relate only to individual health ; but there are many conſiderations of great importance relative to what may be termed the *public health*, or to the removal of thoſe cauſes of diſeaſe, which originate from the circumſtances of the ſocial ſtate, eſpecially where men are congregated in great numbers. To theſe cauſes many of the moſt extenſive and fatal ſpecies of peſtilence, as well as of the ordinary epidemic diſeaſes, which afflict mankind, are in ſome degree or other to be aſcribed. (See EPIDEMIC.) For although theſe have been chiefly obſerved to occur at certain ſeaſons, and are therefore partly the reſult of certain conditions of the weather ; yet theſe conditions of the weather operate principally, it would ſeem, through the medium of the circumſtances which the ſocial ſtate produces.

The two moſt frequent exciting cauſes of thoſe diſeaſes, which ſpread among the public at large, are, 1. The effluvia ariſing from the bodies of perſons already labouring under febrile diſeaſe, termed *contagious* or *infectious* effluvia, and which may be condenſed, and adhere to various ſubſtances, ſuch as clothing, furniture, &c ; and 2. Thoſe which ariſe from moiſt ſwampy ground, or from artificial collections of animal and vegetable matters, in a putrid or decompoſing ſtate. To the former of theſe, malignant, putrid, and ſpotted fevers, as they have been called, commonly owe their origin, and the plague, yellow fever, &c. probably their extenſive propagation ; and from the ſecond, intermittents, remittents, dyſenteries, and perhaps the plague and the yellow fever, have been generally derived.

The operation of theſe cauſes may be moſt obviouſly traced in camps. All the writers on army-diſeaſes, from ſir John Pringle downwards, have ſhewn, that when a camp is ſtationed in a ſwampy ſituation, or when it has remained for a length of time on ground not originally ſwampy, but rendered ſo by the accumulating filth of an army, ſuch as the urine and excrements, the remains of the victuals, the water uſed in cookery and in waſhing, &c. which is neceſſarily impregnated with animal and vegetable matter, a certain claſs of diſeaſes inevitably appear among the men, and become prevalent throughout the camp ; eſpecially in the autumnal ſeaſon, when the ground has been heated by the ſummer ſun, and the dampneſs increaſed by the rains of autumn. The diſeaſes, which occur in ſuch ſituations, are remittent and intermittent fevers, malignant or typhous fevers, and dyſentery. Under ſuch circumſtances the ſickneſs of the Engliſh army, employed in the recent diſaſtrous expedition to Walcheren originated ; and ſuch were the diſeaſes which inflicted ſo much ſuffering and mortality among the troops. Now, that the origin of theſe maladies is to be found in the miaſmata or morbific effluvia, which ariſe from the ground in the ſituations alluded to, experience has abundantly proved. For where a ſwamp is extremely unhealthy, an adjoining height, only a few hundred feet above it, is found perfectly healthy ; the draining of a ſmall marſh, or even the removal of the camp a few hundred yards only from the foul ground, which it had previouſly occupied, has been ſufficient to ſtop the progreſs of thoſe diſeaſes (ſee Dr. John Hunter, on the Diſeaſes of the Army in Jamaica, App. 3d edit.) ; and their occurrence has been prevented, and the health of the troops preſerved, in favourable ſituations, by burying the excrements, and forming proper receptacles underground for the urine, the remnants of victuals, foul water, &c.

Now, a large town is but an extenſive camp, ſo conſtructed, as to be deſtitute of the means of changing its ſituation, and, therefore, liable to be infeſted with the ſame diſeaſes as are endemic in camps, unleſs peculiar care be taken in adopting the precautions juſt alluded to. Hence, in all the old towns of Europe, while the ſtreets were unpaved, or the pavement ill-conſtructed ; while every ſort of filth was permitted to be thrown into the ſtreets, and to remain there ; while vaults and common ſewers were ſeldom adopted, and the drains ran above ground ; while the office of ſcavenger was imperfectly, or not at all executed ; while the ſupply of water was deficient, and the narrowneſs of the ſtreets prevented a free circulation of the air ; in all large towns, under ſuch circumſtances, ſevere and fatal epidemics raged almoſt annually. The general prevalence of theſe maladies was at the ſame time greatly promoted by the internal domeſtic economy of the houſes ; which, from the cloſeneſs of the ſituations in which they were injudiciouſly placed, and from inattention to ventilation and to cleanlineſs, afforded the moſt favourable *nidus* for the propagation of infection. During the 14th, 15th, 16th, and 17th centuries, the principal towns of Europe were in the condition juſt deſcribed ; and the hiſtory of thoſe ages is as full of the phyſical miſeries of the people, as of their political troubles. The plague and putrid malignant fevers, which differed, perhaps, only in degree, every where prevailed, and their head-quarters were always obſerved to be the naſtieſt parts of dirty, crowded, and ill-conſtructed cities, and their firſt appearance among the loweſt of the people. But the connection of peſtilence with ſuch cauſes is ſtill more ſatisfactorily proved, when we reflect that, in proportion as the nations of Europe have become civilized, and the arts of peace have been cultivated, theſe malignant and peſtilential diſorders have gradually diſappeared. Some of the cities of Europe, indeed, which, from natural or political cauſes, have been backward in adopting the improvements of modern times, ſtill continue to exhibit a picture of former diſeaſes, as well as of former manners. In Turkey the plague frequently occurs ; and late in the 18th century it has appeared at Moſcow, as well as in Hungary and Denmark, &c. See Heberden's Obſervations on the Increaſe and Decreaſe of different Diſeaſes, &c. 1801.

As theſe general obſervations may not be deemed ſufficiently concluſive, as to the cauſes which principally influence the *public health*, we ſhall take this opportunity of illuſtrating their operation in the hiſtory of the progreſſive improvement of the health of the inhabitants of London, which has gone on in a correſponding ratio to the progreſs of improvement in the condition of the city, and in the domeſtic economy of the people.

Of the Health of London.

Hiſtory affords us abundant evidence of the filthineſs of the metropolis, and of the exiſtence of thoſe ſources of miaſmata which prevail in camps, and which, by the putrefaction and evaporation occaſioned by the autumnal heats and rains, were the conſtant ſource of diſeaſes, not only before, but even ſubſequent to the great fire in 1666. In the 14th and following centuries, the ſtreets were filled with common lay-ſtalls of all manner of filth and garbage, which the people were in vain ordered to remove from their own doors ; the ſewers were in a very neglected ſtate ; the drains all ran above ground ; in many ſtreets there was no pavement at all, and the acceſs of pure air was prevented by the projecting houſes, almoſt meeting at top, the intervening ſpace being filled with enormous ſigns : nor was the internal ſtructure and economy of the houſes more favourable to health. Eraſmus, in a letter to the phyſician of cardinal Wolſey, aſcribes the *ſweating ſickneſs*, and the plague, from which the Engliſh were hardly ever free, in a great meaſure to the incommodious form and bad expoſition of their houſes, to the filthineſs of the ſtreets, and to the ſluttiſhneſs within doors. "The floors," he ſays, "are commonly of clay, ſtrewed with ruſhes, which are occaſionally renewed, but underneath lies unmoleſted an ancient collection of beer, greaſe, fragments of fiſh, ſpittle, the excrements of dogs and cats, and every thing that is naſty." Even the floor of the preſence-chamber of queen Elizabeth in Greenwich palace, was, according to Hentzner, "ſtrewed with hay, after the Engliſh faſhion." See Heberden loc. cit. Northouck's and Maitland's Hiſtory of London.

We are enabled to form ſome judgment of the effect of this ſtate of the metropolis upon the health of the inhabitants, by conſidering the nature of the diſeaſes which were then prevalent, as well as the comparative mortality of thoſe, and of our own times. In the early part of our hiſtory a great number of years are ſpecified as plague-years. (See the City Remembrancer.) In the 14th, 15th, and 16th centuries, there ſcarcely paſſed ten years without a conſiderable plague: and although only four great plagues are commonly mentioned in the 17th century, *viz.* in the years 1603, 1625, 1636, and 1665; yet Maitland, in his Hiſtory of London, declares that for five and twenty years before the great fire of 1666, the city had never been clear from the plague; and from the year 1603, when the regiſter begins, till 1670, the bills of mortality exhibit only three years entirely free. The other diſeaſes, which were frequently epidemic in London, were ſuch as commonly originate in ſwampy countries and in camps, namely, intermittent, remittent, and ſpotted, or malignant fevers, and dyſentery. Of the great prevalence of theſe diſeaſes, down to the time of the great fire in 1666, we have already given ample evidence. See Epidemic.

On the other hand, the progreſſive improvement in the public health, will be found to be not leſs manifeſtly ſynchronous with the refinements in the arts of life, and the improvements in the economy of the metropolis, if we compare the varying progreſs of the annual mortality, as exhibited in the bills.

Soon after the great fire of 1666, the plague altogether ceaſed, and has never ſince recurred; but the other epidemics above mentioned, although ſomewhat diminiſhed in numbers, ſtill occurred to a great and fatal extent; ſo that, in proportion to the actual population, the annual mortality was exceedingly great. This will appear in ſtrong colours, when it is ſtated that the actual mortality was greater at the beginning of the 18th century, than at the end of it, notwithſtanding the great increaſe both in the number and extent of the out-pariſhes, included in the bills of mortality. The annual average of deaths in the firſt ten years of the century was *twenty-one thouſand* and upwards; in the laſt decade of years, only *nineteen thouſand* and upwards. The mortality and quantity of diſeaſe, in proportion to the population, therefore, was incalculably greater than at preſent. The principal amelioration in the health of the metropolis, however, ſeems to have been more particularly brought about within the laſt ſixty years. Until nearly the middle of the laſt century, the mortality kept pace, in ſome meaſure, with the increaſing population; for, in the 3d and 4th decades, that is, from 1720 to 1740, the annual average of burials was from twenty-ſix to twenty-eight thouſand; and the deaths in 1741, were *thirty-two thouſand!* (See the Bills of Mortality.) From this time the diminution of the mortality has been progreſſive, and in the paſt year, 1809, it amounted to 16,680 only.

It will be recollected, that, although very conſiderable improvements were made in the city, when it was rebuilt after the conflagration of 1666, yet it continued highly incommodious, and retained many of its unſalutary peculiarities, for a century afterwards. For it was not until the year 1766, that the example of reform, which had been ſet by the inhabitants of Weſtminſter, was adopted by parliamentary ſanction in the city. Fleet ditch was then firſt covered in; the ſtreets were paved with large ſquared ſtones; the ſigns, gates, and bars were taken down, and a free ventilation admitted; openings were made in the incommodious parts of the ſtreets; and the accumulation of filth and other ſources of miaſmata farther prevented by the more active employment of ſcavengers, the increaſed ſupply of water, &c.; which ſyſtem has been purſued, and is ſtill continued, to the great ornament of the metropolis, as well as to the ſubſtantial benefit of its inhabitants. From this time, the remittent and intermittent fevers and dyſentery rapidly diminiſhed in frequency and fatality; the two former now ſcarcely ever originating in London, and the latter being ſeldom general or epidemic. Malignant fevers became leſs prevalent in gaols, and in the cloſe habitations of the poor; and Newgate is no longer viſited by its annual typhus, which is now ſeldom found committing its ravages, even in the abodes of poverty.

On the whole, then, it muſt be inferred, from this detail of facts, that the health of the inhabitants of London (as well as of other large cities) is greatly dependent on its phyſical and moral condition; and that the improvements in civilization conduce no leſs to the length and value of life, than to the increaſe of its comforts, and to the general well-being of the ſocial ſtate. To the public and external changes in the condition of the metropolis, we are indebted for our preſent freedom from the endemic and epidemic diſeaſes of camps; *viz.* the intermittent and remittent fevers, dyſentery, and the plague: and to the alterations in our domeſtic economy, in regard to ſituation, ventilation, and cleanlineſs, we owe our exemption from the contagious diſeaſes of gaols, and other crowded and cloſe ſituations, *viz.* typhous and malignant fevers.

Influence of the Seaſons on Health.

One of the moſt extraordinary reſults of the improvements, above alluded to, and one which could not have been anticipated, is the total change of the character of the ſeaſons, as to their influence on health, a change which greatly illuſtrates the doctrine juſt laid down, as well as the nature of what were formerly termed the "epidemic conſtitutions" of the atmoſphere. It has been already obſerved, that epidemic diſeaſes in general have only occurred during particular ſeaſons; and that in the various countries of Europe, the autumn and the end of ſummer have been moſt productive of thoſe diſeaſes. From July to the end of September the plague has generally been moſt deſtructive, not only in London, but at Moſcow, Montpelier, and other places. (See Epidemic.) The ancient phyſicians all remarked the great inſalubrity of the ſummer and autumn, and the comparative healthineſs of the ſpring. Celſus has characterized the four ſeaſons in theſe terms: "Igitur ſaluberrimum ver eſt; proxime deinde ab hoc, hiems; periculoſior æſtas, autumnus longe periculoſiſſimus." (De Medicinâ. lib. ii. cap. 1.) "The ſpring is the moſt healthy ſeaſon, and next to it the winter; the ſummer is more dangerous than theſe, but the autumn is by far the moſt dangerous." Now this obſervation is ſtill in a great meaſure true in the ſouthern climates of Europe, on the borders of the Mediterranean, where the ancient phyſicians practiſed, as well as at Montpelier, &c.; and ſir John Pringle remarks, that "the ancient maxim that held 'the ſummer and autumn to be the moſt ſickly ſeaſons,' is not only verified with reſpect to the warmer climates, but alſo to *a camp*." (On Diſeaſes of the Army, part ii. chap. 1.) The ſame obſervation *was* true, in regard to this country, and to London and the larger towns in particular, during the 17th and the beginning of the 18th centuries; as we learn from the writings of Sydenham, as well as from the publications relating to the bills of mortality by major Graunt, who wrote about the middle of the former century, and obſerved, that "the unhealthful ſeaſon is the autumn." (See his Nat. and Polit. Obſ. on the Bills of Mortality, p. 56, edit. 5.) The obſervation continues to be applicable to the ſouthern latitudes, becauſe, during the heat of ſummer thoſe perſons who are neceſſarily expoſed to the rays of a burning ſun, often ſuffer by its direct influence; but ſtill more ſo, becauſe the rains which fall in the autumn upon the long heated ground, occaſion the generation of miaſmata, wherever the ground is flat, or the ſoil copious, or naturally ſwampy. Under ſuch circumſtances a "malaria," or *bad air*, as it is popularly termed in Italy, is generated, and endemic diſeaſes ariſe in conſequence. (See Irvine on the Diſeaſes of Sicily, p. 6.) The obſervation is ſtill applicable to camps, during the ſummer and autumn, in conſequence of the miaſmata, which the heats of thoſe ſeaſons generate and cauſe to evaporate from the foul and moiſt ſoil, which is neceſſarily occaſioned by the impurities before mentioned, eſpecially when a camp is for any length of time ſtationary. But in this temperate climate, where theſe ſources of the poiſonous miaſmata have been prevented, by the plans already deſcribed, the obſervation is ſo far from being verified now, that the healthineſs of the ſeaſons is nearly reverſed; or, in other words, that the moſt healthy ſeaſon of our forefathers, the ſpring, (which remains at leaſt as healthy as heretofore,) is now the moſt ſickly of our ſeaſons. There is no doubt, indeed, that in conſequence of the improvements before mentioned, the ſpring is actually more healthy than formerly; for vernal agues are conſtantly ſpoken of by Sydenham and others; whereas they are abſolutely unknown to us at preſent in London. The inference is, then, that *the moſt ſickly ſeaſon of our own times is actually productive of leſs diſeaſe than the moſt healthy ſeaſon was a century ago*: a circumſtance which enables us to account for the great comparative diminution of the annual mortality in London, as evinced by the preſent bills. Dr. Heberden ſhews that "the whole number of deaths is greateſt in January, February, and March; and leaſt in June, July, and Auguſt;" (loc. cit. p. 46.) and that February, in proportion to its length, is the moſt fatal month of the 12. At York the ſeaſons were fatal in the following ratio, according to the obſervations of Dr. White, during ſeven years; the number of burials being in the winter months, November, December, and January, 842; in the ſpring, February, March, April, 875; in the ſummer, May, June, July, 759; in the autumn, Auguſt, September, and October, 699; which ſeries is exactly the reverſe of that which Celſus has ſtated, autumn being here the moſt healthy, and ſpring the leaſt: whereas at Montpelier the ancient ſeries is ſtill exemplified; the number of deaths in that city during the five months, from July to November incluſive, being nearly equal to the whole number of the remaining ſeven months. (See a table quoted from the Mem. de la Soc. Roy. de Medicine, ann. 1777 and 1781. Heberden, p. 49.)

The influence of the different ſeaſons of the year on the health of mankind, may, therefore, be referred to the intrinſic and ſenſible conditions of the ſurrounding atmoſphere on the one hand, and to its adventitious qualities on the other: the latter conſtituting its "epidemic conſtitutions," and giving riſe to ſome of the moſt general epidemic diſeaſes; while the former produce chiefly ſporadic, and leſs prevalent complaints.

Sydenham, being unable to detect the connection of the epidemic conſtitutions of the atmoſphere with its ſenſible qualities, conjectured that certain exhalations from the bowels of the earth impregnated the air with deleterious powers.' From the preceding details it would appear, that that ſagacious phyſician erred only in aſcribing thoſe exhalations to the bowels inſtead of the ſurface of the earth. But thoſe perſons undoubtedly erred ſtill farther, who attributed the prevailing diſeaſes to a general contamination of the atmoſphere, brought from afar, and ſpreading widely around; ſince theſe maladies originated from an impregnation received upon the ſpot, a poiſonous exhalation which that portion of the air, immediately encompaſſing the place where they raged, drank up from human or other impurities. In hot climates, where the long and intenſe heat, combined or ſucceeded by autumnal rains, muſt continue to generate miaſmata from the ordinary ſoil, theſe epidemic diſeaſes will continue to recur; the yellow fever will ſtill be known in St. Domingo and Surinam, and remittent fevers and ague in the marſhes of Walcheren. But in the dry and temperate countries of northern Europe, by preventing the adventitious impregnations of the atmoſphere, that is, by removing the medium through which the heat and moiſture of ſummer and autumn operate upon the air, the influence of the ſeaſons on health may be reduced to the direct operation of the ſenſible properties of the air, (its heat, cold, and moiſture,) upon the human frame.

Hence, then, it is obvious, why the winter and ſpring are now become the moſt unhealthy ſeaſons in this country. For in this temperate climate, the *heat* is ſeldom ſo great as to produce any direct ill effect in the ſummer and autumn; and the remaining atmoſpheric qualities of *cold* and *moiſture*, which prevail in the two former ſeaſons, are, therefore, the only active agents in exciting diſeaſes, ſo far as the ſeaſons are concerned. To theſe agents we ſhall briefly attend at preſent, referring an account of the direct effects of heat to its proper head. See HEAT, in *Medicine*.

The diſeaſes which are moſt generally prevalent during the cold ſeaſons, winter and ſpring, and which are univerſally known to originate from the influence of cold, are chiefly inflammatory diſeaſes affecting the organs of reſpiration; ſuch as the common catarrh, the winter-cough with dyſpnæa, pleuriſy, peripneumony, aſthma, ſpitting of blood, and conſumption. To theſe we may add the numerous modifications of rheumatiſm, lumbago, ſciatica, &c. inflammatory affections of the throat; and diſorders of the bowels. It will be found, on referring to the liſts of diſeaſes, which are obſerved at the public medical inſtitutions of London, that the pectoral complaints alone conſtitute upwards of one-third of all the diſeaſes occurring in the cold ſeaſons; and together with the rheumatic affections, &c., upwards of one half. (See Dr. Willan's Reports on the Diſeaſes of London; and the Reports of the Diſeaſes treated at the Public Diſpenſary, Carey-ſtreet, by the writer of this article, in the Edinburgh Med. and Surg. Journal, from the year 1805, downwards.) Now it has been calculated upon well-founded documents, that pulmonary conſumption alone deſtroys about one in ſix, of thoſe who die in this country, or about 55,000 perſons annually. (See Dr. Woolcombe's Remarks on the Frequency and Fatality of different Diſeaſes, 1808.) And when, in addition to this, we reflect that a great number of aged people are cut off by aſthma, and by the winter-cough, ſo that "of thoſe aged above 60 years by much the greateſt number die in the coldeſt months, and the feweſt in the middle of ſummer," (Heberden,) the fatal effects of the cold ſeaſons will be very obvious. We have already ſtated ſeveral facts and authorities, which completely prove the fallacy of the popular opinions, that there is ſomething wholeſome in a ſharp froſt, and that "a green winter makes a fat church-yard." (See Cold, under ſect. II. *Its effects in producing diſeaſes.*). The fact is directly the reverſe, as the ſtatements there adduced will evince. In addition to the references there made, ſee Dr. Heberden on the Increaſe, &c. of Diſeaſes, pp. 55 and 58. Edin. Med. and Surg. Journal, vol. iii. p. 247.

The connection of ſcrofula with the cold and humidity of our climate is likewiſe very obvious; eſpecially in the conſtitution of thoſe young people, who are natives of a warmer latitude. Mr. Pearſon, who ſuperintended an eſtabliſhment for African children, brought over to this country for education, by the Sierra Leone company, ſtates, they all became ſcrofulous or conſumptive, and died in the latter ſtate. "It is remarkable," he obſerves, "that boys brought from tropical climates, from the age of eight to 12, almoſt uniformly become ſcrofulous. They bear the firſt winter tolerably well, but droop during the ſecond, and the third generally proves fatal to them." The conſumptive ſymptoms were ſometimes preceded by ſwelling and ſuppuration of the glands, enlargement of the bones, &c.; but, in females particularly, conſumption was often the primary complaint. Theſe fatal effects of the climate rendered it neceſſary to abandon the plan. It cannot be doubted, we apprehend, that the deluſive attempts to *harden* the conſtitution of children, born in this climate, by thin clothing, conſtant expoſure to the cold air in winter, &c., are very analogous to the influence of a new climate upon the African children; for the perfect and healthy evolution of the animal ſyſtem is thus prevented; and the foundation is laid for ſcrofula, conſumption, and other chronic diſeaſes. See Ann. Med. Rev. vol. ii. 1809, p. 130.

Influence of Manufactories, &c. on Health.

Among the various operations, ſubſervient to the arts and manufactures of modern times, there are many which contribute to diffuſe in the atmoſphere certain effluvia or vapours, ſome of which are diſagreeable in their ſmell, or difficult to reſpire, and others, though not ſo obvious to the ſenſes, are nevertheleſs prejudicial to health. On the whole, however, the public health is not much affected by ſuch effluvia. For, in the firſt place, a diſagreeable ſmell is by no means a certain criterion of an unwholeſome atmoſphere; and, in the ſecond, the volatilization of poiſonous metals by fire, which conſtitutes one of the moſt probable means of contaminating the air, may be ſo managed, by connecting with the works proper chimnies, and other condenſing apparatus, as to obviate altogether the danger which might thence ariſe to the public. Many miſtakes have been committed by writers on this ſubject, and conſiderable difference in principle has been manifeſted in legal deciſions reſpecting the degree of nuiſance in ſuch caſes. In the 17th century the ſmoke from coal-fires was deemed, both by natives and foreigners, one of the principal cauſes of the unhealthineſs of London. This was ſtated in ſtrong terms by major Graunt (Obſ. on Bills of Mortality, fifth edit. p. 95.); and Evelyn, who publiſhed a pamphlet in 1661, entitled "Fumifugium," indignantly laments the "clouds of ſmoke and ſulphur, ſo full of ſtink and darkneſs," in which this glorious and ancient city wraps her ſtately head; and he affirms, that in the year 1664, when Newcaſtle was beſieged, and coals not to be procured in London, "divers gardens and orchards, planted in the very heart of London (as, in particular, my lord Marquiſſe of Hartford's, in the Strand, and my lord Bridgewaters', and ſome others, about Barbican), were obſerved to bear ſuch plentiful and infinite quantities of fruits, as they never produced the like, either before or ſince, to their great aſtoniſhment." In refutation of ſuch notions, however, it is ſufficient to remark, that while this ſuppoſed cauſe of unhealthineſs has been augmented to an incalculable degree, the actual condition of the metropolis, in point of ſalubrity, has been greatly improved.

In like manner, the manufactories, in which various effluvia are diſengaged from animal and vegetable matters, in conſequence of putrefaction or fermentation, are no longer prejudicial to the public health, when they are conducted with care and prudence. Thus in breweries, in ſtarch and colour manufactories, as of turnſol and indigo, in paper-mills, &c. the fumes, which ariſe from the fermenting and decompoſing matters, can be dangerous only to thoſe employed about the works, and in the immediate vicinity of the veſſels and apparatus. They ceaſe to be deleterious the moment they are diffuſed and combined with the external air, and cannot affect the inhabitants of neighbouring dwellings. Even where animal matters are liable to putrefy, as in the manufactories of cat-gut, tanneries, and ſlaughter-houſes, the effects of theſe corrupted exhalations, which, when diffuſed in the neighbourhood, form an atmoſphere very diſagreeable to breathe, may be obviated by proper care. Moſt commonly ſuch putrefaction is not neceſſary to the operations going on, and only occurs from the animal ſubſtances being allowed to remain too long in the manufactory, or in too high a temperature. It is only neceſſary, therefore, to cauſe the materials to be frequently renewed, in order to prevent their corruption, and to keep the place clean. In this reſpect ſlaughter-houſes are attended with ſome inconvenience; but this is by no means of ſo ſerious a nature as to demand their baniſhment without the limits of cities. A ſlaughter-houſe, indeed, when the filth and blood are collected in heaps to putrefy, is peſtilence itſelf; but when the offals are regularly removed it ceaſes to be a nuiſance. Hence a little attention on the part of the magiſtrate, that butchers do not throw out the blood and refuſe of the animals which they kill, nor ſuffer them to accumulate, is ſufficient to obviate any diſguſting and unhealthy effects ariſing from ſlaughter-houſes.

Of the manufactories in which effluvia are driven off by fire, thoſe of the mineral acids, which were formerly deemed extremely injurious, have been found by experience to be deſtitute of danger; and even thoſe effluvia, which are diſengaged in the preparations of mercury, lead, copper, antimony, and arſenic, and are all ſomewhat dangerous to thoſe who inhabit and aſſiſt in the works, can only injure thoſe who reſide in the neighbourhood, when proper chimnies, that may convey the vapours out of the reach of reſpiration, or condenſe them, are omitted to be uſed. Hence the magiſtracy ought chiefly to confine its attention to the adoption of theſe meaſures of precaution, and to direct ſcience towards the improvements of which theſe proceſſes are ſuſceptible with regard to health, inſtead of haſtily baniſhing theſe manufactories from their cities. (See a Report of the Nat. Inſtitute of Paris, 1806, Annales de Chimie, tom. liv. p. 86.—Alſo, in the Edinburgh Med. and Surg. Journal, vol. ii. p. 290.) See Nuisance.

The preſervation of the public health, then, as appears from the foregoing ſtatements, is greatly dependent upon a ſyſtem of cleanlineſs and ventilation, carried on upon an extenſive ſcale throughout ſociety; and this ſyſtem has effected what quarantines, peſt-houſes, &c. in vain attempted to accompliſh. Indeed, from the conſtant exiſtence of the plague in London during the 17th century, it can ſcarcely be ſuppoſed to have been *imported* at the particular periods when it raged ſo deſtructively; and, on the other hand, our quarantine laws, however rigid and ſevere they may be, are by no means adequate to the excluſion of all contagion. (See Howard on Lazarettos; Heberden on Increaſe, &c. of Diſeaſes.) But the laſt mentioned author obſerves, "That the plague was ever actually bred in London, it might be odious to aſſert, and would be impoſſible to prove; yet, to any one who reflects upon its frequent returns in this capital until the latter end of the 17th century, and its total abſence ſince, notwithſtanding the great increaſe of our trade, by which it was ſuppoſed to be imported, it muſt, I think, appear probable, that if its origin were derived from foreign contagion, at leaſt its propagation ought, in a great meaſure, to be attributed to ſome prediſpoſition of the town in thoſe days, which has ſince been corrected." p. 69.

The moſt ancient mode of preventing the progreſs of contagious diſeaſes, was the ſecluſion of thoſe already infected and labouring under the diſeaſes, from the reſt of the community; but this practice ſeems to have been applied principally, in early times, to chronic contagions, or chronic diſorders believed to be contagious, ſuch as the leproſy. In more recent times the principle has been adopted with reſpect to peſtilential epidemics, whence the inſtitution of lazarettos, peſt-houſes, &c. and more lately of fever-houſes, or houſes of recovery, as they have been called, with a view to the prevention of common typhus, or contagious fever. It is poſſible that a vigorous activity of the police, in diſcovering and clearing the houſes firſt infected by the plague, by removing the ſick to a peſt-houſe, might ſuppreſs a naſcent peſtilence; but when we reflect on the total inefficiency of ſuch eſtabliſhments hitherto uſed (as in the laſt plague at Marſeilles, &c.), and on the probable origin of thoſe epidemics, in the firſt inſtance, from filth, however propagated afterwards by contagion, we cannot aſcertain any confident hope of ſucceſs from ſuch expedients. See Plague.

The inſtitution of houſes of recovery for the ſuppreſſion of typhus, during a ſeaſon of comparative health, appear to be, and have actually been found to be, moſt beneficial means of preſerving the public from the influence of malignant fevers. By being conſtantly on the watch, and immediately extinguiſhing, in its birth, the firſt germ of contagion where it originates, and purifying the ſource of its generation, the general prevalence of infectious fevers may perhaps be effectually prevented, and epidemics of this nature baniſhed from ſociety. Such hopes, the ſucceſs of thoſe inſtitutions, hitherto eſtabliſhed in the populous cities of England and Ireland, is calculated to encourage in the higheſt degree. See House of *Recovery*.

For theſe epidemic diſeaſes, by which the public health is at times extenſively and fatally deſtroyed, and which appear to originate, not in miaſmata or in the effluvia from the human body in confined ſituations, but in a ſpecific contagion (ſuch as the ſmall-pox, meaſles and ſcarlet-fever), the means of public ſecurity are not ſo much within our reach. For the two laſt mentioned maladies, indeed, we know of no preventive means; ſo that the inhabitants of large cities muſt probably undergo them once in the courſe of life. But, for the ſmall-pox, the direct peſtilence that viſits mankind, a method of amelioration has been reſorted to, for nearly a century, in Europe, by which the lives of multitudes have been preſerved, but by which alſo death has been inflicted upon multitudes of others, whom prejudice, careleſſneſs, or miſinformation, have led to neglect the employment of the preventive, ſince it has been an artificial ſource of continued contagion; we mean inoculation. Similar prejudice, negligence, or miſtaken views, continue to be fatal to the public health, by encouraging the propagation of this dire contagion, even after an experience of twelve years has eſtabliſhed the efficacy of the invaluable diſcovery of Dr. Jenner, the Cow-pock, in ſuperſeding the influence of ſmall-pox, while it does not contribute to generate any contagion which may injure the health of others. When theſe unfortunate errors in public opinion ſhall be removed, and vaccination ſhall be generally received, the public health will have attained a degree of perfection and permanency, beyond which, perhaps, it cannot be expected to advance, while the paſſions, wants, and occupations of men neceſſarily expoſe them to various cauſes of diſeaſe.

Injuries, affecting a man's health, conſidered in a *legal* view, are thoſe in which, by any unwholeſome practices of another, he ſuſtains any apparent damage in his vigour or conſtitution; as by ſelling him bad proviſions or wine, by the exerciſe of a noiſome trade, or by the neglect or unſkilful management of his phyſician, ſurgeon, or apothecary. For theſe injuries there is a remedy in damages by a ſpecial action of treſpaſs upon the caſe. The ſtat. 51 Hen. III. ſtat. 6. prohibits the ſale of corrupted wine and unwholeſome fleſh, or fleſh bought of a Jew, under pain of amercement for the firſt offence, pillory for the ſecond, fine and impriſonment for the third, and abjuration of the town for the fourth; and by ſtat. 12 Car. II. cap. 25. any brewing or adulteration of wine is puniſhable with the forfeiture of 100*l.* if done by the wholeſale merchant, and 40*l.* if done by the vintner or retailer. See Plague and Quarantain.

The ancients perſonified, and even deified, health; or, rather, they erected a goddeſs, to whom they ſuppoſed the care of health to belong. The Greeks worſhipped her under the name of Υγιεια, and the Latins under that of *Salus*. The place of her worſhip at Rome, was on the Mons Quirinalis, where ſhe had a temple, and a ſtatue crowned with medicinal herbs.

We frequently find the goddeſs Health on the reverſe of medals. She is repreſented crowned with laurel, with a ſerpent ſtretched on her left arm, and holding a patera to it with the right. Sometimes ſhe has an altar before her, with a ſerpent twiſted round the ſame, and raiſing its head to take ſomething off from it.

The inſcription is SAL. AUG.

HEALTHY Cove, in *Geography*, a bay on the S. coaſt of the iſland of Jamaica. N. lat. 17° 44'. W. long. 77°.

HEAM, in beaſts, denotes the ſame with *after-birth* in women.

Thyme, penny-royal, winter-ſavory, and common horehound, boiled in white-wine, and given to a mare, are eſteemed good to expel the heam. Dittany, applied in a peſſary, expels the heam, as well as the dead foal; ſo alſo do fennel, hops, ſavin, angelica.

HEAN, in *Geography*, a town of Tonquin, ſituated on a river about four days journey from the ſea, where the French have a factory; it is the reſidence of a mandarin.

HEARGUET, a town of Candahar; 12 miles W. of Ghizni.

HEARING, Auditus, the act or faculty of perceiving ſounds. Hearing is reckoned among our external ſenſes. Its organ is the *ear*, and particularly the auditory nerve diffuſed through the ſame; and its object, certain motions or vibrations of the air.

Hence hearing may be more ſcientifically defined, a ſenſation, whereby, from a due motion impreſſed on the fibrillæ of the auditory nerve, and communicated thence to the ſenſory, the mind perceives, and gets the idea of ſounds.

The moderns ſpeak of the point on much better ground.

The ear, and the ſeveral parts thereof, membranes, canals, labyrinths, nerves, &c. are the only means and vehicles for the reception, modification, and tranſmiſſion of the ſonorous matter to the brain, which is the ſeat of the ſenſe.

A ſound, in effect, is nothing but a certain rarefaction or modulation of the external air, which, being gathered by the external ear, paſſes through the meatus auditorius, and beats upon the membrana tympani, which moves the little bones in the tympanum. For a deſcription of the bones of the organ of hearing, ſee CRANIUM.

In like manner, as this is beat by the external air, theſe little bones move the internal air which is in the tympanum and veſtibulum; which internal air makes an impreſſion upon the auditory nerve in the labyrinth and cochlea, according as it is moved by the little bones in the tympanum: ſo that, according to the various refractions of the external air, the internal air makes various impreſſions upon the auditory nerve, the immediate organ of hearing; which different impreſſions repreſent different ſounds. For a more particular ſcientific account of the organ and ſenſe of hearing, ſee EAR.

Sir Iſaac Newton carries the thing ſomewhat farther, and ſuppoſes hearing, like ſeeing, to be performed not immediately by the vibrations of the ear, but by thoſe of ſome other more ſubtile medium, excited in the auditory nerves by the tremors of the air, and propagated through the ſolid capillaments of the nerve to the place of ſenſation.

The curious ſtructure of the labyrinth and cochlea tend to make the weakeſt ſounds audible; for the whole organ of hearing having been included in a ſmall ſpace, had the auditory nerve run in a ſtraight line, the impreſſion would only have been made on a very ſmall part of it; and the ſtrength of the impreſſion being, *cæteris paribus*, always as the number of parts on which the impreſſion is made, ſounds which are now low could not have been heard at all. If the auditory nerve had, like the retina, been expanded, into a large web, which had covered or lined ſome wide cavity, the impreſſion of ſounds, even in this caſe, had been much weaker than they are now; for this large cavity had given room for the ſounds to dilate, and all ſounds grow weaker as they dilate.

Both theſe inconveniences are prevented by the preſent ſtructure of the labyrinth and cochlea, whoſe canals, by their winding, contain large portions of the auditory nerve, upon every point of which the ſmalleſt ſound being at once impreſſed becomes audible, and by their narrowneſs the ſounds are hindered from dilating; and the impreſſions made upon the nerves by the firſt dilatations are always the ſtrongeſt.

The ſtrength of the impreſſion in narrow channels is likewiſe increaſed on account of the elaſticity of the ſides of the bony canal, which, receiving the firſt and ſtrongeſt impulſes of the air, do reverberate them more ſtrongly upon the auditory nerve.

It may be obſerved, that though the air be the uſual matter of ſounds, ſo that a bell rung in vacuo is not heard at all, yet will moſt other bodies, properly diſpoſed, do the like office, only ſome more faintly than others.

Thus may a ſound be heard through water, or even through earth; of which we have various inſtances.

Although the ear be the ordinary organ of hearing, yet Hagerup, a Daniſh phyſician, maintains that one may hear with the teeth. Thus, if one end of a knife, or the like, be applied to a harpſichord, and the other held between the teeth, the muſic thereof will be plainly heard, though the ears be ever ſo cloſely ſtopped. But this, perhaps, may more properly be referred to the ſenſe of feeling.

Such as want the ſenſe of hearing are ſaid to be deaf. See DEAFNESS.

HEARING, *Difficulty of.* See DEAFNESS.

HEARING is particularly uſed in civil and judicial concerns, for a cauſe being brought before the judge and jury, and the parties being heard as to the merits thereof.

The method of hearing cauſes in the court of Chancery is this: the parties on both ſides appearing by their counſel, the plaintiff's bill is firſt opened or briefly abridged, and the defendant's anſwer alſo, by the junior counſel on each ſide; after which the plaintiff's leading counſel ſtates the caſe and the matters in iſſue, and the points of equity ariſing from them; and then ſuch depoſitions as are called for by the plaintiff are read by one of the ſix clerks; and the plaintiff may alſo read ſuch part of the defendant's anſwer as he thinks material or convenient: and, after this, the reſt of the counſel for the plaintiff make their obſervations and arguments. Then the defendant's counſel go through the ſame proceſs for him, except that they may not read any part of his anſwer; and the counſel for the plaintiff are heard in reply. When all are heard, the court pronounces the decree, adjuſting every point in debate according to equity and good conſcience; which decree, being uſually very long, the minutes of it are taken down, and read openly in court by the regiſtrar. Blackſt. Com. vol. iii. p. 451. 4to.

The hearing of ambaſſadors at the courts of princes, is uſually called *audience.*

HEARNE, THOMAS. in *Biography*, was born at White-Waltham, in Berkſhire, in 1680, of which place his father was pariſh clerk. The early part of his education he received under his father, but ſhewing a diſpoſition for learning, he was patronized by Francis Charney, eſq. who undertook the charge of his education, and ſent him to Oxford. Here he acquired from his tutors a taſte for antiquities, reſearches to which he had been addicted from his youth. He was ſelected by Dr. Mill and Dr. Grabe as a fit perſon to collate the MSS. which they had occaſion to make uſe of. He took his degree of B. A.; refuſed a curacy which was offered him, and was in time made ſecond librarian of the Bodleian library. To this were added ſome other college offices, all which he reſigned when he was called on to take the oaths to George I. which he felt obliged conſcientiouſly to refuſe. He died in 1735, having been the editor of 38 works, chiefly ſuch as relate to the hiſtory and antiquities of England, though he did not confine his labours to theſe, but gave the world new editions of Pliny the younger, Eutropius, Juſtin, and Livy. To the article in the Biog. Brit. there is ſubjoined a liſt of his works. He continued a nonjuror to the laſt, and notwithſtanding the ſmallneſs of his means, he had contrived, by parſimony, to ſave 1300*l.* in caſh, which was found among his books and papers at his death.

HEARSAY EVIDENCE. See EVIDENCE.

HEARSE, among *Hunters*, a hind in the ſecond year of her age. See HUNTING.

HEARSE is the name of a well known carriage, uſed for conveying the dead to the grave.

The word is alſo uſed by Shakſpeare in his Henry VI. for a monument erected over a grave.

HEART, in *Anatomy*, a muſcular organ, ſituated in the cheſt, and affording, by its contractions, the chief power by which the circulation of the blood is carried on.

Under the article Artery a general account of the ſtructure and functions of the arterial ſyſtem is delivered; and a general view of the Circulation will be found under that word. We propoſe to complete the view, both of the ſtructure and offices of the circulating organs, in the preſent article. For this purpoſe we ſhall adopt the repreſentations of Bichat in his Anatomie Generale, following the general arrangement of the ſubject, exhibited in that work. As the ſtructure of the heart admits of deſcription moſt conveniently, when it is viewed as a ſingle organ, we ſhall defer the conſideration of its anatomy to the concluſion of the general deſcription of the circulation. We ſhall alſo include an account of the capillary and exhaling ſyſtems of veſſels.

"All authors (ſays Bichat, Anatomie Generale, t. 2) who have written on the circulation ſince the time of Harvey, have deſcribed it in the ſame manner, dividing this function into two parts, the great, and the leſs or pulmonary circulations, of which the heart is the common centre. This mode of conſidering the ſubject does not lead us to obſerve, in a general manner, the objects of the blood's motion through our organs; and I deem the mode, in which I explain this important phenomenon of the animal economy in my lectures, infinitely better calculated to convey a correct notion of its nature. I divide the circulation into two parts; one of which carries blood from the lungs to all parts of the body, the other brings this fluid back again from all parts to the lungs. The firſt of theſe is the circulation of red blood, the ſecond that of black blood.

Circulation of Red Blood.—This has its origin in the capillaries of the lungs, where the action of the air on the blood gives it thoſe characters which diſtinguiſh it from the ſame fluid in its black ſtate. From theſe capillaries it paſſes ſucceſſively through the branches and trunks of the pulmonary veins, and the left auricle, into the left ventricle of the heart, which propels it into the arterial ſyſtem. The latter conveys it into the general capillary ſyſtem (the capillaries of the body at large, excepting thoſe of the lungs), which muſt be regarded as the termination of its courſe. Thus the red blood is conſtantly conveyed from the capillary ſyſtem of the lungs to that of the body in general. The cavities, which contain this blood, are all lined by a continuous membrane, which being expanded over the pulmonary veins, the left cavities of the heart, and the arterial ſyſtem, may with truth be conſidered to form an unbroken canal, ſtrengthened on its exterior, in the pulmonary veins by a ſoft membrane, in the heart by a muſcular layer which is thin in the auricle, and thick in the ventricle, and in the arterial ſyſtem by a fibrous layer of peculiar texture. In all theſe various organs, which are added to it externally, the membrane itſelf remains nearly the ſame.

Circulation of Black Blood.—The courſe of this is inverſe to that of the preceding. It begins in the general capillary ſyſtem, and here the blood which it contains acquires its diſtinctive characters: here, if we may uſe the expreſſion, it ſeems to be reproduced, probably by the ſubtraction of thoſe principles, which it had previouſly derived from the atmoſphere in the lungs. From the general capillary ſyſtem it paſſes into the veins, which bring it to the right cavities of the heart: thence it is tranſmitted through the pulmonary artery to the capillary ſyſtem of the lungs. The latter is its true termination, as it is the commencement of the ſyſtem containing the red blood. One general membrane, continuous throughout, lines the whole paſſage of the black blood, and forms for it an unbroken canal, along which it is conſtantly conveyed from all parts of the body to the lungs. On the outſide of this canal there is placed a looſe membrane in the veins, a muſcular ſtratum in the heart, and a peculiar fibrous tiſſue in the pulmonary artery: but the membrane, as in the preceding caſe, remains always nearly uniform, in ſpite of the various organs which ſurround it externally. The folds of this membrane form the valves of the veins: it alſo aſſiſts in the compoſition of the valvular apparatus belonging to the right ſide of the heart, of which it lines the cavities; as the membrane of the other circulation concurs in forming the valves and lining the correſponding parts on the left ſide of the heart.

Differences of the two Circulations.—The general idea, which I have thus given of the two circulations, ſhews plainly that they are perfectly independent of each other, except at their origin and termination, where the red and black blood are alternately changed into the oppoſite ſtates, and communicate, for this purpoſe, by the capillary veſſels. In the whole of their courſe the two circulations are completely iſolated. Although the two ſides of the heart are united together in a ſingle organ, they may be regarded as perfectly independent in their motion. There are in truth two hearts, a right and a left: they might probably perform their functions juſt as well, if they were ſeparated, as in their preſent connected form. Even when the foramen ovale remains open after birth, we ſhall prove afterwards that the ſtructure of its ſides prevents all intermixture of the red and black bloods, and conſequently the two parts are ſtill equally independent, as far as regards the courſe of the blood. This complete ſeparation of the two circulations is one of their moſt decided characters; and it alone ſhews, how preferable the point of view, in which I regard the circulation, is to that in which it is repreſented as divided into the great and leſs, which are manifeſtly confuſed and identified with each other.

According to the obſervations already made, the two circulations begin and terminate in two capillary ſyſtems, which may therefore be conſidered as forming the limits within which the two kinds of blood circulate. In this point of view the lungs alone correſpond to all the other parts of the body. Their capillary ſyſtem is in oppoſition to that of all the other organs, with the ſmall exception of the parts from which the blood of the vena portarum proceeds. Thus each capillary ſyſtem is at once origin and termination: the pulmonary is the origin of the circulation of red; and the termination of that of black blood, while in the general the former ends and the latter begins. Hence ariſes a grand diſtinctive character of the two circulations: in fact, the blood not only follows an oppoſite courſe at the commencement and concluſion of the circulations, but it undergoes alſo a complete change in its nature; and in this reſpect the pulmonary and general capillary ſyſtems are the ſeat of the two moſt important phenomena of the animal economy, *viz.* the change of the blood from black to red, and *vice verſâ*. Each circulation evidently preſents three objects for our examination; 1ſt, the origin; 2dly, the courſe; 3dly, the termination of each kind of blood. In the firſt and laſt of theſe the mechanical phenomena of the circulation, and the transformation of the blood, require our conſideration; in the ſecond there are only the mechanical phenomena to be noticed.

General mechanical Phenomena of the two Circulations.—A general view of this ſubject exhibits to us; 1ſt, the red blood departing from the lungs, forming, as it proceeds, leſs numerous and more conſiderable columns, in proportion as it draws nearer to the heart, in the cavities of which it is ſeen in larger maſſes, and, as it paſſes from theſe to the general capillary ſyſtem, again dividing into ſmaller and ſmaller columns; 2dly, the black blood, accumulated, as it leaves the general capillary ſyſtem to approach the heart into fewer and larger columns, exiſting in the largeſt maſſes in the cavities of the heart, and again ſucceſſively ſeparated into ſmaller and ſmaller ſtreams as it arrives at the capillaries of the lungs. Thus the two kinds of blood circulate on the two ſides in ſtreams ſo much the ſmaller, as they are further from the heart; and they are ſeen in larger columns as they come nearer to this viſcus. Imagine for each of the two circulations two trees united by their trunks, and ſending their branches, the one into the lungs, the other into all parts of the body. Each of the two ſides of the heart is between theſe two trunks, which it ſerves to unite together ſo as to form one general canal, according to the deſcription already given.

Authors have generally repreſented the arteries and veins as forming each, by the whole of its ramifications, a general cone, of which the baſis is in all parts of the body, and the apex at the heart. This mode of conſidering the ſubject is authoriſed by the fact that the ſum of the branches exceeds in diameter the trunks from which they ariſe: in this point of view, each half of the heart is placed at the apices of two cones, which would, but for its intervention, be united together. The pulmonary veins repreſent one cone, and the aorta the other, for the red blood; while for the black, the two cones are formed by the venæ cavæ and coronary veins on one ſide, and by the pulmonary artery on the other. In each circulation one of the cones (that of the lungs) is remarkable for its ſmall extent; the other, (that correſponding to all parts of the body) is diſtinguiſhed by its wide expanſion.

Placed between theſe two cones, each ſide of the heart muſt be regarded as an agent of impulſion, driving the blood in one caſe towards all parts of the body, in the other towards the lungs. If the two cones of each circulation communicated together by their apices, the ſides of the veſſels compoſing them would be manifeſtly inſufficient to keep up the motion from the baſe of one to that of the other, that is, from the general to the pulmonary capillary ſyſtem, and reciprocally from that of the lung to that of the body at large. The courſe is obviouſly too long, and the vital powers of the veſſels too weak; hence the neceſſity of the heart. This conſequence renders neceſſary another arrangement, which we proceed to explain. As the red blood is deſtined to move through a much more extenſive ſpace, from the heart to the general capillary ſyſtem, than is traverſed by the black blood, in its paſſage from the heart to the pulmonary capillaries, that portion of the organ, which propels the fluid in the former caſe, muſt poſſeſs much greater power than is required for the purpoſe of keeping up motion in the latter inſtance. Nature has fulfilled this object, by compoſing the ventricle of the red blooded circulation of a much greater number of fibres than are poſſeſſed by the other. The auricles, which merely receive the blood, and tranſmit it into the ventricles, are nearly of the ſame thickneſs on both ſides of the heart.

Hence we may conclude, that the office performed by the heart in both circulations, relates merely to the mechanical phenomena of the blood's motion, and that if it produced any effect on the compoſition of the fluid, it could only be done by means of the motion imparted to it: ſecondly, that if the courſe of the two circulations were leſs extenſive, this intermediate impelling agent would not be neceſſary. This is preciſely the caſe in the abdominal ſyſtem of black blood, where the two trees, of which one diſtributes its branches in the gaſtric viſcera, and the other in the liver, are united by their trunks at the ſinus of the vena portarum, which occupies the poſition of the heart in the large ſyſtem of black blood, and in that of red blood. It is therefore poſſible to conceive, 1ſt, how the heart may be deficient, of which there are ſome inſtances, in which the two great circulating ſyſtems reſembled that of the abdomen, in ſome meaſure; 2dly, how the blood may oſcillate for a conſiderable time from one capillary ſyſtem to another, although the heart, diſeaſed and enfeebled, can hardly accelerate the current of this fluid; 3dly, how, after the pulſations of the heart have been entirely ſuſpended in ſyncope, aſphyxia, &c. an oſcillatory movement ſtill remains, a real progreſſion of the blood from one capillary ſyſtem to the other, ſince this fluid will ſtill flow in ſome degree from an opened artery or vein. This motion is in truth very feeble, and cannot laſt long; but that it may exiſt, without the influence of the heart, is proved by the fact of the black blood being conveyed, without any organ of impulſion, from the inteſtines to the liver; and hence we infer, that the ceſſation of the heart's action does not prove, as ſome authors have pretended, that the blood no longer moves; 4thly, we know that in ſeveral animals of the lower claſſes there is no heart, although diſtinct veſſels and circulating fluids exiſt.

General Uſes of the red-blooded Circulation.—This furniſhes the materials of all the ſecretions except the bile. From this ſource alſo the exhalants belonging to the ſerous, cellular, cutaneous, medullary, and other ſyſtems derive the fluids which they pour out on their reſpective ſurfaces. All the veſſels, which convey the means of nutrition and growth to the various organs of the body, are continuous with the arteries, and conſequently draw their fluids from the red blood. Even in thoſe parts, to which black blood is ſent, as the lungs and the liver, there are veſſels containing red blood, manifeſtly deſtined to fulfil the purpoſe of nutrition. The red blood communicates to all parts that general agitation or concuſſion (ſécouſſe) ſo neceſſary to the performance of their functions, and ſo clearly recognizable in the brain. Thus the red blooded circulation is the moſt important, and immediately concerned in the principal phenomena of the living economy.

General Uſes of the black-blooded Circulation.—The circulation of black blood, on the contrary, foreign to all the functions, ſeems to be deſigned merely to make good the loſſes which the blood has undergone in the preceding. A conſiderable portion of the red blood is expended in the functions of exhalation, ſecretion, and nutrition. The principles which it had received it its paſſage through the lungs, and which had given it a crimſon colour, have been left behind in the general capillary ſyſtem. The black blood muſt then receive again in proportion to what the red has loſt: hence a great number of matters is poured into the canal which contains it. Theſe are either interior or exterior. 1ſt. The large trunks of the abſorbing ſyſtem are conſtantly carrying in the lymph of the cellular ſubſtance and of the ſerous ſurfaces, the reſidue of the nutrition of all the organs, the ſuperabundant fat, ſynovia, and medullary matter. Every thing, which from the interior of the body is to be rejected outwards, is in the firſt place thrown into the black blood. 2dly. All which enters from without is firſt received into this circulation. The chyle, or the produce of the digeſtive functions, is conſtantly conveyed into the general canal, and circulates there. The gaſeous matters which traverſe the lungs in the act of reſpiration, are mingled with the blood in the ſame place. Laſtly, whenever abſorption takes place from the ſkin or the mucous membranes, the black blood firſt receives the product. Hence the circulation of black blood may be regarded as a general reſervoir, receiving in the firſt place all thoſe ſubſtances which are to be expelled from the body, and all which are to be admitted. In the latter point of view it performs a very important part in diſeaſe. There can be no doubt, 1ſt, that deleterious ſubſtances may be introduced with the chyle into the circulation, and there produce, as they are carried round with the fluids, more or leſs decidedly pernicious effects. To produce this effect it is merely neceſſary that the organic ſenſibility of the lacteal veſſels ſhould be changed: they then admit what they before rejected, as, in conſequence of a ſimilar change, the glands often ſeparate fluids very different from their ordinary productions. 2dly. The cutaneous ſyſtem is often the ſeat of deleterious abſorptions. 3dly. Beſides the principles which impart colour to the blood, deleterious miaſmata probably often paſs through the lungs, and give riſe to diſeaſes. Thus the alimentary canal, the lungs and the ſkin are three inlets, through which, in many caſes, various morbific cauſes may enter the body: now all theſe are received at firſt into the black blood, and only admitted ſubſequently into the vaſcular ſyſtem which contains the red blood. A clear proof of the truth of this repreſentation may be derived, by introducing artificially into the black blood, thoſe ſubſtances which enter by natural paſſages: the phenomena obſerved in the former are completely analogous to thoſe exhibited in the latter caſe. Emetic or purgative infuſions, thrown into the veins, occaſion evacuations of the ſtomach and bowels, as when ſimilar ſubſtances are introduced into the body by frictions on the ſkin. The experience of numerous phyſiologiſts have completely eſtabliſhed this point. I am convinced that it is poſſible to communicate diſeaſes to animals by introducing various ſubſtances with their circulation through the veins.

From the foregoing account we may conclude, that the eſſential office of the circulation of black blood in the animal economy, is to introduce into this fluid various new ſubſtances; and that, on the contrary, the object of the other circulation is to expend or employ theſe matters. The maſs is conſtantly increaſing in the one, and diminiſhing in the other. Health ſupppoſes a perfect equilibrium between the loſſes of the red blood and the additions made to the black; whenever this is diſturbed, diſeaſe enſues. If the black blood receives more than the red expends, plethora is produced; and, in the oppoſite ſtate, the humours are ſaid to be impoveriſhed."

The preceding extract will ſhew the reader the new and intereſting point of view in which the important function of circulation is repreſented by Bichat: we ſhall proceed to a more detailed account of the matter, ſtill adhering to the arrangement, and making conſiderable uſe of the opinions of the French phyſiologiſt.

The Circulation of Red Blood.—The pulmonary veins which terminate ultimately in each lung, in two trunks opening into the left auricle, agree in their general ſtructure with the veins of the body at large, which will be conſidered in a future part of the article; they have however no valves. The circumſtances belonging peculiarly to theſe veſſels will be conſidered under LUNG. The auricle and ventricle, through which the blood paſſes in its courſe from the firſt tree of this ſyſtem to the ſecond, will be deſcribed in a future part of this article in the general account of the heart.

The firſt tree of the red blooded circulation, the trunk of the ſecond, and the heart which connects theſe together, are concentrated in the cavity of the cheſt; while the branches of the ſecond trunk are diſperſed through all the organs of the economy, and reach to all the extreme points of the body.

The organ of motion of the red blood, or the heart, is placed about the upper part of the middle third of the body. "This poſition," ſays Bichat, "is not a matter of indifference. It places more immediately under the influence of this viſcus, all the upper parts of the body, particularly the head, the organs of which, eſpecially the brain, require an habitual and powerful excitation from the blood, in order to maintain their functions in a ſtate of permanent activity. Hence, in the gangrene of old age, and in other affections ariſing from the blood being propelled with diminiſhed force to all parts of the body, the toes are firſt affected, and the hands are much ſeldomer and later attacked in this way. In general there are very numerous differences between the phenomena exhibited in the upper parts of the body, and thoſe which take place in the lower. In the integuments we find that portion of the general capillary ſyſtem, which belongs to the former, infinitely more ſuſceptible of diſtenſion with blood, than that of the latter; as is proved by aſphyxia, apoplexy, drowning, the various cutaneous affections, and even injections. Theſe differences may obviouſly be referred to the relative poſition of the upper and lower parts of the body to the heart."

Bichat finds fault with the accounts, which anatomical writers have generally given, of the origin of the aorta from the heart, and deſcribes it in the following way. "The internal lining of the left or aortic ventricle, after lining that cavity, enters the mouth of the aorta, is ſo folded as to form the three ſemilunar valves, and is there continued into the veſſels lining it and its branches. The artery is connected to the heart merely by the intervention of this membrane. The proper fibrous coat of the artery is not identified with the muſcular ſubſtance of the heart. Its extremity ends in three ſemi-circular feſtoons, correſponding to the three ſemicircular valves which they ſupport. The feſtoons do not reach to the muſcular fibres of the ventricle, ſince there is between them an interval of two or three lines cloſed by the internal membrane only. There are three ſmall triangular ſpaces between the feſtoons and the valves, filled in the ſame manner by the membrane. In order to obſerve this ſtructure clearly, the origin of the aorta ſhould be diſſected from the outſide, and carefully cleaned from the ſurrounding adipous matter. Then, by ſlitting up the ventricle and the artery, after having removed the valve, and obſerving their union againſt the light, the ſtructure now deſcribed will become very apparent, in conſequence of the tranſparence of the internal membrane, and the opacity of the three portions, by which the aorta commences. Hence it follows, that if the veſſel be exactly diſſected on the outſide, and the internal membrane of the canal containing the red blood be detached from below upwards, the artery will be completely ſeparated from the heart. This marked diſtinction between the aortic fibres and thoſe of the heart would be already a ſtrong preſumption, that their nature is different, even if an abundance of other conſiderations did not eſtabliſh the point in the moſt incontrovertible manner." The ſtatement of the French writer on this point does not deſerve all that credit on the ground of originality, which he himſelf ſeems inclined to claim. Haller gives the following deſcription of the origin of the pulmonary artery, and adds, that that of the aorta is exactly ſimilar. "Caro cordis in circuli perfecti formam terminatur, et fibræ tranſverſæ cordis partim inter valvulas arterioſas per lineæ longitudinem producuntur, et aliquanto plus, partim in partem arteriæ, quæ ſinum valvuloſum perficit, pariter ſurſum pergunt, fere per ſeſquilineam, et accurate tranſverſæ cum alba pariter membrana arteriæ connectuntur, celluloſæ brevis telæ ope, ut nulla cordis fibra in arteriam continuetur." Elem. Phyſiol. lib. 4, ſect. 3, §. 8.

The leading circumſtances concerning the ramifications and ſtructure of the arteries are mentioned under ARTERY: but we have ſomething further to ſtate on theſe ſubjects in the preſent place.

Having ariſen in the way juſt deſcribed from the left ventricle of the heart, the aorta divides very ſpeedily into two portions; of which the aſcending paſſes upwards to the neck, head, and upper limbs, while the deſcending purſues its courſe to the cheſt, abdomen, and lower limbs. The firſt, quickly ſubdivided into four principal trunks, differs from the latter, which remains a ſingle trunk for a conſiderable length. Since the latter has to paſs through a much more extenſive courſe than the former, it preſerves more effectually, by this diſpoſition, the whole ſum of motion communicated to the blood by the heart. Nevertheleſs, in conſequence of the ſmaller diſtance of the parts from the heart, the impulſe produced by its action is more ſtrongly felt by the ſuperior than by the inferior organs, as we have already obſerved. At the upper part of the pelvis the aorta is divided into two ſecondary trunks; ſoon after the ſubdiviſions begin, under the name of branches, and are ſubſequently continued under the terms of ramifications, twigs, &c.

It is difficult to ſtate accurately and generally how often the arteries divide in their courſe from the heart to their termination in veins. The mathematical phyſicians ſeem to have erred in aſſigning much too large a number of diviſions. Keil ſtates that there are forty or fifty, and relies chiefly on this ſuppoſition for making good his theory concerning the great retardation of the blood's velocity in the ſmall veſſels. "Much," ſays Haller, "muſt be detracted from this calculation, if we diminiſh, as we certainly muſt, the number of diviſions ſtated by this author. I have ſometimes counted the diviſions of the branches in the membranes of the inteſtines accurately injected, beginning from the heart, and ending in the very minute ramifications, as far as the eye could follow them. I have hardly ever found twenty diviſions: nor could there be many, between thoſe which I took for the laſt, and the commencement of the veins, both becauſe the ſmalleſt viſible arteries are extremely ſhort, not exceeding a few lines in length, and becauſe I reckoned down to the very convexity of the inteſtine, which is at the greateſt diſtance from the commencement of the trunks." Elem. Phyſiol. t. 1. p. 77.

Where arteries divide, or a branch is given off from any trunk, a projection is obſerved on the inſide of the tube, formed by the internal coat of the artery, and correſponding in its ſituation to the angle formed by the ſeparation of the branch, and favouring the change in the courſe of the blood by breaking the column. The form and appearance of this projection vary according to the nature of the angle. If the angle be a right one the edge is circular, and equally manifeſt in the whole circumference. Where the angle is acute, there is a very ſharp projection, of a ſemi-circular form, between the branch and the continuation of the trunk; but there is hardly any projection obſervable between the trunk itſelf, before the origin of the branch, and the commencement of the latter, in which ſituation there is an obtuſe angle on the outſide. In proportion as the latter angle is more obtuſe, and conſequently in proportion as the other is more acute, the laſt-mentioned prominence is leſs obſervable: its form, like that of the other, is ſemi-circular, and the two make together an entire circle, which is placed obliquely. That part of this circle, which is formed by the ſecond projection, is the neareſt to the heart. When there is an acute angle between the trunk and the branch, and an obtuſe one between the branch and the continuation of the trunk, the arrangement is exactly the inverſe of that laſt deſcribed. An oblique circle is obſerved at the mouth of the artery, of which the moſt projecting half is the neareſt to the heart.

The origin of the arterial trunks is tolerably conſtant, but that of the branches is expoſed to ſuch variety, that we hardly meet with two ſubjects exactly ſimilar in this reſpect. This circumſtance correſponds to the common variations of form obſerved in the organs of the organic life. Neither does their diſtribution obey the law of ſymmetry. Even in the limbs, which correſpond to each other, there are varieties in the origin and courſe of the branches.

The arterial diviſions take place very near each other. The carotid and the iliac arteries are almoſt the only inſtances of arterial tubes paſſing for conſiderable diſtances without producing any branches. Ramifications of different ſizes do not come off ſucceſſively according to their magnitude; but the largeſt trunks may produce very ſmall twigs: thus the aorta gives origin to the bronchial and thymic arteries.

The name of trunks is given to the firſt diviſions of the two great portions of the aorta already mentioned: ſuch are the carotids in the neck, the ſubclavians in the axillæ, and the iliacs below. Theſe are generally lodged in large cellular interſtices, as the groin, axilla, the neck and ſides of the pelvis. As they divide they form branches, which are received into leſs conſiderable intervals, and are, therefore, more immediately expoſed to the influence of the ſurrounding organs. They are generally covered in ſuch a manner by the neighbouring parts as to be ſhielded in great meaſure from external injury. Some have ſuppoſed that the contraction of the muſcles accelerates the blood's motion in theſe tubes, and, on the other hand, the movements of the arterial trunks produce in the neighbouring organs, and even in the whole limb, a very ſenſible motion, a kind of agitation, which, in the opinion of Bichat, maintains the vital energy. This fact may be rendered viſible by a very ſimple experiment. When the elbow is reſted on a table, and a body of ſome length is held in the hand, its extremity is obſerved to vacillate, and the motion follows exactly the pulſations of the arteries. When a perſon ſits with his knees croſſed, the foot of the upper leg is raiſed by each projection of blood into the arteries of the limb, and then ſinks again. To the ſame cauſe may be referred the motion of the brain, and that of tumours ſituated over the trunks of large arteries.

The courſe of the arteries differs much from that of the veins. The trunks of the latter veſſels are under the ſkin, and the deep-ſeated branches are ſmaller: the cutaneous branches of the arteries are ſmall and ſhort; the larger trunks have a deep-ſeated, and conſequently more ſafe poſition. It cannot, therefore, be generally aſſerted that veins accompany the arteries, unleſs it be at the ſame time obſerved, that the deep-ſeated venous tubes, following the large arteries, are comparatively ſmall, and that the cutaneous arterial ramifications which accompany the large venous trunks, are ſtill ſmaller. The vertebral arteries run through the long canals of the tranſverſe proceſſes, while the veins lie on the outſide; the radial, ulnar, tibial, peroneal, and lingual arteries, have each a ſmall vein cloſe to them, while the large trunks of the cephalic, baſilic, ſaphenæ, and external jugular veins paſs ſuperficially without any attendant arterial ramifications. This arrangement leſſens the danger of hæmorrhage in wounds; the impulſe of the heart occaſions great riſk from the diviſion of an artery, while that of a vein is attended with little danger in compariſon. Where the courſe of the vein is in a protected ſituation, as when covered by bones or large muſcles, it is often attended by an artery; as in the meſentery, kidnies, lungs, arm and thigh.

The direction varies in the trunks and branches. The former are commonly ſtraight, and conſequently the circulation goes on in them almoſt inſenſibly; when they are laid bare in a living animal, no locomotion is obſervable. Yet ſome exceptions occur to this rule; as in the arch of the aorta, and the curvatures of the internal carotid. The branches are more tortuous, and this arrangement gives riſe to that motion of the veſſel, which, according to ſome, produces the pulſe.

The ſmaller diviſions of the arteries run in the interior of our organs, without, however, entering into their intimate ſtructure. Thus, in the muſcles, they paſs between the fibres, in the brain between the convolutions, in the glands between the lobes of which they conſiſt, &c. "By theſe," ſays Bichat, "an inteſtine motion is communicated to the whole organ, which facilitates its functions, and keeps up the activity of its various parts, as the more general motion already ſpoken of ſupports that of the whole part taken together. The ſudden ceſſation of life, when the blood ceaſes to agitate the brain, proves the immediate connection between this inteſtine motion and its active powers. Hence, we obſerve, that the vital energies are more decidedly marked in all parts where the arteries are very numerous, as in the muſcles, the ſkin, the mucous ſurfaces, &c.; while, on the contrary, the vital phenomena are much more obſcure in organs of leſs vaſcularity, as the tendons, cartilages, bone, and other white parts.

The tortuoſities of the arteries increaſe as they become more minutely divided, and injections render this point very clear, particularly in the brain; but as theſe turns depend very much on the cellular ſubſtance, they diſappear partly when the veſſel is inſulated on all ſides. They are much increaſed when the veſſels are diſtended in injection. In the article CIRCULATION, we have conſidered how far the common opinion, which aſſigns this arrangement as the cauſe of retardation in the blood's motion is correct, and have expreſſed our doubts whether it is at all founded in truth. The remarks of Bichat coincide with this view of the ſubject. "Where the ſtomach or inteſtine is expoſed in a living animal, alternately in a ſtate of plenitude and emptineſs, I have found the circulation nearly equally rapid in both caſes; although in the firſt inſtance, the veſſels muſt have been rendered ſtraight by the diſtenſion, and in the ſecond, they muſt have been thrown into curves. I opened the carotid in a dog, and, after obſerving the jet of blood, expoſed both ſides of the cheſt. The lungs immediately collapſed, and their veſſels muſt have become folded on themſelves; yet the ſtream of blood proceeding from the wound, and which muſt have come through the pulmonary veſſels, was not retarded, and it was only gradually enfeebled by the action of other cauſes, which need not be particularized here. If, after opening an artery, the trachea be alſo opened, and all the air contained in the lungs ſuddenly extracted by means of a ſyringe adapted to the aperture, thoſe organs are reduced at once to a very ſmall bulk; their veſſels muſt, therefore, be at once conſiderably folded on themſelves; yet the blood continues to flow with equal force as before from the opened artery. Laſtly, after opening the abdomen of a living animal, I have alternately folded and ſtretched out the meſentery, of which ſeveral arteries had been previouſly opened; no difference was perceptible in the jet of blood in theſe two ſtates of the part. The ceſſation of the pulſation at the wriſt, when the arm is forcibly bent, does not ariſe from the angle formed in the artery in conſequence of that particular poſition of the limb, but from the direct preſſure of the ſurrounding parts on the arterial tube. The ſingle turn of the brachial artery in this caſe ſhould produce much leſs effect than the numerous windings of the internal carotid, which, however, do not ſeem to have any influence on the courſe of the blood. If the whole arterial ſyſtem were empty, and the blood departed from the heart to fill it ſucceſſively, the courſe of the fluid might be retarded by its ſtriking againſt the windings of the arteries. Hence, in anatomical injections, a tortuous artery is leſs readily filled: the ſpermatic, for example, is often not diſtended by the injected fluid. The caſe is very different in an aſſemblage of tubes completely full of fluid; the ſhock impreſſed at the commencement of this ſyſtem is propagated ſuddenly through all the cavities."

The windings in the courſe of the arteries allow theſe tubes to accommodate themſelves to the varying poſitions of the organs in which they run, without their undergoing any actual extenſion; hence, they are moſt remarkable in parts which exert a conſiderable motion in the execution of their functions, as in the lips and other parts of the face, the tongue, the uterus, the hollow viſcera, as the ſtomach and the inteſtines.

This opinion concerning the end obtained by the winding courſe of arteries, is more fully explained in the following quotation from Haller: "Facile vero finis fabricantis naturæ proſpicitur. Arteria flexa omnino multo longior eſt, ea recta linea, quæ per medias flexiones tranſit, et arteriæ longitudinem metitur, ſi ea recta foret; poteſt adeo arteria flexa, quoties ejus finis a principio removetur, abſque ullo incommodo longior reddi, dum gyri a ſe invicem recedunt, et arteria totam ſuam longitudinem explicat, quæ nunc exporrecta diſtantiam terminorum metitur. Eſt enim ea harum flexionum conſtans indoles, ut arteria circa lineam imaginabilem decurrat, ſupra quam alterne elevatur, infraque eandem viciſſim deprimitur. Plethora et injectiones anatomicæ has flexiones augent. Arteriæ cerebri, dum inanes ſunt, pene rectæ videntur: eædem repletæ flexuoſæ fiunt. Quæ vero arteriæ etiam inanes flexuoſæ ſunt, eædem repletæ ad angulos minores incurvantur, ſi interim ea pars corporis animalis, cui incumbunt, longitudinem ſuam non mutaverit." (Elem. Phyſiol. lib. 2. ſect. 1. § 20.)

The arterial anaſtomoſes are of two kinds: 1ſt, where two equal trunks unite together, and, 2dly, where a large branch is joined by a ſmaller. Three varieties may be obſerved in the firſt of theſe modes. 1ſt. The two arteries may be joined together at an acute angle, ſo as to form a ſingle trunk; this may be ſeen in the junction of the ductus arterioſus and aorta, and of the two vertebrals. 2dly. Two arteries may be joined by a tranſverſe branch, as, for example, the anteriores cerebri. 3dly. They may join ſo as to form an arch; the meſenteric veſſels afford examples of this arrangement. Here the branches are given off from the convexity of the arch. In the firſt caſe, two columns of blood are united into one, which takes the middle courſe between the directions of the former: in the ſecond, the two columns purſue their original courſe, and merely communicate together: in the laſt, they meet together, coming in oppoſite directions, and the blood goes on through ſecondary ramifications. The ſecond kind of anaſtomoſes, formed by the junction of conſiderable branches with ſmaller ones, is very frequent, and exhibits no varieties. Theſe communications, which grow more and more frequent, as the arteries become ſmaller, are at laſt ſo numerous and univerſal, that theſe veſſels form one general network over the whole body. "To this ſyſtem," ſays Scarpa, (on aneuriſms), "may be juſtly applied the ſaying of Hippocrates, in toto corpore unus conſenſus et una conſpiratio: for it may be boldly ſtated, that the whole body is an anaſtomoſis of veſſels, a vaſcular circle. This fact is ſo true, that although in ſome rare caſes there may occur a conſtriction and obliteration of the great artery of the body, (I mean the aorta), immediately below the arch, which this artery makes; the circulation through the reſt of the body, from the neck to the feet, is not thereby ſtopped or obſtructed.” And he adds this further remarkable proof of the fact: “I have repeatedly had occaſion to obſerve, what others may likewiſe ſee at pleaſure, that on tying tightly the aorta in the dead ſubject, immediately below its arch, in order to throw with great force the injection into the arterial veſſels of the head and arms, a very fluid injection has likewiſe found its way, by the veſſels of the neck, by the ſubclavian, the dorſal, and eſpecially the two upper intercoſtal arteries, into the arteries of the thorax, and to thoſe of the abdomen, and for a long ſpace, even to the principal arterial trunks of the lower extremities.” P. 48. This fact, of the freedom and univerſality of the arterial anaſtomoſes, is highly important in ſurgery, as it enables us to tie any of the large arterial trunks, in the caſes of aneuriſm, without any apprehenſion for the ſubſequent nouriſhment of the limb.

Many phyſiologiſts have repreſented the arteries as conical;—have conſidered each artery as a cone, of which the baſis is at the heart, and the apex at the extremities of the body.

In this view of the ſubject the following ſuppoſition is made; *viz.* that you ſhould ſelect any artery, as that of the finger for example, follow it to its trunk, and ſucceſſively trace the canal to the aorta and the heart; in which caſe it will be found, that the area increaſes conſtantly as you approach the heart. Hence, an artery may be called conical, when the aorta is followed out to the end of any particular branch on the ſurface of the body; and we may conceive in our imagination this continuation of the tube to the finger as a ſingle canal, of which the origin and baſis are in the heart, the termination and apex in the finger. But there are ſeveral circumſtances to be taken into the account in this caſe. The decreaſe in the ſize of the veſſel ſeems to depend leſs on its diſtance from the heart, than on the branches which it furniſhes in its courſe. When an artery runs for ſome length, without giving off any branch, or at leaſt any important one, from its ſize, it does not ſeem to be diminiſhed in that ſpace, if common modes of meaſurement can be truſted. Ræderer obſerved the umbilical artery to be larger in the chord than at the opening in the linea alba. The trunk of the carotid is not ſmaller at its diviſion than at its origin; neither is the vertebral artery diminiſhed in the neighbourhood of the occiput, although it has ſent branches off in its courſe through the tranſverſe proceſſes of the cervical vertebræ. Senac has aſcertained the ſame fact concerning the thoracic aorta, the humeral, radial, and internal mammary arteries. This is the reſult obtained by examining the tube of an artery between two branches, by ſlitting it up when empty, or meaſuring it when full of blood. Hence we are led to conſider an artery, which has been generally termed conical, as compoſed of a ſeries of cylinders, ſucceſſively decreaſing, adapted to each other in ſuch a manner, that, at the origin of any tolerably large branches, two of them meet together, the larger being between the heart and the origin of the branch, the inferior beyond the origin.

Mr. Hunter affirms, that an artery which produces no branches, actually increaſes in ſize as it proceeds from the heart. “The arteries of the placenta evidently increaſe in ſize, the nearer they approach to the placenta; and this ſo very conſiderably, as to require no experiment, unleſs it be intended to aſcertain the difference correctly. In the ſpermatic artery of the bull it is equally evident: but as theſe arteries are much longer than the diſtance between their origin and the parts which they are to ſupply, it may be ſuppoſed that this increaſe is peculiar to them, in order to anſwer ſome particular purpoſe; but the carotid arteries, in ſome animals, afford ſufficient proof that the arteries in common become larger as they paſs on and ramify; for the carotids may be reckoned ramifying arteries, as they ſend off branches.” (On the Blood, p. 169.) Mr. Hunter then relates the reſult of ſome trials on the carotid artery of the camel and the ſwan. On weighing exactly equal ſections from the upper and lower end of the carotid of a camel, he found that the former was one grain and a half heavier than the latter. “The carotid artery of another camel, meaſuring three feet and a half in length, was found to ſend off forty-four ſmall branches, about the ſize of the human intercoſtal arteries, with one as large as the ulnar. Of this artery, a tranſverſe ſection, of one inch in length, being taken from each end, and weighed; that from the lower end was found to weigh two ſcruples, 16 grains and a half: while that from the upper end weighed only two ſcruples, fourteen grains and a half. In ſimilar ſections of the oppoſite carotid, which ſent off forty-ſeven branches, the difference in weight between the upper and lower ſection was five grains. Similar ſections from carotid arteries of a ſwan being weighed, the lower ſections were found to be three grains and a half heavier than the upper; the lower ſection weighing thirteen grains and a half. Had the lateral branches been preſerved an inch long, being the length of the ſections of the trunk, I believe each might have weighed above a grain, and in that caſe, the forty-four would have been nearly equal in weight to the trunk; ſhould this be true, the arteries increaſe very conſiderably, not only in their ramifications, but in their trunks. I imagine, if the carotid artery in the camel did not ſend off any branch in its courſe, it would increaſe in ſize nearly in the ſame proportion with the umbilical artery, or the ſpermatic in the bull.

“It is to be obſerved, that as arteries divide, they increaſe in ſize much faſter than if they did not; for inſtance, if a ſection of an artery, two inches long, is equally divided into two, the ſection that is the further from the heart ſhall be heavier than the other, perhaps by one grain; but if the moſt diſtant ſection had divided into two branches, the two taken together would have been a grain and a half heavier; if three branches, two grains heavier, &c.” Ibid. p. 170. On this ſubject the reader may refer alſo to Haller, Element. Phyſiolog. t. i. p. 56 et ſeq.

We have already obſerved, that the arterial ſyſtem, taken altogether, repreſents a cone, whoſe baſe is in all parts of the body, and its apex at the heart: that is, that the diameter of the aorta is leſs conſiderable than that of all its branches united. This is proved by comparing a trunk with the two branches formed from it; the latter ſurpaſs it in diameter, and as the proportion is conſtantly the ſame in all the ſub-diviſions, it muſt be obvious that the capacity of the arterial ſyſtem is conſtantly increaſing. The amount of this augmentation has been variouſly ſtated, and the reports of the various authors who have conſidered the ſubject, are collected by Haller in the firſt ſection of the ſecond book of his Element. Phyſiol. § 18. Senac found the proportion of the aorta to its branches to be as 81 to 144; of the axillary 484 to 1296; of the brachial to the radial and ulnar 36 to 64; of the aorta above the origin of the cæliac, to the ſame veſſel below that point, together with the cæliac, 1764, to 3249. Haller himſelf gives the following numbers as the proportions between the trunk of the aorta on one ſide, and on the other, the three branches ariſing from its arch and the trunk after their origin, as obſerved in different trials: 4900 to 6075; 3789 to 4659; and 1521 to 2250. He found the proportion of the trunk of the ſuperior meſenteric to its eleven branches to be as 529 to 988: and of the carotid to its external and internal branches as 529 to 768.

Although there can be no doubt that the capacity of the arterial ſyſtem increaſes as it proceeds from the heart, the general opinions concerning the mode and degree of this augmentation, and the ratio of the branches to the trunk in each particular inſtance, have been called in queſtion by ſome phyſiologiſts. "It has been commonly taught, "ſays Blumenbach," that in the whole arterial ſyſtem, the branches are more capacious than the trunk from which they ariſe. I apprehend that this propoſition has been enunciated too generally, and that the meaſure of the *diameter* has been often very improperly confounded with that of the *area* of the veſſel. I have examined this point more than once, not in veſſels diſtended with injection, but in the undiſturbed arteries of the moſt recent ſubjects, and have found, in the caſe of the innominata and its right carotid and ſubclavian branches, and of the brachial with its radial and ulnar diviſions, that the areas of the branches did not at all exceed that of the trunk in capacity." (Inſtit. Phyſiol. ſect. 7, § 90.) Bichat mentions another ſource of error on this ſubject; " that of meaſuring the arteries on their exterior after injecting them: in fact, the calibre of trunks is greater, in proportion to the thickneſs of their ſides, than that of the branches taken ſeparately: in other words, the parietes of the aorta are leſs thick, ceteris paribus, in proportion to its cavity than thoſe of the ulnar artery. To this circumſtance we may undoubtedly refer the comparatively rare occurrence of aneuriſms in the branches, and their frequency in the trunks." Anat. Gener. t. ii. p. 275

After having been divided and ſubdivided, and having exhibited in their courſe the appearances juſt detailed, the arteries end in the general capillary ſyſtem. It is almoſt impoſſible to ſhew where the latter commences and the arteries end: we may, indeed, ſtate, that it is at the point where the blood ceaſes to be entirely under the influence of the heart, and has its motion kept up by the inſenſible contractility of the vaſcular parietes: but the line of demarcation cannot be rendered obvious to the ſenſes.

In treating of the termination of the arteries, authors have conſidered their continuity with the excretory tubes, exhalants, veins, &c.; but the general capillary ſyſtem is clearly interpoſed between the latter kind of veſſels and the arteries. We ſhall therefore refer what we have to ſay of their origins to our account of the capillary ſyſtem, which is diſperſed through all the organs of the body, but preſents eſſential differences, in reſpect to its continuity with the arteries, according to the different ſyſtems in which it is found. There are ſyſtems in which the above-mentioned tubes are found in great numbers, and where, conſequently, the general capillary ſyſtem contains much blood; ſuch are the glandular, the mucous, the cutaneous, the muſcular, &c. Other ſyſtems receive but few arteries, as the oſſeous, fibrous, ſerous, &c.; and have therefore but a ſmall quantity of blood circulating through their capillaries. Laſtly, the cartilaginous, hairy, and cuticular ſyſtems poſſeſs no arteries, and contain only colourleſs fluids in their capillary veſſels.

The arteries are compoſed of ſucceſſive membranous ſtrata, differing in their organization and appearance. The firſt of theſe is called the *cellular* or *external* coat, and forms the medium of connection between the veſſel and the ſurrounding parts. Within the cavity of the pericardium, the origin of the aorta is covered by the reflected portion of that membrane, a certain quantity of cellular and adipous ſubſtance being interpoſed. On the left ſide of the cheſt, and in ſome parts of the abdomen, this artery and its iliac branches are covered in a ſimilar manner by the peritoneum on their anterior ſurface. Theſe coverings are foreign to the eſſential conſtruction of the artery, and are adventitious circumſtances ariſing from local cauſes. With the exception of the arteries in the head and thoſe of the navel ſtring, theſe veſſels are connected on all ſides to the ſurrounding parts by cellular ſubſtance. This covering, which is very conſtant, envelopes the whole artery and all its branches on all ſides, connecting them to the neighbouring viſcera, membranes, perioſteum, and muſcles. The threads compoſing it are ſhort, and more delicate in proportion as the arterial diviſions are more minute; but it is never abſent, ſince the ſmalleſt perceptible veſſels are ſtill connected by cellular threads, and become looſe and moveable when theſe are removed. In the larger trunks this covering is more looſe, compoſed of longer threads, united at very acute angles, and nearly parallel, free from fat, and ſometimes called the *cellular ſheath* of the artery. Nerves and ſmall blood-veſſels are frequently diſperſed in theſe ſheaths, ſo as to give them a peculiar reddiſh appearance. A remarkable example of this ſtructure may be ſeen in the carotid artery. Where theſe veſſels are tortuous, their turnings are deſtroyed by removing the cellular ſubſtance, and they then appear ſtraight. In the neighbourhood of the artery this covering ſeldom contains any fat, but that ſubſtance is obſerved in the cells, as we approach the ſurrounding parts. When the veſſel is divided, its cut ends are withdrawn within this ſheath, in conſequence of the power of retraction, which is then exerted. This cellular ſheath gives a pulpy flocculent appearance to the outſides of the artery, more particularly if it has been inflated, or if its cells have been diſtended by maceration in water; hence the term of *villous* coat, as applied to the covering in queſtion.

Immediately round the artery the cellular ſubſtance forms a very denſe, cloſe, and firm layer, which on the firſt view appears to be a peculiar membrane, but, on more accurate examination, is found to belong to the cellular ſyſtem. Yet this is never the ſeat of ſerous effuſion in anaſarca, nor does it ever contain fat. It is formed by the gradual condenſation of the ſurrounding cellular ſubſtance, which aſſumes a more and more compact texture, and the threads of which are at laſt ſo firmly interwoven, that it may be detached in a continuous ſtratum, forming a kind of canal, correſponding to that of the artery, which it contains and ſupports. After conſiderable maceration, the cells of this part are ſo diſtended with water that it ſeems to conſiſt entirely of a ſpongy cellular ſubſtance. According as different authors have attended more particularly to the ſurrounding cellular ſheath, which connects the artery to the neighbouring parts, or to the condenſed layer, which immediately inveſts the canal, their deſcriptions have varied in ſome particulars. Haller's account is very correct, and he diſtinguiſhes the two portions by different names, calling the latter the tunica celluloſa propria, and the former cellulоſa adſcititia. This cellular organ, taken altogether, ſeems rather ſubſervient to the office of connecting the veſſel in its ſituation, than eſſentially concerned in the execution of its functions; hence it is not included by ſome in their enumeration of the arterial coats. Walter in the Memoires de Berlin, 1785, deſcribes only two coverings of the arterial tubes; and Scarpa, in his large work on aneuriſm, calls the two ſtrata, which we ſhall preſently deſcribe, the *proper coats* of the artery.

The moſt ſtriking characteriſtic of the arteries is their ſecond covering, called by ſome anatomiſts ſimply tunica media, by others the muſcular or fibrous coat, and by Bichat, la membrane propre. It is a denſe and firm covering, very apparent on the large arteries, and leſs ſenſible on the ſmaller ramifications, on which it is gradually loſt. Its colour is uniform throughout: the apparent redneſs of the branches, and yellowneſs of the trunks in living animals, depend merely on the tranſparency of the former allowing the blood to be diſcerned through their ſides, and the opacity of the latter. The colour of the arterial fibre is yellowiſh; yet it aſſumes, under certain circumſtances, a ſomewhat grey hue. Often, after a few days maceration, it grows red, or rather roſe coloured, like the cartilages of the fœtus, or the fibro-cartilages of the adult when ſimilarly treated. The external or cellular covering always becomes whiter from maceration. The redneſs produced in the arterial fibre by immerſion in water diſappears in conſequence of continued maceration. "The thickneſs of the proper arterial membrane," ſays Bichat, "is conſiderable in the large trunks. It decreaſes gradually; and this circumſtance diſtinguiſhes it from the internal coat, which I have found nearly as thick in the tibial artery as in the aorta. The arteries of the brain have been ſaid entirely to want the fibrous coat. Undoubtedly this covering is thinner in proportion on the trunks of the internal carotid and vertebral, than in arteries of equal magnitude, which run in the muſcular interſtices of the body; but an attentive examination of theſe veſſels has enabled me to diſtinguiſh clearly circular fibres. Can we explain the extravaſations of blood, which are ſo frequent in the brain, from the thinneſs of the arterial ſides? This is a matter of doubt. Such effuſions take place only from the capillaries; the trunks are never concerned; and hence I have ſought in vain to diſcover the torn veſſels by injections." The organization and arrangement of this covering ſeem to be uniform in all other parts of the body; perhaps it may be thinner in the interior of the viſcera, as the liver, ſpleen, &c. than in the intervals of the muſcles.

This fibrous coat is compoſed of very diſtinct fibres, adhering to each other, but ſeparable without much force, diſpoſed in ſucceſſive concentric ſtrata, ſo that, after removing the cellular covering, the various layers may be detached without trouble, which circumſtance has led ſeveral authors to repreſent the large arteries as being formed of ſeveral coats. The fibres are circular, or nearly ſo; and the exterior ones have ſome attachment to the cloſe cellular tiſſue which is contiguous to them. Hence, when we remove the latter, a greater or leſs number of the fibres remains connected to it. The internal membrane may be eaſily ſeparated, without carrying away any of the arterial fibres.

Haller's deſcription of this part repreſents it as more decidedly of a muſcular nature. "Poſt hanc præcipuam arteriæ partem ſequuntur interiores *carneæ fibræ*, quas in arteriæ aortæ principio inprimis contemplatus ſum, qua in ſede utique et copia et rubore facilius ſe produnt. Multorum ibi ſtratorum ſunt, quorum alia poſt alia eleves, denſæ, cellulofitate pauciſſima ſeparatæ, duræ, in circulum flexæ. Eam vocem ita volo ſumtam, ut nulla quidem fibra integrum circulum abſolvat, annuloque poſſit comparari. Perinde enim, ut in aliis muſculis, rectæ breveſque fibræ extremos ſines ſuos ad latus detortos inter vicina ſui ſimilia carnea fila abſcondunt. Hæc eſt *muſculoſa* tunica arteriarum, a pleriſque anatomicis recepta, quam primam arteriæ membranam vocavit Cl. Monrous. In minoribus arteriis ſenſim malignius apparet, in capillaribus denique ne lente quidem vitrea adhibita, qua rerum ſpecies augetur. A cerebri enim vaſis vulgo carneas fibras abeſſe ſcriptum eſt; quem errorem ita redarguit Cl. Ludwigius, ut tamen pauciores faciat." Elem. Phyſiol. lib. 2, ſect. 1, § 7. On another occaſion he ſpeaks more decidedly of the *muſcular* nature of theſe fibres; "in arteriis majoribus muſculoſam carnem deſcripſi, nihilque ab ipſis abeſſe volui, quo muſculi pollent." Oper. Minor. t. 1. p. 190.

Mr. Hunter, who conceived that the arteries poſſeſs a power of contracting like muſcles, does not deſcribe the fibrous coat as compoſed of muſcular fibres; nor indeed does he ſpeak very clearly on the ſubject. He rather infers the exiſtence of muſcular fibres, from his notion that arteries certainly exhibit phenomena, which can only be accounted for by aſſigning to them muſcular ſtructure. "Although, when we conſider the conſtruction and uſe of the arteries, we muſt at once ſee the neceſſity of their having theſe two powers (the muſcular and elaſtic); yet, in the greateſt number, it is impoſſible to give clear ocular demonſtration of the exiſtence of diſtinct muſcular fibres. But ſtill, as arteries are evidently compoſed of two diſtinct ſubſtances, one of which is demonſtrably elaſtic, and we *know them likewiſe to be endowed with the power of contraction, peculiar to a muſcle*, it is reaſonable to ſuppoſe the other ſubſtance to be muſcular; I ſhall endeavour alſo to prove its exiſtence in ſuch veſſels, from their having the power of contraction in the action of death." On the Blood, p. 117.

In the ſubſequent paſſages, he attempts to ſhew how the muſcular part may be diſtinguiſhed by the eye. By looking on the cut edge of an artery, he ſays, we ſhall obſerve, that it is redder towards the inner ſurface; that this darker coloured portion begins almoſt inſenſibly in the larger arteries, and increaſes in amount as the veſſels become ſmaller. He ſtates further, that the difference in ſtructure between theſe parts is not very conſiderable, and that the elaſtic and muſcular fibres are intermixed. The account on the whole is by no means clear; and the aſſertion of a difference between the outer and inner portions of the fibrous coat is not founded in fact; while the notion of two different tiſſues being intermixed, as he conſiders the muſcular, and elaſtic to be, is repugnant to our obſervations on all other parts of the animal machine.

When a branch ariſes from any trunk, the circular fibres of the latter are ſeparated, and form on each ſide a half circle, from the union of which an entire circle is formed, ſurrounding and embracing the ſmall rings formed by the circular fibres of the branch. The latter are continued to the internal prominence of the lining membrane, which is ſeen on the inſide of the arterial cavity, as we have already deſcribed. Theſe projections are in fact made by the fibrous coat covered on its inner ſurface by the internal membrane. There is, however, very little continuity between the fibres of the trunk and thoſe of the branch; they are chiefly connected together by the continuity of the cellular and the internal coats. When two equal branches ariſe from a trunk, as the iliac arteries from the aorta, the laſt circular fibres of the primitive trunk are intimately united with the commencement of each of the two circular planes, which ariſe at the level of the ſemi-circular projection, ſeparating the two arteries internally.

There are no longitudinal fibres, nor indeed any but the circular already deſcribed, in the arterial ſyſtem.

"What," ſays Bichat, "is the nature of the arterial fibre? Moſt anatomiſts have conſidered it as identical with the muſcular; yet a very curſory examination will ſuffice to convince us of their differences. It is not the abſence of the red colour that eſtabliſhes this difference, ſince, in the human body, many parts, undoubtedly muſcular, as the inteſtines, do not poſſeſs it. But the muſcular tiſſue is ſoft, looſe, and eaſily ſtretched; while the arterial fibres are firm and ſolid, and break rather than give way to the ſtretching. The conſequences of this difference are eaſily ſeen in the effects of a ligature. When an artery is tied firmly, the two internal coats are divided, and the cellular covering alone ſuſtains the effect of the ligature, which however is immediately applied to it. On expoſing the tube, a ſection, preciſely like what would be produced by a cutting inſtrument, is ſeen correſponding to the ſituation of the thread. The reſult of this experiment, which I have often repeated, is conſtantly the ſame; and I conſider the arterial tiſſue to be the moſt brittle of any in the body; a ſimilar experiment performed on an inteſtine, where the fibres, as in an artery, are circular, produces different effects; they are compreſſed and bruiſed, but not cut through. Arteries differ from muſcles in almoſt every point; in their organic and vital properties, in their developement and diſeaſes." The power of reſiſtance of the arteries in their natural ſtate is very conſiderable, although the fibres ſeem to give way eaſily in aneuriſms, and under the application of ligatures; and this ſtrength is exerted both in the tranſverſe and longitudinal directions. A conſiderable force is neceſſary to burſt an arterial trunk, by the injection of air or any other fluid; ſo great a force, that the effect can hardly be produced ſuddenly by the heart's action, and aneuriſms muſt be formed by a progreſſive and continued action on the arterial parietes, of which the tiſſue is probably previouſly diſeaſed. Wintringham, who inveſtigated this ſubject by means of injections of air, found that the aorta was burſt in a young ſubject, near the heart, by a force equal to 119 ℔. 5 oz; and further down by 131 ℔. 10 oz. The carotid of a ſmall dog was burſt by 25 $\frac{71}{100}$ ℔.; the ſplenic artery of a man by 41 ℔. 8 oz.; and its ſtrength, compared to that of the aorta, was as 1319 to 1000; that of the renal artery to the aorta, as 51 to 40. If an artery and a muſcle be extended longitudinally in the dead ſubject, the former is the moſt difficultly torn; but the reſult of a ſimilar trial in the living ſubject is juſt the reverſe; the artery will yield to a pretty ſtrong extenſion, which muſt be vaſtly augmented in order to tear the muſcle. The ſource of this difference muſt manifeſtly be ſought in the vital properties of the latter; it contracts violently under the circumſtances juſt ſtated; while the artery reſiſts only by means of its organic properties.

This power of reſiſtance in the arterial parietes is neceſſary to enable them to withſtand the action of the heart, more particularly when the contractility of that organ is unuſually exerted: in this point of view, a relation muſt always ſubſiſt between the power of the heart, and the ſtrength of the large arteries.

The fibrous covering of the arteries is a diſtinct and peculiar tiſſue of the animal economy: its fibres alone could have led to the notion of its being muſcular; but this property is common to it with ligaments and tendons, and external forms cannot regulate the intimate nature of organs. The action of the various re-agents on the arteries ſhews another claſs of ſtriking differences between their fibres and thoſe of muſcles. "When dried in the air they aſſume a reddiſh yellow colour, dark and approaching to black in the large trunks, more clear in the ſmaller ones. In this ſtate the arterial tiſſue is hard and extremely brittle, and breaks with a cracking, which is not obſerved in any other animal ſtructure. In this mode of preparation, the difference between the cellular covering and the fibrous ſubſtance is clearly obſerved, the former remaining flexible. The latter loſes very little of its thickneſs in drying; and this circumſtance diſtinguiſhes it from moſt other tiſſues. It ariſes from the ſmall quantity of fluid contained between its laminæ, a circumſtance, which ſeems to depend on the abſence of cellular ſubſtance in this ſituation. We cannot fail to be ſtruck with the dryneſs of the arterial laminæ, as contraſted with the humidity of muſcular fibres. When expoſed in this ſituation, among the ſurrounding parts, to the action of air, the arteries putrefy ſlowly; indeed for a certain time they ſeem almoſt to reſiſt this change. They give a much leſs fœtid odour than other tiſſues, when allowed to putrefy ſeparately, and produce a ſmaller proportion of ammoniacal matters. The want of fetidity characteriſes the water, in which arteries, completely ſeparated from all ſurrounding ſubſtances, have been macerated; and the difference is very ſtriking, when this water is compared to that in which muſcles have been macerated; we find alſo, that the arteries are almoſt unaffected when the viſcera, in which they run, as the liver, ſpleen, &c. are reduced into a ſoft maſs of putrefaction. In the living ſtate alſo, theſe veſſels reſiſt diſeaſe much longer than the other ſoft parts: hence the arteries are often ſeen as it were diſſected and inſulated, when ſloughing has carried away the ſurrounding ſubſtance. In the end, however, maceration or expoſure to air deſtroys the texture of the arteries; and the effect is produced much the moſt rapidly by the latter method. In the former caſe the part is gradually ſoftened, and after loſing the coheſion of its fibres, is reſolved into an homogeneous and greyiſh pulp. Expoſure to air renders the veſſel at firſt of a greyiſh colour, and afterwards reduces it to a pulp.

Expoſure to heat produces criſpation, or contraction and curling of the veſſel to the greateſt degree. Boiling has the following effect: 1ſt. Very little ſcum ariſes before ebullition, which is juſt the contrary of what we ſee in the muſcular ſyſtem, under ſimilar circumſtances. 2dly. There is a very marked criſpation at the moment of ebullition; but exerted more ſenſibly in the direction of the diameter, than in the axis of the veſſel; the artery at the ſame time becomes harder, and the water gains a yellowiſh tint. 3dly. The part is again ſoftened; but a greyiſh tint ſucceeds to the yellow colour; the fibres loſe their coheſion, ſo as to break with great facility. 4thly. However the ebullition may be protracted, the arterial tiſſue is never reduced into a gelatinous and yellowiſh pulp, like the fibrous, cartilaginous, and others. The fibres remain in their original ſtate, with the ſame bulk and relations; having merely loſt their coherence, and changed their colour. 5thly. The broth produced is inſipid. Concentrated acids firſt corrugate, then ſoften, and afterwards reduce the arteries into a fluid ſtate, or rather into a pulp, which is yellow when the nitric, and black when the ſulphuric is employed. Other acids have a leſs ſenſible effect. In the diluted ſtate, there is no immediate corrugation, as the conſequence of immerſion: but the tiſſue is gradually ſoftened and becomes brittle, as after boiling. Alkalis, even in the cauſtic ſtate, have very little effect on the arteries.

Common Membrane of the circulating Syſtem of red Blood.—This lines the pulmonary veins, the left cavities of the heart, and the arteries: in the latter veſſels it is called ſimply the *internal* membrane, and has alſo been deſcribed by the names of villous, nervous, or cuticular. In order to inſulate this membranous lining in the arteries, the fibrous ſtrata ſhould be ſucceſſively removed: the laſt of theſe adheres but ſlightly to the membrane, which may eaſily be detached in the form of a canal for a conſiderable extent. It is diſtinguiſhed from the fibrous coat, by its extreme thinneſs and conſequent tranſparency: by its white colour, for the yellowneſs of the internal ſurface of the artery, previous to diſſection, ariſes from the fibrous coat; and by the entire abſence of fibres. Its inner ſurface is perfectly ſmooth, and its texture uniform, like that of ſerous membranes. But it is diſtinguiſhed from theſe membranes by the kind of brittleneſs which it poſſeſſes: it is torn by very ſlight force.

Although this membrane is continuous over the whole internal ſurface of the circulating ſyſtem of red blood, it preſents ſome differences of ſtructure in the different regions. It is thinner in the left ventricle, than in the correſponding auricle, and in the arteries. It is ſuſceptible in that ventricle, and in the pulmonary veins, of much more conſiderable dilatation than in the arteries, where it and the proper fibrous coat would inevitably be burſt by any conſiderable dilatation. On the inner ſurface of the auricle and on the mitral valves it aſſumes a peculiar whiteneſs, in conſequence of maceration. Air, water, heat, &c. act on this as on the fibrous coat of the artery. The ſmooth poliſhed ſurface of this membrane offers no obſtacle to the tranſmiſſion of the blood through the tubes which it lines; and the moiſture of the part after death ariſes probably from ſome adhering portion of ſerum, and not from any mucous fluid, different from the blood, ſecreted by the veſſels of the part. Folds of this membrane form the aortic and the mitral valves, and the angular projections at the various diviſions of the arteries. On the outſide, where it is but weakly connected to the fibrous coat, there is no cellular ſubſtance intervening between them: yet neither boiling, maceration, nor putrefaction produces its detachment without the aſſiſtance of diſſection.

Although the appearances of the two be very different, this membrane is very analogous in its properties to the former. Neither can be well arranged under any of the organic ſyſtems of the body: they ſeem to form ſeparate tiſſues marked by excluſive and diſtinct characters. The internal membrane when dried is more pliant than the fibrous coat, and remains tranſparent inſtead of aſſuming the deep tint of the other. The phenomena produced by the other reagents, except the corrugation, are nearly the ſame.

“Among all the organic ſyſtems,” ſays Bichat, “this membrane is remarkable for its ſingular tendency to become oſſified in the old ſubject. This change will be found in ſeven out of every ten individuals after the 60th year of their age. The incruſtations conſtantly begin on the external ſurface of the inner coat, ſo that a thin pellicle ſeparates them from the blood. They do not obſerve the laws of common oſſification, as they do not exiſt previouſly in the ſtate of cartilage. The earthy matter is always depoſited in ſeparate plates of greater or leſs breadth: very ſeldom does the whole artery form a continuous ſolid tube. Membranous portions connect together the ſeparate plates, and allow the veſſel to accommodate itſelf to the motions neceſſary in the circulation. So long as the plates continue thin, the ſurface of the veſſel remains ſmooth, as in the natural ſtate; but if the depoſition be increaſed in quantity, they become thicker and project internally. The thin pellicle which covers them, and is continued over the neighbouring ſurface, gives way at their circumference, and they then adhere to the fibrous coat, only by their external ſurface. When they are numerous, and have paſſed into this ſtate, the whole lining of the arterial tube preſents numerous aſperities. Theſe circumſtances may be obſerved particularly in the origin and courſe of the aorta. All parts of the arterial ſyſtem are ſubject to this kind of oſſification, the branches ſeem to be affected as frequently as the trunks: the radial artery, for example, is often oſſified in old ſubjects. Such incruſtations, however, occur leſs frequently in the ſmaller twigs, and never in the capillaries.

“Similar bony depoſitions are ſeen in this membrane, where it forms the aortic and mitral valves; but they are hardly ever ſeen in the other parts of its expanſion over the interior of the left cavities of the heart. Oſſification of the trunk of the aorta is found by morbid reſearches to derange the circulation; but that of the ſmaller arterial trunks and branches does not impair this function in the ſlighteſt degree.

“The bony depoſitions, which we have juſt deſcribed, differ from thoſe, which come on in other parts of the body, inaſmuch as they are natural phenomena, while the others are accidental, and often preceded by inflammation, or other diſorders of the part. Conſequently the latter are not influenced by age, but happen in young ſubjects and adults, as well as in old perſons. Oſſifications of the internal arterial membrane may alſo occur before old age, but they are the moſt frequent, beyond all compariſon, at that time.”

Of the common Parts belonging to the Organiſation of the circulating Syſtem of red Blood.—The membranes, which compoſe the arterial tubes, are ſupplied with blood by ſmall arterial ramifications, called the vaſa arteriarum, and which ſerve the ſame purpoſes here, as in other ſtructures of the body. They come from the ramifications of the ſurrounding parts, and not from the trunk itſelf: for, if a portion of the common carotid be filled with fine injection, the arteries of its coats are not injected. The arteriolæ arteriarum firſt ramify in the cellular ſheath of the veſſel, where they divide and communicate in various ways, and ſend branches into the proper membrane of the artery, which are diſtributed among its laminæ, and terminate ſhort of the internal lining. “I have never ſeen,” ſays Bichat, “any arteries penetrating to this coat, either after injection, nor in the living animal, after opening an artery, in which the courſe of the blood had been intercepted for a certain ſpace by the application of two ligatures. In order to diſtinguiſh the arterial veſſels clearly without injection, we ſhould ſelect a large trunk, as the aorta, in a young animal which has died of aſphyxia: all the ſmall arteries are then completely filled with black blood. In the fœtus, particularly if it died from aſphyxia in the birth, an abundance of blood-veſſels will be ſeen in the large arteries, which are rendered almoſt livid from this circumſtance.” There is nothing particular to be obſerved concerning the veins, which muſt neceſſarily accompany the arteries now deſcribed.

The arteries are ſurrounded by two kinds of cellular tiſſue: one, which is quite external, and foreign to the arterial tube, is looſe, contains fat and ſerous fluid, and is compoſed of diſtinct laminæ, unites them to the ſurrounding organs, favours their motions, and forms a part of the general cellular ſyſtem: the other, which is compact, contains no fat, and is not laminated, forms the firſt of the arterial coats. This ſubſtance, and particularly the latter kind, maintains the folds of the arteries, which accordingly diſappear after diſſection, except in caſes where the veſſel is permanently held in the bent ſtate.

The cellular tiſſure does not ſeem to be continued into the interſtices of the fibrous coat of the artery, and this circumſtance particularly diſtinguiſhes the latter from the muſcular and other ſtructures. Long maceration exhibits nothing cellular in this part, and, when the artery yields at laſt to its continuance, it forms a mere pulp without any appearance of celluloſity. By detaching the fibres from each other, in careful diſſection, they ſeem to be held together merely by prolongations of the ſame nature with themſelves. Neither do we ſee any cellular ſubſtance between the fibrous and internal coats. “I conceive,” ſays Bichat, “that this peculiarity contributes much to the peculiar brittleneſs, which characterizes the arterial tiſſue, and which occaſions it to give way under the application of a ligature. And on the ſame principle I ſhould explain the difficulty or rather the impoſſibility of arterial dilatations, or of the formation of cyſts by the arterial coats. There are no true aneuriſms; at leaſt, when the tumours are large; "for the internal coats give way, and the cellular tunic alone is dilated." From the preceding views of the ſtructure of the arterial ſyſtem, the ſame author explains why there is never any fat in the coats of theſe veſſels; why they are never the ſeat of anaſarcous infiltration; why hydatids or cyſts are never developed between their laminæ; and why the various tumours, to which the cellular tiſſue gives birth; are never ſeen in thoſe organs. Granulations are never formed by its ſides after a wound; yet they are produced by the cellular covering of an artery laid bare, but not if that has been carefully diſſected away.

The proceſs of nutrition ſuppoſes the exiſtence of exhalants in the arteries; but there is no reaſon to believe that they open on the interior ſurface of theſe veſſels.

Bichat conceived that the empty ſtate of the arteries after death aroſe from the abſorbents continuing to act longer than the other parts, and made experiments to elucidate the ſubject. He incloſed blood and other fluids between two ligatures placed on the common carotid; but did not diſcover any diminution of them. Abſorbents generally abound where there is cellular tiſſue, and are not obſerved where this ſyſtem does not exiſt. Hence we ſhould not expect them in the arteries.

The firſt portion of the red-blooded circulating ſyſtem, (the pulmonary veins,) receives almoſt excluſively cerebral nerves, derived from the par vagum. The centre of the ſyſtem, or the heart, has branches from the ganglia as well as from cerebral nerves; and indeed more from the former than from the latter. The arterial ſyſtem is ſupplied almoſt excluſively from the ganglia, and the particular mode will be more minutely conſidered under the article Nerve. The cerebral nerves which often accompany the arteries in their courſe, very ſeldom give them any filaments.

Properties of the circulating Syſtem of red Blood.—We ſhall conſider in this place, thoſe properties only which belong to the arteries; thoſe of the veins and heart will be examined ſubſequently. Elaſticity, which is obſcure in moſt other animal tiſſues, characterized generally by conſiderable ſoftneſs, is very remarkable in the arteries; and this property particularly diſtinguiſhes them from the veins. This keeps their ſides ſeparate, although they may contain no blood; and theſe veſſels are the only tubes, excepting thoſe of a cartilaginous nature, which remain permanently open when undiſtended. In conſequence of this property, an artery, when cut acroſs, in the dead ſubject, preſents a circular area, and this diſtinguiſhes it from a vein, the ſides of which collapſe. The aorta indeed, and ſome of its larger branches, may occaſionally preſent an oval appearance, when thus divided, from the preſſure of the ſurrounding parts. Their elaſticity enables theſe veſſels to reſtore themſelves after their ſides have been preſſed together; or when the whole tube has been bent. By enabling the veſſel to give way when the blood is thrown into it, this property produces the locomotion conſequent on the contraction of the heart; and provides for the reſtoration of the tubes to its former ſtate.

Properties reſulting from the Organization of the Part.—1ſt. *Extenſibility.* This muſt be conſidered in two points of view: 1ſt, as it acts in the tranſverſe; and, 2dly, in the longitudinal direction. Arteries yield but ſlightly in the former of theſe ways. Attempts at dilating them by injections of water, air, or other matters will ſcarcely extend them beyond their natural calibre. If the force be continued, the two inner coats burſt, and the cellular covering forms a cyſt; in ſhort, the effect is repreſented by ſome as exactly analogous to what occurs in aneuriſms. When a large artery is tied in a living animal, the blood, ſtrongly propelled againſt the ligature, muſt exert a dilating force on the arterial parietes, yet there is hardly any ſenſible dilatation. The arterial tiſſue will yield, if the diſtending power be applied more gradually: thus we frequently ſee the arch of the aorta enlarged, and dilatations occurring which form true aneuriſms. But the extent of this enlargement is confined within narrow limits by the brittleneſs of the arterial coats. The arteries enjoy a greater power of diſtenſion in the longitudinal direction; hence we ſee the tied end of an artery protruded at each pulſation, and hence we are enabled to draw out the divided extremity from the face of a ſtump.

Athough there ſeems hardly any perceptible extenſion of the arterial tubes in the tranſverſe direction in the living body, they admit of conſiderable elongation in the dead ſubject. "Having," ſays Mr. Hunter, "cut off a portion of about an inch in length, from the aſcending aorta, at half an inch above the valves, and having ſlit it up, it meaſured tranſverſely two inches and three quarters, but, when ſtretched to its full length, three inches and three quarters, having gained rather more than one third, and having required a force equal to the weight of one pound ten ounces to produce this effect." On the Blood, p. 113.

Extenſion in the tranſverſe direction is reſiſted by the fibrous coat, and in the longitudinal by the internal and cellular covering.

2dly. *Contractility* muſt be conſidered, like the preceding property, in two points of view. It is much more ſtrongly marked in the tranſverſe direction, than the extenſibility. When an artery is no longer diſtended by blood, it contracts upon itſelf, and that to a degree proportionate to the diminiſhed quantity of its contents. We may explain the following phenomena by this general law. 1ſt. The ductus arterioſus and the umbilical arteries gradually contract after birth, until they are converted into impervious cylinders by the union of their ſides. That portion of an artery, which is included between a ligature and the firſt collateral branch, undergoes exactly the ſame change. 2dly. A portion of artery (the carotid) included between two ligatures and emptied by a puncture, immediately loſes one half of its calibre. 3dly. In a dog, in whom an artificial plethora has been produced by transfuſion of the blood, the diameter of the arteries is nearly double that which they poſſeſs in an animal of the ſame ſize deſtroyed by hæmorrhage. And two animals of equal ſtature deſtroyed, the one by hæmorrhage, and the other by aſphyxia, preſent the ſame differences. Will not this view ſufficiently account for the ſmallneſs or largeneſs of the pulſe? 4thly. The very different diameters of the arteries in ſubjects of ſimilar ſtature after death depend on the quantity of blood contained in theſe veſſels at the time of death. Hence injection, by diſtending them artificially, deſtroys theſe differences. If the animal be bled to death, its arteries exhibit the greateſt degree of contractility, and the amount of this, in various parts of the ſyſtem, has been aſcertained by Mr. Hunter from actual admeaſurement of the veſſels in a horſe killed in this manner. He removed from the body very carefully ſections of various arteries, and meaſured them, when ſlit open, ſo as to aſcertain the greateſt degree of contraction; he then ſtretched them tranſverſely, and meaſured them when elongated as much as poſſible; laſtly, he meaſured them a third time, in the ſtate to which they recovered by their own powers, and which may perhaps be repreſented as the natural condition of the artery. He found that the power of recovery was greateſt near the heart, and gradually diminiſhed towards the extremities of the body. In the following tabular view of theſe experiments, the figures of the firſt column ſhew the meaſurement of the artery in its contracted ſtate; thoſe of the ſecond, the meaſure at the point of greateſt contraction; of the third, in the ſtate of recovery; and in the fourth, the degree of contraction in parts of the whole artery.

	Inches.	Inches.	Inches.	
Aorta aſcendens -	$5\frac{6}{12}$	$10\frac{6}{12}$	6	$\frac{1}{11}$
Aorta deſcendens at the firſt intercoſtal	$4\frac{1}{2}$	$7\frac{6}{12}$	$4\frac{6}{12}$	$\frac{1}{17}$
Aorta deſcendens at its loweſt part	—	—	—	$\frac{1}{10}$
Iliac artery -	2	—	$2\frac{4}{12}$	$\frac{1}{6}$
Axillary -	1	—	$1\frac{1}{6}$	$\frac{1}{8}$
Carotid - -	$\frac{6}{12}$	$1\frac{4}{12}$	$\frac{10}{12}$	$\frac{2}{3}$
Crural - -	$\frac{10}{12}$	—	$1\frac{2}{12}$	$\frac{1}{3}$
Humeral - -	$\frac{7}{12}$	—	$\frac{9}{12}$	$\frac{1}{7}$
Radial - -	$\frac{3}{7}$	—	$\frac{6}{12}$	The whole.

5thly. In longitudinal wounds of the arteries, the cut ends of the circular fibres ſeparate from each other, and leave a vacant ſpace between them.

Bichat complains that moſt authors have confounded the property which we are now conſidering, with irritability. He obſerves, "that in all the preceding caſes there is no neceſſity for applying any ſtimulus to the arterial tiſſue; the only condition requiſite is the ceſſation of the diſtending force, and this circumſtance particularly characterizes the contractility which reſults from organization. It is moreover evident that this property is exhibited after death, although leſs ſenſibly than during life; whereas, on the contrary, every kind of irritability ceaſes in a few hours after the ceſſation of life." Mr. Hunter is one of thoſe, to whom the preceding obſervations of Bichat are applicable. He ſpeaks familiarly of the *muſcular* coat and *muſcular* action of arteries; as if theſe points were moſt clearly aſcertained; and he adduces the experiments performed on the arteries of a horſe bled to death, which we have quoted above, to ſhew the different degrees of muſcularity poſſeſſed by different arteries.

The contractility in the longitudinal direction is leſs ſtrongly marked than in the tranſverſe; but it exiſts to a certain degree. Thus, when an artery is divided between two ligatures, the two ends are retracted into the cellular ſheath, and become ſeparated by a certain interval. This retraction occurs in amputation, but, as that of the ſkin and muſcles is more conſiderable, the artery remains ſomewhat projecting. A tranſverſe wound of the arterial coats produces a wide opening of the tube, in conſequence of this retraction. When an artery is extended violently, and then ſuddenly left to itſelf, it is withdrawn conſiderably into the ſurrounding ſoft parts; hence, when a part is torn away from the body, and when its arteries have conſequently undergone this treatment to a very great degree, no hæmorrhage follows.

The effect of ſtretching an artery longitudinally in the dead ſtate is different from that which reſults from applying force to it in the tranſverſe direction. Mr. Hunter made this experiment on the occaſion alluded to above; and he found that the arteries, when ſtretched longitudinally, recovered their former ſtate completely. On the Blood, p. 127.

Vital properties. Animal ſenſibility.—The following is the reſult of Bichat's experience on this ſubject. The application of a ligature ſometimes cauſes pain, but more frequently has no ſuch effect. In numerous trials on the carotid, irritation by the knife, by acids or alkalies, occaſioned no ſigns of pain; and ſimilar reſults have been obtained by numerous authors. This is a proof of the inſenſibility of the nerves of the organic life, which are diſtributed upon the arteries in almoſt every part. With reſpect to the internal membrane, the injection of a mild fluid, as of water at the temperature of the animal, is abſolutely indifferent; but irritating ſubſtances, ſuch as ink, dilute acids, wine, &c. produce a very acute pain, if we may be allowed to judge from the cries and agitation of the animals when they enter the carotid.

Animal or voluntary contractility does not belong to the arteries. Irritation of the brain, which convulſes the voluntary organs, and opium, which paralyſes them, have no effect on theſe tubes. Irritation of the cerebral nerves, or of thoſe from the ganglia, is equally incapable of affecting the arteries; neither can we influence theſe veſſels by means of galvaniſm. Hence all the obſervations of Cullen, and others, on the nervous power, and the influence of the brain on the arteries, are vague, illuſory, and contrary to experience.

Properties of the Organic Life.—Organic ſenſible contractility is manifeſtly abſent from the ſyſtem which we are now conſidering. No irritation, either of the external or internal ſurface, produces any contraction of an artery in the living animal. It betrays no ſigns of contractility when removed from the body, as the inteſtine or heart does. When the laminæ are diſſected by ſucceſſive ſtrata, they exhibit none of the quivering which is obſerved in the organic muſcles under ſimilar circumſtances. Some authors have produced contraction by means of concentrated acids; but this is the action of the ſubſtance on the tiſſue of the part which remains permanently corrugated. A ſtatement of all that can be ſaid on the oppoſite ſide of the queſtion, with references to various authors, may be ſeen in Soemmerring, de Corp. Hum. Fabrica, tom. 5. § 58.

Organic ſenſible contractility, or tonic power, is manifeſt in the arteries. In thoſe which have pulſation it is confined excluſively to the purpoſe of nutrition; but as ſoon as the influence of the heart on the blood's motion ceaſes, which is probably at the beginning of the capillary ſyſtem, this power is not merely concerned in the nutrition of the vaſcular parietes, but alſo carries on the circulation. Organic ſenſibility always exiſts with the preceding contractility, and amounts only to an obſcure proportion in the large trunks.

On the Cauſes of the Motion of the red Blood.—Are the arteries active or paſſive in this buſineſs? When the phyſician examines the pulſe, does he diſcover the condition of the heart or of the arteries? From the foregoing obſervations concerning the abſence of ſenſible organic contractility, it will follow that theſe veſſels are paſſive; that their motion is imparted to them from the heart; that the latter organ is the ſource of the impulſion which theſe veſſels merely obey; conſequently, that the ſtate of the pulſe, in almoſt all caſes, indicates the condition of the vital powers of the heart, and not of the arterial ſyſtem, the vitality of which is not more excited when the pulſations are the moſt frequent and forcible, than when they are feweſt and moſt feeble.

If the pulſe were produced by vital contraction of the arteries, it ſhould be irregular below an aneuriſmal tumour, ſince the diſeaſed condition of the arterial tiſſue would naturally be expected to deſtroy or conſiderably modify this power. But no ſuch effect is obſerved; while, on the contrary, organic diſeaſes of the heart conſtantly affect the pulſe. Oſſification of an artery does not obſtruct the blood's paſſage, but the change has the mechanical effect of preventing us from feeling the pulſe. A ligature placed on an artery, by intercepting the influence of the heart, ſtops the pulſe in the veſſels beyond the ſituation of its application. That the phenomenon of the arterial pulſations is not owing to any contraction of the veſſels is proved by the following curious experiments of Bichat. "Take the arm of a dead ſubject and place it in warm water; then inſert a ſmall tube in the brachial artery, and fix its other extremity in the carotid of a large living dog. Immediately the heart of the animal will propel the blood into the dead limb. The artery pulſates leſs ſtrongly indeed than in the living ſtate, but quite ſufficiently to admit of the effect being felt even through the integuments. When the red blood is made to circulate in the veins by a contrivance of this kind, there is an effect produced ſenſible to the finger, and the fluid moves with conſiderable rapidity. The latter experiment alone is almoſt ſufficient to prove that the heart is the only agent by which the blood is made to move through the arterial tubes. In fact this fluid flows uniformly through the veins, becauſe the capillary ſyſtem ſupplies them uninterruptedly, while it is thrown out of an artery by ſucceſſive jets, which ariſe from the contractions of the heart. Now, if you open a vein in which you have introduced red blood by means of a bent tube connected with the artery of another animal, the ſtream of blood will exhibit the jets correſponding to the contractions of the heart. If this experiment be inverted, that is, if a bent tube be adapted to a vein and an artery in ſuch a manner that the blood of the former may be introduced into the latter, the artery will loſe its pulſation, unleſs it ſhould be kept up by the collaterals, which will not be the caſe if large trunks, ſuch as the crural, and its correſponding vein, be ſelected. The reſult of all theſe experiments, which I have frequently repeated, ought to have been exactly the converſe of their actual reſult if the arteries participated in the circulation by their vital powers. The action of the heart will drive the blood through dead tubes of conſiderable length adapted to the arteries. Remove a portion of the carotid, and inſert a pipe in its open ends: the blood will traverſe this, and occaſion the arteries to pulſate beyond the ſituation of the experiment. Inſert the end of a tube in the carotid of a dog towards the heart, and its oppoſite extremity in the crural or carotid of another dog in the direction leading from the heart: the heart of the firſt will conſtantly produce pulſation in the arteries of the ſecond. If a tube, having a bag of ſome kind at its end, be inſerted in an artery, the blood immediately fills the bag, in which there will be a kind of pulſation at each action of the heart, analogous to what is felt in an aneuriſmal cyſt."

A further proof that the pulſe is produced by the heart's action, is afforded by ſome experiments of Bichat mentioned on another occaſion. He expoſed the carotid artery and the heart by a ſection of one ſide of the cheſt, in the ſame animal; the other ſide ſtill remained for reſpiration. The pulſe was at firſt hurried, as the contact of the air accelerated the contractions of the heart; but, in a little time, the motions grew weaker, and were ſoon performed by a general quivering of the fibres. The pulſe underwent a correſponding change; when the convulſive motion took place, the beating of the artery was converted into a kind of undulation, or weak oſcillation, which is the precurſor of the total ceſſation of all motion.

"Nature," ſays the ſame author, "has ſelected, for the compoſition of the arteries, a tiſſue in which the vital properties are indiſtinctly marked. In proportion as thoſe of the heart are remarkable for their intenſity, are the arteries conſpicuous for the oppoſite reaſon. In this reſpect they muſt be claſſed with the cartilaginous, fibrous, fibro-cartilaginous, and ſimilar ſyſtems. Nature ſeems to have organized the arteries in this manner, that their motions might not diſturb the unity of the impulſe produced by the heart. Suppoſe their vital powers had reſembled thoſe of the inteſtines; a convulſive action of the aorta or the large trunks might have ſtopped the circulation, and produced the moſt alarming effects by counteracting the exertions of the heart. The more attentively things are examined, the more perfectly ſhall we be convinced of the neceſſity that there ſhould be only a ſingle impelling agent for the arterial ſyſtem, and that the latter, conſtantly inert, ſhould not have the power of arreſting the motions of the contained fluid."

The action of the heart on the red blood ceaſes, according to Bichat, in the general capillary ſyſtem, where the place of its influence is ſupplied by the tonic powers of the ſmall veſſels. "In the trunks, the branches, and the ſucceeding diviſions, according to the opinion of this phyſiolgiſt, the blood is moved only by the heart; in the ſmall ramifications the vital action of the arteries concurs with this force in keeping up the blood's motion; and, laſtly, in the general capillary ſyſtem the vital action of the veſſels is the only power employed.

"The pulſe, therefore, is only obſerved in its greateſt extent in the firſt order of tubes; it is ſenſibly weakened in the ſecond; and entirely ceaſes in the capillary ſyſtem. In the large trunks, the impulſe produced by the contraction of the heart is ſo ſtrong, and the column of blood ſo large, that the inſenſible contractility has no effect. Irritability alone might act in this ſituation, but that property does not exiſt in the veſſels. In the ſmall tubes the effect of the heart's action is ſenſibly diminiſhed, and the blood, divided into very ſlender ſtreams, requires, for the maintenance of its motion, merely a kind of oſcillation, or inſenſible vibration of the vaſcular parietes. This compariſon ſhews us the eſſential diſtinction of the two kinds of organic contractility. The one is exerted on the fluids, when accumulated in a maſs, as on the blood, aliment, urine, &c.: the other moves them when divided into ſmaller portions, and preſides over the capillary circulation, exhalation, and ſecretion. Wherever there is a large cavity, as in the heart, ſtomach, inteſtines, &c. the former is eſpecially obſerved, while the ſecond is confined to the caſe of ſmall veſſels. Hence, while the blood continues in maſſes, as in the heart, and large arteries, the firſt of theſe powers, which reſides in the heart, produces its motion; when it is in ſmall ſtreams, the inſenſible contractility of the veſſels keeps up the movement."

Phenomena produced by the Action of the Heart.—As the arteries are always full of blood, the impulſe produced by the contraction of the left ventricle is felt at once through the whole ſyſtem to its very extremities. If a tube, dividing into a ſeries of branches, which were again divided for any number of ſucceſſive times, and completely filled with fluid, were connected to a ſyringe, the depreſſion of the piſton would cauſe an efflux from all the open branches at that very inſtant. In the ſame way, if you ſtrike the end of a long beam, the motion is quickly communicated to the oppoſite extremity. Hence, if the arteries of a dead body are filled with water, and an additional quantity is forced in by means of a ſyringe, ſome will be projected at the ſame inſtant from the tibial, or any other veſſel which may be opened. The repreſentation of a wave of blood, conſiſting of two ounces, expelled by the contraction of the ventricle, and ſucceſſively paſſing through the various parts of the arterial ſyſtem, which proceeds on the ſuppoſition of the arteries being empty when the heart contracts, while in fact they are full, is calculated to convey a notion of the ſubject altogether erroneous.

If an artery be opened far from the heart, each jet of blood will correſpond to the contraction of the ventricle, becauſe that contraction throws the blood from the orifice of the veſſel. But, if this fluid were ſent to the extremities of the body by contractions of the arteries, the contracted and relaxed ſtates of theſe tubes ſhould alternate with the correſponding conditions of the ventricle, and conſequently, each jet of arterial blood ſhould take place when the ventricle is dilated, which is contrary to the fact.

In the common deſcriptions of the circulation we are informed that the heart, by its contraction, propels the blood into the aorta, which is then dilated; and that in the ſucceeding period of time the aorta contracts to ſend it on to all parts of the body. But this latter time does not exiſt at all. If a large artery be laid bare and obſerved, it will be ſeen to riſe at each pulſation, but to undergo hardly any dilatation; nor does it contract to any greater degree. Contraction of the left ventricle, general movement of the whole maſs of arterial blood, and paſſage of this blood into the capillary ſyſtem, are three circumſtances which occur at the ſame moment. "We may derive," ſays Bichat, "a very exact idea of the circulation by examining the meſenteric arteries of a living animal, through the peritoneum. At each pulſation they appear to be raiſed at once from their origin to their extremities. No correct notion of this ſubject can be acquired by conſidering the wave of blood as extending at each contraction through the arteries, and arriving ſucceſſively at various parts of the ſyſtem. All authors ſpeak at length of the progreſs of the arterial fluid, yet in no point is there more doubt and obſcurity, becauſe they all proceed on a falſe principle. It is not the freſh portion of blood expelled from the ventricle that enters the capillary ſyſtem at each contraction of the heart, but that which was neareſt the capillaries in the arteries. Hence an interval of time ſeparates the departure of the blood from the heart from its arrival at the capillary ſyſtem, during which it remains, for a certain number of contractions, in the arteries. According to this mode of conſidering the arterial part of the circulation, which is the only true and admiſſible one, the windings of theſe veſſels cannot produce any retardation. I regard alſo, as entirely deſtitute of foundation, all the remarks contained in phyſiological writers concerning the cauſes of retardation in the courſe of the blood, occaſioned, 1ſt, by its paſſage from a narrower into a wider ſpace, and by the conical form of the arterial ſyſtem in general; 2dly, by friction againſt the ſides of the containing tubes; 3dly, by the angles; 4thly, by the anaſtomoſes, &c. &c. All theſe remarks would hold good if the arteries were empty at the moment of contraction, becauſe the blood would then really have a progreſſive motion; but, in the general and inſtantaneous ſhock, which the maſs expanded through the whole ſyſtem experiences, theſe cauſes are manifeſtly inefficacious. I ſtill return to the trivial, but illuſtrating compariſon of the ſyringe. Suppoſe a tube ſhould be adapted to it with a thouſand turns, angles, and inequalities; if this tube and the ſyringe are full, the depreſſion of the piſton will cauſe the water to flow out at the open end juſt as ſoon as if the canal had been ſhort and ſtraight. So true is it, that all the cauſes of retardation which might affect the blood's motion if the arteries were empty, do produce no ſuch effect in the ordinary ſtate of the veſſels, that numerous judicious obſervers, who admitted the retardation in their reaſonings, have ſeen in their experiments that the motion was uniform throughout, and the ſame in the branches as in the trunks. The pulſe occurs at the ſame time in all parts of the arterial ſyſtem. How could this happen if the deſcribed retardation actually took place? The progreſs of phyſiology concerning the circulation has been much obſtructed by the current notions concerning the velocity of the blood's motion in the arteries. Of this indeed we can form no true eſtimate, becauſe the motion is not progreſſive, and the blood does not *flow*, properly ſpeaking, but is puſhed ſuddenly by a gentle ſhock, which cannot be ſubjected to calculation."

We take this opportunity of ſtating, that the application of the laws of the various branches of natural philoſophy, and of the mathematical ſciences to phyſiology, in which the opinions juſt animadverted on took their riſe, does not ſeem to us at all calculated to advance our knowledge of the animal economy. Not that the living body is exempted from an obedience to theſe natural laws, which regulate matter and motion in other caſes; but becauſe their operation is conſtantly modified by the living powers, and the data, on which calculation ought to be founded, are themſelves by no means ſettled. On this point, the ſentiments of Senac, expreſſed in the preface to his "Traité de la Structure du Cœur, de ſon Action, & de ſes Maladies," exactly coincide with our opinions. "Phyſicians who, in ſpeaking of their art, are conſtantly recurring to mechanics, and ſprinkle their works with calculations, are only charlatans, or men of heavy and ignorant minds. They endeavour to deceive by aſſuming the ornaments of a ſcience foreign to medicine, and they incur, without ſuſpecting it, the contempt of true geometricians. What a contraſt do we ſee between the bold calculations of ſome phyſicians, and the modeſty with which the moſt enlightened calculators ſpeak of the operations of living bodies!" According to D'Alembert, in his admirable Treatiſe of Hydrodynamics, "the mechaniſm of the human body, the velocity of the blood, and the action of this fluid on the containing veſſels cannot be brought under any theory: we are ignorant of the influence of the nerves, the elaſticity of the veſſels, their various capacities, the tenacity of the blood, and the different degrees of heat which it poſſeſſes. If each of theſe circumſtances ſhould be known, the great number of elements, which would enter into ſuch a theory, would probably conduct us to impracticable calculations. It would be the moſt complex caſe of a problem, which is extremely difficult of ſolution in its moſt ſimple ſtate. When the operations of nature are too complicated to be ſubmitted to our calculations, experience is our only remaining guide, we can only ſupport our reaſonings by inductions from numerous facts. The notion that the ſprings of the human frame can be developed by means of algebra and hypotheſes, can be entertained only by idle phyſicians. Theſe ſprings are unknown, multiplied, combined; the moſt juſt calculations on this ſubject can merely appreciate our ignorance." P. 34.

When the contraction of the left ventricle propels the blood into the arteries, theſe tubes are ſlightly dilated; a general locomotion takes place, cauſing the pulſe; and ſome red blood paſſes into the general capillary ſyſtem. Theſe circumſtances occur, when the finger feels the arterial pulſation, at the diaſtole of the tube. In the following inſtant the ventricle is relaxed, that it may be filled again; the arteries, leſs full of blood, recover from the ſlight dilatation experienced juſt before; and are reſtored to their original ſituation. This is the ſyſtole, deſcribed as an active, but in reality a merely paſſive ſtate of the arterial tube. Since very little blood is thrown out of the ventricle at each pulſation, and, when the new quantity enters the arteries, ſome paſſes out at the oppoſite end, the arterial dilatation and the ſubſequent contraction are ſo ſlight in degree as to be hardly obſervable. In this view, the arterial contraction does not take place, in order to propel the blood, but it is a recovery of the veſſel from its forced ſtate, conſequent on the paſſage of the blood which diſtended it, into the capillary ſyſtem. In ſhort, it is contraction from the ceſſation of extenſion.

Although this repreſentation may ſeem to deſtroy the ſources of the varieties in the pulſe, obſerved by authors, Bichat points out how the phenomena may ſtill be ſufficiently explained. "The cauſes which may affect the pulſe, may reſide, 1ſt, in the heart, the ſole agent of impulſion in their circulation. Its contractile power, augmented, diminiſhed, or ſympathetically modified, may cauſe it, with the ſame ſtimulant, to act more quickly, or ſlowly, or irregularly. Thus, organic affections inevitably alter its action. 2dly. The blood may contain various natural or morbific matters capable of exciting the heart's motion in various ways. 3dly. The general capillary ſyſtem produces many variations in the pulſe, according as it receives a greater or leſs quantity of blood. There are, then, two circumſtances to be particularly noted in the pulſe: 1ſt, impulſion of the blood, a ſudden and general motion of its maſs by the contraction of the heart; 2dly, locomotion of the arteries, an effect produced by this fluid on the arterial parietes. The firſt is the moſt eſſential point: the ſecond would be changed, if the arterial tiſſue, from the nature of which it ariſes, were no longer the ſame; it is not eſſential to the circulation.

The obſcure vital properties of the arteries occaſions them to be the ſeat of very few affections, either acute or chronic. Conſequently, they can exert only a very ſlight ſympathetic influence on other organs. For the ſame reaſons, other parts have very little ſympathetic influence on this ſyſtem. The innumerable ſympathetic variations of the pulſe have their ſource in the heart.

Progreſſive Developement of the vaſcular Syſtem containing red Blood.—1ſt. State of this ſyſtem in the fœtus. The fœtus differs eſſentially from the child, which has breathed, in this reſpect, that its two grand vaſcular ſyſtems form, in truth, but one; ſince the foramen ovale and canalis arterioſus form immediate communications between them. The blood is all of one kind in the fœtus. Bichat aſcertained this fact by examining guinea pigs while ſtill in the uterus: all their veſſels contained venous blood, at leaſt as far as could be judged by the colour. He repeated the obſervation, with the ſame reſult, on the pregnant bitch. Accoucheurs have always found the blood of the umbilical veſſels to preſent the venous colour.

The preſence of black blood in the ſyſtem of red blood in the adult cauſes the moſt dangerous ſymptoms, and ſoon produces aſphyxia and death: yet it circulates with impunity in the arteries of the fœtus. Probably there is ſome difference in the properties of the black blood in theſe two caſes. It gives an unctuous feel to the touch in the fœtus, which is not produced in the adult. It is never found coagulated in the dead ſubject, but fluid, like that of animals which have been deſtroyed by aſphyxia. Fourcroy conceives that it does not poſſeſs fibrine, nor phoſphoric ſalts: and aſſerts that it does not aſſume the crimſon colour on expoſure to air. Beſides theſe differences in the nature of the blood, we muſt advert alſo to the great difference in the functions of the fœtus and adult; and we ſhall find, on the whole, that no exact parallel can be eſtabliſhed between them with regard to effects produced by the black blood.

Yet, though the blood in all parts of the fœtus is uniform in its nature, there is a kind of ſeparation in the general maſs, firſt clearly pointed out by Sabatier, and which we have deſcribed in the article CIRCULATION. From this view, we may eſtabliſh the exiſtence of two ſyſtems, very different from thoſe which belong to the adult. The firſt has its origin in the capillaries of the abdomen, of the lower limbs, and of the placenta: its common trunks are the inferior vena cava, and the four aſcending branches of the aorta: its central organ is the left ſide of the heart, and its termination is in the capillaries of the head and upper limbs. The ſecond ariſes in the laſt-mentioned capillaries; its common trunks are the ſuperior cava and the deſcending aorta; its impelling agent the right ſide of the heart; and its termination the capillaries of the lower parts of the body, and the placenta. We have explained, in the article CIRCULATION, how the parts are changed from their fœtal arrangement, to that which is ſeen after reſpiration has begun: the deſcription of the umbilical veſſels, and the canalis arterioſus, will be found under EMBRYO.

Bichat conceives, that thoſe peculiarities which diſtinguiſh the fœtal circulation, do not undergo a ſudden revolution at the time of birth, but that there is a gradual change towards the ſtructure of the circulating organs, as they are found in an individual which has breathed before birth. "The two portions of blood are almoſt completely ſeparated in the firſt months of fœtal exiſtence: all that which comes through the inferior vena cava is ſent into the aſcending aorta, while that of the ſuperior cava goes into the deſcending. As the time of birth approaches, theſe two quantities begin to be mixed, and the circulation aſſumes a middle kind of mechaniſm between thoſe of the early months, and of the adult. The foramen ovale, and the ductus arterioſus, are already contracted before birth, and the circulation approaches towards the ſtate in which it is found after reſpiration has commenced. The introduction of red blood into the economy is the moſt ſtriking phenomenon that occurs after birth. We ſhould form an erroneous conception of the ſubject, if we ſuppoſed a ſudden change at birth. Examinations of the foramen ovale, and canalis arterioſus, at different periods of pregnancy, will ſhew us that they contract ſucceſſively; ſo that if the child remained beyond its natural term in the uterus, and the ſame proceſſes were continued, the blood would at laſt circulate as it does in the adult, merely from the pulmonary to the general capillary ſyſtem, and *vice verſâ*. But it would be of one uniform colour. I do not mean to ſay that reſpiration does not invite towards the lungs the remainder of the blood which uſed to paſs through the canalis arterioſus; but this derivation can affect a part only of the blood of the pulmonary artery: one portion of this already paſſes through the veſſels of the lungs before birth, although the cells were empty. There is a conſtant relation between the quantity of blood ſent by the right ventricle to the lungs, and that which the left propels into the lower parts of the body. As the former increaſes, the latter becomes more abundant, and this manifeſtly exceeds the quantity which goes to the upper parts. The proportion of the blood brought by the inferior cava, which mixes with that of the ſuperior, and paſſes into the right ventricle; that which from the right ventricle traverſes the lungs and returns to the left ventricle; and that which goes from the left ventricle into the deſcending aorta, are always increaſing in proportion as the time of parturition draws near."

The vaſcular ſyſtem, in general, is remarkable for its great developement in the fœtus. The arteries are larger in proportion to the other parts, and correſpond in this reſpect to the volume of the heart. The ſize of theſe veſſels, however, is in proportion to the relative bulk of the parts which they ſupply: thus thoſe of the pelvis and lower limbs are very ſmall.

The arterial tiſſue is more pliant in the fœtus than in the adult; and ligatures conſequently cut it leſs eaſily. The number of the vaſa vaſorum ſeems greater; they are, however, more conſpicuous. In the early months, when the ſubſtances compoſing the arteries cannot be diſtinguiſhed, theſe veſſels are remarkable for their firmneſs, in which reſpect they exceed the ſurrounding organs.

2dly. *State of this Syſtem during the Time of Growth.*—At the moment of birth two great revolutions take place in the ſyſtem of red blood; *viz.* a mechanical one, if we may be allowed to uſe that expreſſion, in the courſe of the blood; and another of a chemical nature in the compoſition of this fluid. The commencement of reſpiration may be referred partly to the general convulſive kind of motions, produced by the acute ſenſations conſequent on the remarkable change in the poſition of the child, and partly to inſtinct. The commencement of reſpiration attracts towards the lungs the blood which paſſed formerly through the canalis arterioſus. Such is the mechaniſm of the foramen ovale, that when the two auricles contain an equal quantity of blood, their contraction preſſes together the ſides of this aperture, and thus prevents the paſſage of the blood through it. "Although," ſays Bichat, "this aperture be ſtill open at the time of birth, the black blood ceaſes to paſs through it; I go ſtill farther, and affirm, that the opening often continues throughout life. Many authors relate examples of this; and I have met with a great number. The diſpoſition of the ſides of the opening is ſuch that the blood cannot paſs. When the two auricles contract together, the blood, which is preſſed from without inwards, applies the overlapping edges cloſely together, and cuts off the communication between the two cavities. The adheſion of the parts, in moſt caſes, is very weak; they are rather agglutinated than continuous, ſo that they may be eaſily ſeparated by the preſſure of the handle of a ſcalpel, and hardly any trace of rupture remains. Authors may, therefore, ſave themſelves the trouble of explaining how perſons may live when the foramen ovale is open; the courſe of the blood is juſt the ſame as if the aperture did not exiſt." The ſame fact is diſtinctly ſtated by Soemmerring, as a circumſtance of not unfrequent occurrence. (De corporis humani fabrica, tom. 6. § 14.) When the blood no longer traverſes the canalis arterioſus, that tube is quickly cloſed in conſequence of its organic contractility: it is converted into an impervious and firm cylinder, which fixes the aorta and pulmonary artery, to a certain degree, in their reſpective poſitions. The obliteration of the other opening is effected in a different manner; not by a contraction of the two ſemicircular folds between which it is obliquely ſituated at the time of birth. It ſeems to be an effect of the preſſure exerciſed in oppoſite directions upon the middle ſeptum of the auricles by the blood which each contains. The proceſs, as we have ſeen above, may not take place; but the contractility of the arterial canal being invariably exerted when the tube is no longer diſtended, that veſſel is invariably obliterated. The obliteration of the umbilical vein and arteries is coeval with theſe changes.

When the function of reſpiration is completely eſtabliſhed, the lung is in oppoſition to the whole body: it ſends blood to all the parts, which return it again. The limits between the two vaſcular ſyſtems are then rigorouſly fixed.

"For a long time after birth, the vaſcular ſyſtem of red blood ſtill predominates, is ſtill remarkable for its great developement, and for the great number of its branches. Red blood penetrates into a much greater number of theſe, than will receive it in the ſequel. Diſſection of living animals at different ages will ſufficiently ſhew that this ſyſtem contains a much greater quantity of blood in young than in old ones: ſo that the proportion of the ſolids and fluids at one end of exiſtence is the inverſe of that which exiſts at the other. The latter are the moſt abundant as we draw nearer to the moment of conception: the former predominate towards the end of life.

"The predominance of the ſyſtem of red blood continues marked until the end of growth. That this ariſes from the functions of nutrition and growth is very clear; the arteries in the adult contain only what is required for the former of theſe; and the latter is ſuperadded in the child. Hence, increaſed calibre is neceſſary in the child, and injections exhibit this fact.

"As the child advances, the various parts of this ſyſtem arrive at thoſe proportions with reſpect to each other, which we find in the adult."

3dly. *State of the Syſtem after the Growth is finiſhed.*—About the epocha of puberty, the height of the body is complete; but it ſtill continues to grow in bulk. The generative organs now come into play, and that portion of the arterial ſyſtem, which belongs to them, receives conſiderable additional developement. At the ſame time the vital energy of the lungs is augmented, and theſe organs are the moſt frequent ſeat of diſeaſe. At the ſame time the diſeaſes produced by arterial plethora ſhew themſelves; and theſe marks of abundant blood ſeem to admit of a ſatisfactory ſolution from the ceſſation of growth. Gradually an equilibrium is eſtabliſhed between all the organs, and the arteries acquire that proportionate volume, which they will retain afterwards. Subſequently to the end of growth, the arteries are increaſed in denſity and thickneſs. Their fibres become more clearly marked, their elaſticity is increaſed, and their pliancy diminiſhed. The denſity of theſe tubes holds a relation to the fleſhy fibres of the heart; in proportion as the latter becomes capable of propelling the blood more forcibly, are the former rendered able to reſiſt this force.

4thly. *State of the Syſtem in old Age.*—The number of arterial twigs is much diminiſhed. The heart, loſing its energy, propels leſs blood with leſs energy; and the general vibration produced in the whole ſyſtem is leſs felt at the extremities of the ſyſtem. The ſmall branches ſeem to be gradually obliterated. Hence, on ſeparating the perioſteum or dura mater, very few drops of blood are perceptible; the ſkin, rendered dry and hard, no longer exhibits the roſy tint of the preceding ages, particularly of youth; the ſection of a bone affords hardly any blood; the mucous ſurfaces grow pale; and the muſcles loſe their colour. Every practical anatomiſt knows that injections ſucceed leſs perfectly in proportion as the ſubjects are more advanced in age; that the arterial trunks only are filled in very old bodies, and the fluids never penetrate into the ſmaller branches; and that young ſubjects exhibit circumſtances exactly contrary.

This diminiſhed quantity of red blood in the old ſubject ariſes from the relative condition of his nutrition, which function has almoſt ceaſed; and this circumſtance, together with the weakneſs of its motion, accounts for the low ſtate of excitation of all parts in old perſons. If the functions of our organs diſplay a vigour and activity proportioned to the quantity of fluid and the force of its motion, we ſhould expect them to be characterized in childhood by a vivacity which would form a contraſt to the ſlowneſs and diminiſhed energy of old age.

The arterial tiſſue becomes more and more condenſed as the individual advances in years, and the laminæ of the fibrous coat appear more dry. The arch of the aorta is almoſt the only part which experiences nearly always a degree of enlargement in old age;—an extenſion without the rupture of fibres. The pulſe is remarkable for its ſlowneſs; a character exactly oppoſite to that of infancy. It will be underſtood, from what has been already ſtated, that the cauſe of this variation is in the heart.

Accidental Developement of the Syſtem.—The formation of new arteries ſeems to take place in ſome circumſtances; as in the caſe of adheſions in the cheſt or abdomen, &c.; but there has been no minute inveſtigation of this fact. Theſe veſſels are dilated, when any obſtruction is formed to the paſſage of the blood by the ordinary channels; as when the artery of a limb has been tied in the operation for an aneuriſm, or when a ſwelling of this kind has undergone a ſpontaneous cure. A ſimilar dilatation generally takes place when tumours are formed, particularly ſuch as are attended with acute pain. In amputating a thigh, for diſeaſed knee-joint, the arteries requiring ligatures are very numerous, if the diſeaſed part be at the time in a ſtate of active inflammation.

Vaſcular Syſtem containing black Blood.—The red blood circulates in a ſingle ſyſtem, of which the branches communicate together in all parts; the black, on the contrary, is contained in two inſulated ſyſtems, *viz.* the general, and the abdominal. The veins will be the principal object of our attention in this diviſion of the ſubject, as the pulmonary artery is analogous in its ſtructure and ramifications to the arteries of the preceding ſyſtem, and the central cavities will be conſidered in the general account of the heart.

The veins originate in the general capillary ſyſtem, and are produced in no organ, into which arteries do not penetrate; as in tendons, cartilages, &c. This clearly proves that blood is not formed in the general capillary ſyſtem; it depoſits there the principles, from which its red colour was derived, and perhaps derives new ones; in a word, it is modified, but never created there. It is not ſo eaſy to diſtinguiſh the veins, at their origin from this ſyſtem, as to trace the arteries into it; ſince the valves prevent injections from penetrating. Hence ſubjects, who have died of aſphyxia, apoplexy, &c. are the moſt favourable for obſerving the minute venous ramifications. On ſuch occaſions, we can diſcern that they are ſoon divided into two orders, of which one accompanies and the other is diſtinct from the arteries. In moſt organs veins paſs out in the ſame ſituations at which arteries enter; however, there are ſome exceptions to this rule. The arteries of the brain enter below, and the veins go out above; the former veſſels enter at the lower part of the liver, and the latter eſcape behind. Theſe differences have no effect on the circulation. Beſides the veins, which correſpond to the arteries, there is an order of theſe veſſels which have a diſtinct courſe. The organs near the ſurface of the body furniſh, 1ſt, veins which go towards the interior, together with the arteries; 2dly, others which become ſubcutaneous, and form trunks, which we ſhall mention preſently. It appears from this deſcription that the arteries, quitting the general capillary ſyſtem, are much more numerous than the veins which enter it. Here the diſproportion in capacity between the two ſyſtems begins.

The progreſs of the veins, after their commencement, is not uniform. In the limbs and exterior parts of the trunk they form two claſſes; an interior, following the courſe of the arteries, and an exterior, which is ſubcutaneous. A ſimilar diſtribution is ſometimes obſerved in the internal organs; thus, there are ſuperficial and deepſeated veins in the kidney; but generally all the veins end in thoſe trunks which accompany the arteries.

The cutaneous claſs of veins is very remarkable in the extremities and neck, where they conſtitute large trunks, ſuch as the ſaphenæ, cephalic, baſilic, and external jugular veins. No ſuch large branches are found in the trunk; but there is a more conſiderable number of ſmaller ramifications. Thus, the external ſurface of the body exhibits a remarkable predominance of trunks containing black blood over thoſe which are filled with red blood. In this ſituation, as their ſides, compared to thoſe of the arteries, are thin, they may often be diſtinguiſhed through the integuments by their colour. The prominences, which they form, have a pale blue tint, made up of the dark purple of the venous blood, and the whiteneſs of the ſkin, and more diſtinct in proportion as the ſkin is thin and clear. No part of this colour reſides in the veſſels themſelves.

In the interior of the body the veins almoſt univerſally accompany the arteries. Generally a common cellular ſpace contains both the trunks of the two kinds of veſſels and the nerves. The azygos is, however, an inſulated vein. The deepſeated veins are more capacious than the arteries, and uſually more numerous, as in the limbs, where each artery has two correſponding venous veſſels.

It muſt be obvious, from the foregoing ſtatements, that the venous ſyſtem, taken altogether, much exceeds the arterial in capacity. This aſſertion may be eaſily verified in detail, wherever an arterial and venous trunk are found together; and it is not leſs true wherever theſe veſſels are ſeparate in their diſtribution. The area of the inferior cava is to that of the aorta, according to Haller, as ſixteen to nine; and Wintringham makes theſe proportions as 1713 to 1000. The latter author gives 191 and 100 as the proportions of the vena cava and the aorta juſt above the iliac veſſels. Haller found the ſplenic artery to be to the vein as 156 to 676; and theſe proportions are expreſſed in the renal veſſels by 614 and 1490. The ſubclavian artery was to the vein as 81 to 196; and the carotid to the jugular as 196 to 441. A deduction from various data will give us four to nine as a general ſtatement of the relation which the capacity of the arteries bears to that of the veins. The exceſs of the latter veſſels is rendered very obvious by injections: where both orders of veſſels are filled, as in the inteſtine, the arteries are almoſt hidden by the ſuperior numbers and ſize of the veins.

The veins do not exceed the arteries in their diameter merely, but alſo in number; and the proportion of the former to the latter is threefold according to ſome. The united areas of all the veins will, therefore, far ſurpaſs thoſe of the arteries, if the former veſſels are not only more capacious individually, but alſo more numerous. Large venous plexuſes exiſt in many parts without any correſponding arteries, as under the ſkin of the extremities and neck, in the ſpermatic chord, about the bladder and generative organs, &c.

To theſe calculations Bichat objects the uncertainty to which they muſt always be expoſed. If the veſſels ſhould be meaſured in the dead ſubject, the kind of death occaſions great variety in their volume. In apoplexy, aſphyxia, &c. their diameter is double what they preſent in caſes of death from hæmorrhage: hence we may give to them nearly what capacity we pleaſe, according to the mode in which we deſtroy the animal. The veins vary equally in ſize in the living ſubject, according as they are more or leſs full: hence thoſe under the ſkin are ſometimes prominent, and at others hardly diſtinguiſhable. Whenever the maſs of blood is diminiſhed, from whatever cauſe, the veins contract proportionably; while the arteries, on account of their more firm texture, change in a much ſmaller degree. When there is ſuch variety in the facts, the calculations founded on theſe muſt be neceſſarily vague. Theſe exact proportions are not however of any aſſiſtance in explaining the phenomena of health and diſeaſe. We may be contented with the general aſſertion, that the capacity of the venous conſiderably exceeds that of the arterial ſyſtem: in a given time there is more blood contained in the former, than in the latter. A ſimilar obſervation may be made concerning the two ſides of the heart; the right is more capacious than the left, becauſe it contains more blood. If this fluid be confined in a dying animal to the left cavities, while the right are emptied by punctures, the latter will appear to be the largeſt. In ordinary deaths the blood is accumulated in the right cavities, and makes them appear the largeſt.

Thus we have arrived at two ſtatements, which are generally true: 1ſt, that the great tree, which terminates the ſyſtem of red blood, is generally inferior in capacity to that by which the ſyſtem of black blood begins; 2dly, that the ſame obſervations applies to the two ſides of the heart, which correſpond to theſe.

"The caſe," ſays Bichat, "is not the ſame with the tree in which the ſyſtem of black blood ends, when compared with that in which the red-blooded ſyſtem commences. The pulmonary artery, and the veins of the ſame name, preſent a leſs conſiderable diſproportion in their capacity than is obſerved between the two kinds of veſſels in other parts; yet there is a real difference, and that is in favour of the veins. Since the artery is continuous with the veins of the body in general, and tranſmits the fluid brought by thoſe veſſels, and ſince the pulmonary veins are connected in a ſimilar manner with the arterial ſyſtem, it would probably have been expected that theſe canals ſhould correſpond relatively to each other. The phenomenon may be explained by the difference in the velocity of the blood: that fluid circulates more rapidly in the pulmonary artery, than in the veins of the ſame name, becauſe it receives the impulſe of the heart in the former caſe, but not in the latter. Hence as much blood paſſes through the artery as through the veins in a given time, although the diameter of the former is the ſmalleſt. The ſame explanation applies to the aorta and its correſponding venous trunks.

The four pulmonary veins taken together are rather larger than the aorta, which yet tranſmits all the blood that arrives through them. Becauſe the contraction of the left ventricle ſends more blood in a given time through the aorta, than paſſes through theſe veins. Hence the two circumſtances, *viz.* velocity of the blood's motion, and the capacity of the cavities in which it circulates, are in an inverſe ratio to each other in the two oppoſite trees, which form each vaſcular ſyſtem. In that of red blood there are diminiſhed velocity and greater capacity from the pulmonary capillaries to the agent of impulſion: from the latter to the general capillary ſyſtems, we obſerve, on the contrary, increaſed velocity and diminiſhed capacity. In the other ſyſtem the characters firſt mentioned prevail from the general capillaries to the impelling power: and the other circumſtances are ſeen in the ſecond part of the ſyſtem.

The capacity of the pulmonary veins, however, ſurpaſſes that of the aorta by a much ſmaller proportion, than that by which the venæ cavæ and the coronary veins exceed the pulmonary veins. The following reaſons ſeem ſufficient to explain this arrangement. As the courſe of the pulmonary veins is very ſhort, the impulſe received by the red blood from the pulmonary capillaries is more effectually exerted, and many cauſes of retardation, which affect the cavæ, are avoided. Hence greater velocity and leſs diameter in the pulmonary veins.

There can be no trouble now in underſtanding the cauſe of the numerous arrangements in the circulating organs, which have attracted conſiderable attention from phyſiologiſts: *viz.* why the ſum of the arteries coming from the aorta poſſeſſes leſs capacity than that of the veins entering the right auricle; why the four pulmonary veins exceed the artery of the ſame name; why theſe veins are not exactly proportioned to the aorta, which is continued from them; and why the coronary and venæ cavæ are ſo diſproportionate to the pulmonary artery.

If there were no impelling power in the two ſyſtems, their capacity would be uniform throughout, becauſe the velocity would be the ſame in all parts. Hence in the abdominal ſyſtem of black blood, the hepatic and inteſtinal portions of the vena portarum are of equal capacity.

The velocity of the fluid is leſs in the general and in the pulmonary veins, becauſe there is no agent of impulſion at their beginning, but merely a capillary ſyſtem. An arrangement of circumſtances, exactly contrary, explains the greater velocity in the pulmonary and the general arteries. We have obſerved, in ſpeaking of the ſyſtem of red blood, that the preſence of the impelling power at the commencement of the arteries renders it neceſſary that the organization of theſe tubes ſhould poſſeſs conſiderable powers of reſiſtance, while the abſence of ſuch an agent from the beginning of the veins allows theſe to be weaker in their ſtructure. Thus we may ſee very clearly how it happens, that weakneſs of their ſides, ſlow motion of the contained fluid, and conſiderable capacity, are attributes of the veins in both ſyſtems; and why the arteries are marked by three oppoſite characters. Hence too we underſtand, although the red and the black blood form in their whole courſe one continuous column, and although the common membrane, over which they move, be nearly the ſame in the whole extent of each ſyſtem, why the organs placed on the exterior of this membrane ſhould be ſo different.

Theſe conſiderations will lead us alſo to the explanation of the different proportions which the arteries and veins bear to each other in different parts of the body. The renal, bronchial, and thymic veins are generally ſmaller in proportion to their arteries, than the ſpermatic or hypogaſtric veins are to the correſponding arterial tubes. The blood moves more eaſily in the former than in the latter, through which it aſcends, contrary to the force of gravitation. For the ſame reaſon, the diameter of the veins exceeds that of the arteries, by a greater proportion in the lower than in the upper parts of the body, particularly at a certain age.

The veins are diſtributed in a manner analogous to the arteries, with reſpect to their diviſions and ſubdiviſions, excepting that theſe take place in an inverſe order to thoſe of the arteries. They begin by minute twigs, which are united together to form larger canals; theſe, uniting together, make larger branches, which, by their ſubſequent junctions, compoſe more conſiderable trunks. The ſmaller venous tubes are found in the interior of our organs, and are a component part of them: as theſe unite into larger branches, they are lodged in the intervals of parts, as between the lobes of the glands, the faſciculi of muſcles, &c. When they quit their reſpective organs, they join into more conſiderable branches, which form two claſſes, a ſubcutaneous and a more deeply ſeated one. The former run immediately under the ſkin, and are interpoſed in the limbs between the integuments and the faſcia: the latter are lodged in the intervals between the organs, and generally accompany the arteries. The veins of the brain have a diſpoſition peculiar to themſelves, being lodged in cavities of the dura mater, called ſinuſes.

In all ſituations theſe veſſels are much leſs tortuous than the arteries :-"this circumſtance," ſays Bichat, "would prevent locomotion of the veins, even if there were an impelling agent at their commencement, and if their ſides were of a firmer ſtructure. Hence too it follows, that a ſeries of arterial tubes is actually longer than a correſponding ſeries of veins. This facilitates the motion of the black blood, by making its courſe leſs extenſive, as well as by avoiding the retardation, which a tortuous arrangement would create in this ſyſtem, where there is no impelling power, as in the arteries, to overcome ſuch an obſtacle.''

The veins are united ultimately into a certain number of trunks, opening into thoſe which terminate in the right auricle of the heart: theſe are the internal jugular, ſubclavian, and azygos veins above, and the iliac below. Like the arterial trunks, they are placed deeply, and protected by the ſurrounding organs from external injury, ſince a wound might produce fatal hæmorrhage.

No conſtant rule is obſerved as to ſize, in the union of the veins; ſmall twigs often ending in large trunks. The angles of junction vary, being ſometimes right and ſometimes obtuſe, but moſt frequently acute. "In the diſtribution and number of theſe veſſels," ſays Haller, "there is much more variety than in the arteries; and ſo inconſtant are the arrangements of nature in this ſyſtem, that, although I have proſecuted the courſe of the arteries minutely, in all parts of the body, I could never undertake the labour of a ſimilar inquiry into the diſtribution of the veins. It would be neceſſary to give almoſt as many deſcriptions as there are ſubjects; ſuch at leaſt would be the caſe in the extremities, face, head, and neck, while their courſe in the viſcera is tolerably regular and like that of the arteries." Elem. Phyſiol. lib. 2, ſect. 2, § 13.

A vein is cylindrical, when examined in a part where it receives no branch. It appears flattened on the dead body, ſince its ſides are collapſed in conſequence of the abſence of blood: but if it be diſtended, it regains its original form. In the living ſubject the form of the veins is round. A vein, traced from the extremity of the body to the heart, is conical, with the baſis of the cone at the heart, and its apex turned towards the general capillary ſyſtem. Yet there is an exception to this obſervation, ariſing from dilatations of theſe veſſels in particular inſtances: the vena cava is enlarged juſt under the diaphragm, the internal jugular vein exhibits a ſimilar enlargement, &c. The venous ſyſtem forms three trunks, the cava ſuperior and inferior, and the coronary vein: theſe have their apex in the right auricle, and their baſis in the general capillary ſyſtem. Anatomiſts give this repreſentation of the venous ſyſtem, becauſe, as in the arteries, the ſum of the branches exceeds in capacity the trunk, formed by their union. As the area of the aorta is very much leſs than the ſum of the united areas of all its branches, we ſhall find that the ſame compariſon holds good of the vena cava and its branches. Haller ſays that he finds the ratios of the trunks to the branches to be nearly the ſame as in the arterial ſyſtem. Bichat ſtates that the proportions are not ſo conſtant as in the arteries: that the ſum of the branches, in certain inſtances, far exceeds the area of the trunk, while it is leſs in others. He refers this, in great meaſure, to the varieties in the ſtate of the veſſels produced by the quantity of contained blood. If the circulation through the lungs have been obſtructed, accumulation takes place in the right cavities of the heart, and then in the large venous trunks: on the contrary, when a limb has been long in a perpendicular poſition, in the living body, as the leg in ſtanding, the branches are much enlarged. Since the relation of the trunks to the branches is thus ſo conſiderably expoſed to cauſes of variation, and ſuch differences may be found in this reſpect according to the mode of death, and the diſeaſes which have preceded it, we may neglect all attempts at exact calculation, which could not lead to any uſeful reſult.

The veins communicate together more freely than the arteries. In the ſmaller ramifications the anaſtomoſes are ſo numerous as to form a real network: they are comparatively fewer in the ſucceeding branches, and become leſs frequent as we proceed towards the heart. Yet we ſtill find many even in the large branches, and in this reſpect the veins are particularly diſtinguiſhed from the arteries, the larger trunks of which are almoſt always iſolated. Theſe anaſtomoſes unite, in a very obvious manner, the cutaneous and the deepſeated veins: thus the ſinuſes of the cranium are connected, by means of the emiſſaria, with the temporal, occipital, and other external veins; the external and internal jugulars are joined together, under the angle of the jaw, by a large branch; the baſilic, cephalic, and their numerous diviſions ſpread over the forearm, to the brachial, radial, and ulnar, by ſeveral branches penetrating between the muſcles; and the ſaphenæ to the crural, tibial, and peroneal in a ſimilar manner. Thus the communications between the two great diviſions of the veins provide againſt interruption to the circulation from local preſſure. Thus we account for the encreaſed flow of blood in phlebotomy, produced by exerting the muſcles of the forearm; for the continuation of the circulation, when the ſuperficial veins are compreſſed by a ligature; and for the paſſage of anatomical injections from theſe into the deepſeated trunks. To theſe anaſtomoſes we are indebted, according to Bichat, for the power of following various faſhions in dreſs; the preſſure produced in the neck, at the ham and other parts, by different articles of clothing, would, he ſays, be very dangerous, if the ſuperficial veins could not empty themſelves into the more deeply ſeated trunks. If a ſingle vein be compreſſed, the blood paſſes readily into the neighbouring tubes; but when the preſſure is more general, it cauſes a retardation to the blood's paſſage in the capillary ſyſtem, and a general redneſs of the whole ſurface.

The anaſtomoſes take place nearly in the ſame manner as in the arteries: branches of equal ſize may communicate together; or ſmaller may be joined to larger ones. There may be ſimply a ſtraight communicating canal; or two branches may be joined by their extremities ſo as to form an arch; or there may be numerous communications between ſeveral branches, ſo as to form a plexus of veins. In general the anaſtamoſes are moſt numerous where the courſe of the blood is expoſed to the greateſt difficulty. Hence the frequent conjunctions of the ſpermatic veins, and the very intricate plexus formed in the bottom of the pelvis by the hypogaſtric veſſels. Yet theſe two parts of the venous ſyſtem are frequently the ſeats of varices; and few are found more frequently dilated in the dead body, on account of the great difficulty which the blood experiences in aſcending contrary to its own weight.

A comparative view of the courſe of the blood in the two ſyſtems will ſhew us, perhaps, that there are means of explaining why the communications are more frequent in the venous than in the arterial ſyſtem. The black blood is manifeſtly influenced by the force of gravitation on many occaſions. The erect attitude occaſions the veins of the lower parts to ſwell, particularly after diſeaſes which have produced debility: this ſwelling quickly diſappears if the legs are placed in an horizontal poſition, and increaſes if the perpendicular attitude be maintained. How conſiderably poſition affects various tumours and ulcers of the lower limbs is well known. A conſiderable ſwelling from difficulty in the return of the black blood is produced by what we call in common ſtanding on the head. Any kind of violent motion communicated to the black blood, independently of gravitation, will affect its courſe; and to this cauſe we may perhaps aſcribe the peculiar effect experienced on moving the body quickly in the circular direction. External and internal preſſure, and various mechanical cauſes, are conſtantly influencing the courſe of the venous blood. The arterial blood is exempted from theſe cauſes of retardation, particularly from the action of gravity. The influence produced by the contraction of the heart deſtroys all effect of ſuch a cauſe.

The two venæ cavæ form two large venous cones; of which one, placed above the diaphragm, correſponds not only to the aſcending branches of the aorta, which ſupply the head, neck, and upper limbs, but alſo to the cheſt by the vena azygos: the other, ſituated below this muſcle, returns the blood carried out by the deſcending aorta, excepting that which goes in its intercoſtal branches. Although each of theſe veſſels forms a diſtinct cone, they communicate together, in the ſituation of their boundary, the diaphragm, by means of the azygos. This communicates below with the renal and lumbar veſſels, and opens above into the ſuperior cava; ſo that, if the inferior vena cava be obliterated, its blood can be conveyed, through the communications juſt mentioned, to the right auricle. Dr. Baillie has related a caſe of this kind in the "Tranſactions of a Society for the Promotion of Medical and Chirurgical Knowledge;" and the example is by no means a ſolitary one. When the blood takes this route, it paſſes, in ſome part of its courſe, contrary to its uſual direction. It goes from the trunk of the vena cava into the renal vein, and thence into the azygos; and this courſe is favoured by the abſence of valves from the parts juſt mentioned.

Organization of the vaſcular Syſtem of black Blood.—The muſcular fibres of the heart, and the fibrous coat of the pulmonary artery, which is exactly analogous to that of the aorta, will not be conſidered here: it is the ſtructure of the veins which we ſhall now examine.

After removing all the cellular covering of the vein, its proper coat (membrane propre of Bichat, membrana media of Haller) is brought into view. We now diſcern in the large trunks longitudinal fibres parallel to each other, forming a very thin layer, often difficultly perceptible at the firſt view, but always preſent. When the veſſels are conſiderably diſtended, theſe fibres are leſs manifeſt than in the contracted ſtate. Bichat finds them more numerous in the inferior than in the ſuperior cava; and in the ſuperficial, than in the deepſeated veins, as in the ſaphena compared to the crural. This anatomiſt alſo repreſents that they are more clearly marked in the branches than in the trunks, and that they are continued, at all diviſions, from one to the other: alſo that they are ſometimes condenſed, ſo as to give to the vein a conſiderable thickneſs. In general the venous fibre is remarkable for its tenacity, which greatly favours the extenſibility of the veins, and forms a ſtriking contraſt to the thickneſs of the arterial membrane. The ſtructure and properties of each order of veſſels are ſuited to the mode in which the blood circulates in them. The agent of impulſion at the commencement of the arteries requires in theſe tubes a firm and reſiſting ſtructure, while the ſlow movement of the venous blood is accommodated to the power of yielding in the ſides of the veins.

The fibres of the venous membrane ſeem not to have attracted the notice of phyſiologiſts in any great degree; Haller merely mentions them as "fibræ flexiles et rubræ, quæ venæ longitudinem ſequuntur;" and Soemmerring, who includes this with the cellular covering under the name of tunica extima, ſays of it, "fibroſi aliquid nonniſi in venis majoribus poteſt diſtingui." Bichat, from whom the deſcription is derived, ſays, that he conceives it to be of a peculiar nature, eſſentially different from all other tiſſues, and having its own organization and vital properties. He obſerves further, that they preſent very different appearances in different individuals, being ſometimes much more manifeſt than at others. They do not exiſt in the ſinuſes of the dura mater, which preſent merely ſeparations of that membrane, lined by a continuation of the common membrane of the veins: conſequently the cellular covering, as well as the fibres, are abſent in the caſe of theſe veſſels. There is no appearance of circular fibres in any part of the veins.

The force with which the veins reſiſt any power tending to tear them is much greater than would be expected from their apparent tenacity. Their area is much larger in proportion to their ſides, than in the arteries; and the proportion, according to the experiments and calculations of Wintringham, which the thickneſs of the arterial coats bears to that of the veins, is as 15 to 1. This ſtatement, however, applies to the largeſt trunks, ſuch as the aorta and deſcending cava, and the ratio of the coats to the area of the veſſel increaſes as the veins become ſmaller. The ſpecific gravity of the veins exceeds that of the arteries in a ſmall degree.

As the denſity of the venous exceeds that of the arterial coats, their ſtrength is alſo ſuperior; that is, they bear greater diſtenſion without burſting. They yield more readily, and admit greater dilatation: the internal jugular vein may be diſtended with injection ſo as to form a very large cavity, and the minute veins admit injection ſo as to form extenſive networks, while the arteries would burſt under ſimilar force. Many examples ſhew us very conſiderable enlargements of the veins, when the ordinary courſe of circulation is obſtructed. Hales found the jugular vein bear a column of water of 175 feet, when the carotid was burſt by one of 190. Wintringham's experiments ſhew that the veins will bear even greater weights in this way than the arteries: the cava inferior ſuſtained 176½ lb., and the aorta, in the ſame ſituation, 158 lb. 11 oz. The iliac vein was to the artery in this reſpect as 1034 to 1000. But in the veſſels of the viſcera, the arteries exceeded the veins, as the renal and ſplenic; and in an old dog the aorta was ſtronger than the cava. Still experience proves that in the living ſubject the veins are much more ſubject to dilatation and rupture than the arteries: varices and hemorrhoidal tumours are much more frequent than aneuriſms, and actual rupture is not a very unfrequent occurrence.

The common membrane of the black blood, extended from the general to the pulmonary capillary ſyſtem, is every where nearly of the ſame nature. It differs from that of the red blood by ſeveral characters. It admits of much greater diſtenſion, and is conſequently leſs brittle. Apply a ligature on a vein, and it will not cut through this coat, unleſs indeed the conſtriction ſhould be exceſſively tight; it is indeed nearly as pliant as the cellular covering, and can be diſſected much more eaſily than the correſponding membrane in the arterial ſyſtem. It is thinner, as we may ſee by obſerving the valves, which often eſcape obſervation on the firſt view from their great delicacy. Oſſification never takes place in it, and hence the tricuſpidal valve with the ſigmoid valves of the pulmonary artery and the lining of that veſſel, which are all formed by this membrane, never exhibit the bony depoſits which are ſo common in the correſponding parts of the other circulating ſyſtem.

This membrane is remarkable for forming a number of folds, called valves; the ſigmoid of the pulmonary artery, and the tricuſpidal are formed by it: but we ſhall here confine ourſelves to thoſe which are found in the veins carrying black blood. They are formed by the ſmooth inner membrane of the vein, produced from that part of the veſſel which is fartheſt from the heart, towards the heart, and into the cavity of the vein: in the latter ſituation they end by an extremely thin lunated margin, at which the membrane is reflected upon itſelf, and returns in a contrary direction to its commencement, to the lining of the vein. Thus two plates or laminæ are produced, exactly ſimilar to each other; an aſcending one from the lining of the vein to the lunated edge, and another deſcending from the latter to the former part. This deſcription, however, is in ſome degree imaginary; for the valves are ſo thin that they can hardly be ſplit into two plates. As the direction of branches, with reſpect to their trunks, varies, ſo the valves may differ in their poſition as compared to the heart; but in the above deſcription we ſuppoſe the veſſel to be going ſtraight to the heart. The extremities of the looſe edge, where they are connected to the ſides of the vein, are prolonged in a narrow form, ſo as to repreſent the two horns of a creſcent, theſe are called the cornua, and vary in length. Theſe folds are extremely thin, but ſtrong, and poſſeſs a ſomewhat ſhining appearance: according to Haller they often preſent foramina, and a reticulated appearance, as if they had given way to the force of the blood.

In every valve we diſtinguiſh the *fixed edge* by which the fold adheres to the lining of the vein, which is parabolical in its figure, and always turned from the heart; the *looſe edge*, floating in the cavity of the veſſel, lunated in its figure, prolonged into the cornua, and turned towards the heart; the *internal flat ſurface* which faces to the tube of the vein, and againſt which the blood tranſmitted through the veſſels paſſes; and the *external flat ſurface* turned towards the coats of the vein, and in contact with thoſe coats when the venous blood is flowing towards the heart in its natural direction. The two latter are continuous at the looſe edge. The margin adhering to the vein is ſtronger, and often hard or callous in its ſtructure; this is the *agger* of Morgagni; *le bourlet* of Senac. The figure of the valve, taken altogether, is that of a parabola, of which the convex apex is turned from the heart, and the ſides are continued along the tube of the vein towards that organ: hence, between the valve and the ſide of the veſſel a blind cavity is intercepted, called by ſome the *ſinus* of the valve, and repreſenting, when diſtended with wax, a parabolic cone, longer or ſhorter in different inſtances.

In the larger trunks theſe folds are generally arranged in pairs, as at the entrance of the internal jugular into the ſubclavian, in the large veins of the leg and arm, and the vena azygos. The two valves, compoſing the pair, are of equal ſize, and touch each other, at their looſe edges, when diſtended, ſo as to fill up the canal of the veſſel. It is uncommon to ſee three valves together; yet they are obſerved ſometimes in ſuch an arrangement, and completely meet in the canal of the vein, when raiſed, ſo as to cloſe it. Solitary valves are frequently found in the ſmaller veſſels, as in thoſe of the hand and foot: theſe are at the ſame time generally longer. Haller has ſeen ſuch in the ſpermatic and vena azygos, and ſays that they are ſometimes found in the extremities, and ſhut the whole canal of the vein when elevated. Branches ſometimes join venous trunks without any valves at their openings, and then there is a ſimple round opening with a ſharp edge, as at the origin of an arterial branch: in other inſtances there are valves juſt at the orifice, formed by the membrane of a branch.

The ſize of the valves is proportioned to that of the veſſel in which they are found; but they are not always ſufficiently large to cloſe it completely. This circumſtance, which has attracted the attention of moſt anatomiſts, who refer it to the original formation of the parts, is explained by Bichat by the varying ſtate of the calibre of the tube. When the vein is conſiderably dilated, the valves, which do not yield in the ſame proportion, are rendered ſmaller with reſpect to the enlarged canal, and do not, therefore, cloſe it completely: in the contracted condition of the part they are adequate to their original purpoſe. This circumſtance accounts for anatomical injections ſometimes finding their way, contrary to the courſe of the circulation, in theſe veſſels.

There are no valves from the auricle down to the iliac veins; none in the hepatic, renal, uterine, umbilical, cerebral, or coronary veins, excepting the ſingle one at the mouth of the coronary in the auricle. Some have deſcribed a valve at the opening of the ſpermatic into the renal vein. Haller has ſeen one or two valves, or pairs of valves, in the trunk of the vein, but not at its termination: this repreſentation is alſo ſupported by Monro, (De Semine et Teſtibus,) who has occaſionally found them more numerous in this veſſel. There are none in the ſmall veſſels over the whole body, in ſuch at leaſt, according to Haller, whoſe diameter is leſs than one line. Theſe folds begin in the iliac veins, where, however, they are not numerous. They are found in ſuch branches of the hypogaſtric veins as do not go to the uterus or bladder, and particularly in the veins of the penis and clitoris. Conſiderable numbers exiſt in the crural and popliteal: they are found at the opening of the ſaphena and of the ſaphena minor, and in their ramifications.

In deſcribing the ſituations, where valves are found in the branches of the ſuperior cava, we come firſt to the vena azygos, about which much controverſy has ariſen on this point. Fallopius and Euſtachius deny their exiſtence in this vein, and Haller aſſerts, as an excuſe for their error, that fluids, injected into the ſuperior cava, will always fill the trunk and branches of this veſſel. Various anatomiſts, as Riolan, Bartholin, Senac, and Morgagni, have deſcribed valves in different ſituations in this vein. Haller never ſaw any at its termination, nor in the intercoſtal veins; but always diſcovered ſome in the trunk, where it lies on the vertebræ. A large pair of valves is placed at the inferior end of the internal jugular vein; which, however, allow the paſſage of injection. In the ſinus of the poſterior valve, on the left ſide of the body, is the opening of the thoracic duct, furniſhed with a pair of valves, which prevent the blood from gaining admiſſion into that veſſel. Haller admits no other valves in the internal jugular vein; nor in the vertebral, nor the ſinuſes of the medulla ſpinalis. They are deſcribed in the external jugular, as alſo in conſiderable numbers in the branches which are ſent from the internal jugular to the face, tongue, and other parts on the outſide of the head. They are found in the ſubclavian trunk, and in the whole ſyſtem of the arm and forearm, where they are very numerous: hence the knotted appearance of theſe veins in injected preparations. Haller aſſigns four pairs to the trunk of the baſilic between the elbow and its termination, and the ſame number to the brachial vein in the ſame diſtance.

It appears, then, in general, that theſe folds are chiefly found in veins which have a perpendicular ſituation, as in the limbs, penis, teſticles, neck, and the vena azygos: alſo, that they are more numerous in the limbs, and in the cutaneous veſſels, and are hardly ever ſeen in the viſcera. Their exiſtence on the whole is conſtant, but their number and ſituation vary conſiderably. The moſt convenient mode of exhibiting them is by placing a vein, ſlit up, in water.

The effect of the valves, in preventing the blood from returning through the veins, in a courſe contrary to that of its natural current, is ſo obvious, that it need hardly be inſiſted on. Theſe thin folds lie cloſe to the ſide of the veſſel, and offer no obſtacle to the blood's courſe; but when that fluid is repelled in the vein, it lifts the looſe edge, enters the ſinus, and cauſes the margins of the two valves to approach ſo as to form a partition in the cavity of the veſſel. Hence the blood cannot retreat further than the ſituation of the firſt pair of valves; conſequently, any portion of a venous trunk has to ſuſtain only that quantity of blood, which is contained between the two pairs of valves which bound it. But for this arrangement the whole column of venous blood, when its return to the auricle was impeded, would have preſſed on the minute veins with a degree of force, which the coats of theſe veſſels could not have reſiſted. The neceſſity of ſuch a ſtructure ariſes out of the comparatively ſlow motion of the venous blood, the abſence of an impelling agent at its commencement, and the degree in which it is influenced by the force of gravitation.

In conſequence of theſe valves all preſſure muſt have the effect of ſending the blood on towards the heart: the valves prevent it from retreating, and there is conſequently but one direction in which the fluid, when urged by any external preſſure, can eſcape. Hence muſcular motion promotes the venous circulation.

The action of the valves can be well eſtimated by injections contrary to the blood's courſe: the elevation of the folds prevents the injected matter from paſſing the valve, and it diſtends the two ſinuſes ſo as terminate in two parabolical cones.

They enable us to diſpenſe with ligatures on the veins in moſt ſurgical operations, for no more blood can eſcape, than is contained between the opening and the firſt pair of valves.

The abſence of valves from the arteries proves, in the opinion of Bichat, that theſe veſſels have no active power of contraction. If they had, he ſays that valves would have been required to prevent the blood from being forced back. As the arteries recover themſelves by their organic contractility, which is exerted in a gentle manner, the valves at the mouth of the aorta are ſufficient to prevent the return of the blood towards the heart. There is the leſs need of valves in any other parts, becauſe the contraction of the arteries is conſequent on their containing leſs blood.

The effect of re-agents on the venous tiſſue preſents no very intereſting reſults. Theſe veſſels are pliant when dried: they reſiſt putrefaction and maceration leſs effectually than arteries, but more than moſt other tiſſues. Warm water or acids corrugate their coats, and render the fibres more ſenſible: this is the beſt method of obſerving them.

Veins poſſeſs in their coats arteries and veins, which do not differ eſſentially from thoſe of the arteries. Like the arteries alſo they are ſurrounded by two kinds of cellular ſubſtance: one of theſe is like that found in the intervals of all the organs, and ſerves to connect the veins to the ſurrounding parts; the other is denſe and cloſe in its ſtructure, and forms an external or cellular coat to the vein (celluloſa of Haller). This covering is very ſtrong, of a filamentous texture, and, although compoſed of cellular tiſſue, never contains any fat or ſerous fluid. It covers and includes the longitudinal fibres of the veins, according to the deſcription of Bichat, and is continued even to the ſurface of the common membrane. This anatomiſt remarks alſo, that the preſence of cellular ſubſtance in the parietes of the veins is a diſtinctive character of theſe veſſels, decidedly ſeparating them from the arteries, to which indeed their tiſſue is not at all analogous.

There is no reaſon to ſuppoſe that abſorption or exhalation are carried on at the internal ſurfaces of veins. Bichat performed ſimilar experiments on theſe veſſels to thoſe which are mentioned concerning the arteries, and with the ſame reſult. If there were any ſecretion from the common membrane, a vein would not become obliterated as it does, when blood no longers paſſes through it. The exhalants and abſorbents of veins are therefore confined to the office of nutrition, and conſequently are few in number.

There are very few nerves from the ganglia obſerved on the veins, while they are ſo numerous, in many parts of the arterial ſyſtem, as to form almoſt an acceſſory covering. Yet the right ſide of the heart ſeems to poſſeſs as large a ſupply of theſe organs as the left. The pulmonary artery has very few nerves. Hence, in a general view of the matter, the ſyſtem of red blood has obviouſly a much larger ſhare of nerves than that of black.

Properties of the vaſcular Syſtem of red Blood.—The veins have very little elaſticity, are ſoft and lax in their texture.

Extenſibility.—They poſſeſs but little of this property in the longitudinal direction: but enjoy it in a very high degree in the direction of their diameter. They may be diſtended enormouſly in the dead ſubject by injections; and undergo very great enlargement, when they form varices, in the living ſtate. Arteries can hardly be ſtretched to twice their natural diameter without burſting their internal lining, while veins may be extended to three, four, or even five times their original ſize. Yet, as we have already obſerved, there are frequent examples of their rupture during life; as of thoſe in the lower extremity, during pregnancy, in the hemorrhoidal and cerebral veſſels, &c. The venæ cavæ, ſubclavian, and jugular veins have burſt ſuddenly, without any apparent diſeaſe. Poſſibly the different courſe of the fibres may account for the veins being moſt extenſible in a direction oppoſite to that of the arteries.

The *contractility* correſponds in degree and direction to the former property. It cauſes the parietes of the umbilical vein, or of any trunk, when tied, to contract and obliterate the veſſel; and occaſions the ſudden evacuation of the blood contained between two ligatures, when the veſſel is punctured. The innumerable varieties of calibre, dependant on the quantity of contained blood, which the veins preſent both in the dead and living body, ariſe from their extenſibility and contractility. In what different ſtates are the ſuperficial veins ſeen; dilated in ſummer, in the warm bath, and in the perpendicular poſition of the limbs; contracted in winter, in the cold bath, and in the horizontal ſtate of the extremities. "I doubt," ſays Bichat, "whether thoſe who have favoured the world with ſo many calculations of the capacity of the veſſels, the velocity of the blood, &c. would have undertaken theſe labours if they had opened many bodies, or diſſected many living animals."

Vital Properties. Animal Senſibility?—Mechanical irritation of the external or internal ſurface, the application of ligatures, and the injection of irritating ſubſtances, as urine, bile, wine, narcotics, &c. produce no marks of pain. The introduction of air is ſpeedily, but not inſtantaneouſly followed by piercing cries and violent convulſive motions. It may be doubted whether this ariſes from any effects produced upon the veins. The ſame proofs which are mentioned concerning the arteries, demonſtrate that the veins poſſeſs on animal contractility.

Properties of the organic Life. Senſible Contractility?—No kind of irritation produces any diſcernible contraction in the veins; ſuch was the reſult of Haller's experiments, which have been confirmed by the ſubſequent trials of Bichat. The venæ cavæ, near the auricle, poſſeſs obviouſly muſcular fibres, continuous with thoſe of the heart; and here therefore the power of contraction is not doubted. Neither the arteries nor veins ever preſent, in diſeaſes, thoſe phenomena produced by the augmented energy of contractile power, which are exhibited by organs, in which this power exiſts evidently in a natural ſtate. The kind of beating, ſometimes obſerved in the large veins near the heart, muſt not be miſtaken for the effect of irritability. This phenomenon is produced merely by the reflux of the blood, which not being able to paſs through the lungs, is accumulated in the pulmonary artery and right ſide of the heart; hence, when the latter contracts, as it finds an obſtacle to the propulſion of its contents in the ordinary courſe, the blood is urged back again. This reflux takes place to a certain diſtance, in ſpite of the valves; and is very perceptible, on many occaſions, in the jugular veins, when animals ſubmitted to experiments reſpire laboriouſly. It is alſo ſeen in the laſt moments of life, when the pulmonary circulation begins to be troubled. The cauſe of dilatation ceaſing, the contractility of the veins reduces the veſſel to its former ſtate.

This reflux of the black blood takes place, in a ſlight degree, in the natural actions of the parts. As the openings of the veins are free, the contraction of the auricle muſt repel the contained fluid to a certain extent.

Inſenſible contractility, and its inſeparable concomitant, organic ſenſibility, exiſts in the veins as in other parts of the body, and is concerned merely with the buſineſs of nutrition. It is more ſtrongly marked than in the arteries; at leaſt the diſeaſes, which particularly increaſe its energy, are more frequent in the veins. The latter veſſels are more readily inflamed, in conſequence of injuries, and their wounds, as in phlebotomy, heal more rapidly.

Bichat gives us the following account of the motion of the black blood in the veins. "It appears from what has been already ſaid, and what is ſtated of the capillary ſyſtem, that the blood, when it has arrived in the veins, is no longer influenced by the heart's action; conſequently theſe veſſels can have no pulſation. As there is no agent of impulſion in this ſyſtem, the cauſe determining the pulſe does not exiſt. The conditions neceſſary to its production, in the organization of the veſſel, as elaſticity and reſiſtance, do not exiſt in the veins. They admit therefore only the reflux produced under certain diſordered ſtates of the circulation; or the undulation cauſed by making arterial blood circulate in them in experiments; and in both theſe caſes the effect is produced by the heart.

"The blood moves through the veins in the following manner. The capillary ſyſtem, by its inſenſible contraction, is conſtantly pouring into the veins a certain quantity of blood. A general movement is communicated by this newly arrived portion to the former contents of the veſſels; and the addition at one end, as the ſyſtem is always full, renders it neceſſary that ſome ſhould eſcape at the other, or elſe the venous parietes would be dilated. Now, as theſe poſſeſs ſome power of reſiſtance, the blood flows on to the heart.

"However, the impulſe produced by the inſenſible contraction of the capillary ſyſtem, is too weak to extend inſtantaneouſly from one end of the veins to the other, particularly where the fluid is obliged to move in a direction contrary to the force of gravity. The weight of the column would produce a retardation, and conſequent dilatation of all the veins, if this effect were not obviated by the valves. The exiſtence of theſe folds is a neceſſary conſequence of the weakneſs of the veins. If the veins had been as unyielding as the arteries, they would neceſſarily tranſmit a portion of blood to the heart, whenever a new quantity enters the ſyſtem, although they ſhould poſſeſs no valves.

"As the impulſe communicated to the blood does not much exceed the reſiſtance which it meets with, a very ſlight cauſe will diſturb its motion. Hence the neceſſity of anaſtomoſes; and hence too the acceſſory circumſtances which aſſiſt this motion. Under this head the following are enumerated. 1ſt. The action of muſcles; of which the influence is clearly proved by the acceleration of the jet in phlebotomy, when the muſcles are exerted. In confirmation of this ſtatement we may adduce the abſence of varices from the deepſeated, and their frequency in the cutaneous veins. 2dly. The pulſation of arteries has been ſuppoſed to accelerate the blood's motion in the contiguous veins; but this appears to us more than doubtful. 3dly. The motions of various organs, as of the brain, abdominal and thoracic viſcera, have been conſidered to produce an accelerating effect; but we do not deem this to be very clearly proved. 4thly. Friction of the ſurface. 5thly. Slight compreſſion unqueſtionably favours the return of the venous blood; as is ſhewn in the ſurgical employment of bandages in ulcers and varices of the legs.

"As the ſource of the blood's motion in the veins is placed in the general capillary ſyſtem, inſtead of being concentrated in a ſingle organ, it may vary according to the ſtate of the capillaries in various parts, as obſervation will eaſily prove to us, whereas, in the arteries, the motion is uniform in all parts.

"In general, the motion of the blood in the veins requires many reſearches for its elucidation; the ſubject is involved in an obſcurity through which we can ſcarcely diſcern a few rays of light. The cauſe of this is, that we do not know the kind and degree of motion communicated to the blood in the capillary ſyſtem, the influence of the vaſcular parietes, &c. Our knowledge conſiſts merely of a few ſeparate views, tending more particularly to ſhew the contraſt between the circulation in the veins and in the arteries. A parallel of the two circulations may aſſiſt in elucidating that of the veins, and we therefore give a ſhort general ſtatement of it. 1ſt. General pulſation in the arteries; abſence of this in the veins. 2dly. Rapid courſe of the blood in the former, and ſlow progreſs in the latter. 3dly. Greater capacity and thinner ſides in the veins; leſs capacity and thicker coats in the arteries. 4thly. Neceſſity of acceſſory aſſiſtance in the veins; inutility of this in the arterial circulation. 5thly. Projection of blood by ſucceſſive jerks in the latter; uniform ſtream in the former. 6thly. The circulation influenced by gravity and other extraneous circumſtances in the veins; and exempt from ſuch influence in the arteries. Such is the ſeries of phenomena, which appear to depend on the exiſtence of an impelling agent at the origin of the arteries, and its abſence in the veins. From the unity of the impulſe in the former, and its varieties in the latter ſyſtem, ariſe, 1ſt, conſtant uniformity of motion in all the arteries; varieties in the movement in each part of the venous ſyſtem; 2dly, general ſameneſs in the degree of dilatation or contraction in all the arteries of the dead ſubject; great variety in the veins of different parts.

"To illuſtrate the different motions of the arterial and venous blood, ſome authors have inſiſted much on this point: that in the arteries the blood is urged through tubes conſtantly decreaſing to the capillary ſyſtem, which reſiſts; while in the veins it flows in canals, always increaſing to the right auricle, which offers no reſiſtance. But the black blood of the abdomen moves through decreaſing tubes to the capillaries of the liver, and its motion ſeems exactly ſimilar to that in the general veins."

The ſympathies of the veins, like thoſe of the arteries, are very obſcure. As the tiſſues of theſe veſſels are ſeldom morbidly affected, as inflammation and pain but ſeldom occur in them, we know hardly any thing of the effects which they produce on other organs. When the experiment of tranſfuſion was frequently practiſed, acrid and irritating matters introduced into the veins often produced ſudden convulſions in different muſcles. The influence of other organs on the veins is as little known; ſince theſe veſſels are generally diſſeminated, as well as the arteries and nerves, it is difficult to decide whether any ſympathetic phenomenon takes place in the vein or in the organ to which the veſſel belongs.

Progreſſive Developement of the circulating Syſtem containing black Blood.—Contrary to what we have pointed out in the arteries, the veins in the fœtus are proportionally leſs developed than in the adult. To obſerve this fact, we muſt not ſelect the large trunks of the cavæ, ſubclavian, &c. becauſe they are commonly diſtended at the moment of death, ſo as to appear much larger than is natural to them: it is in the branches and ſmaller ſubdiviſions that we find the diſproportion alluded to. Yet the right ſide of the heart does not partake this character with the reſt of the ſyſtem; on the contrary, as it receives the blood of the umbilical vein it is larger than the left. The ſmaller proportional ſize of the veins, at the period alluded to, ariſes from the rapidity of nutrition, which diſpoſes of much matter in the growth of the body, ſo that there is leſs to be ſent back again through the veins. As the growth is leſs rapid towards the time of birth, the veins approach to the relative magnitude, which they exhibit in the adult. The venous fibres cannot be diſtinguiſhed at this time; yet their organization is as ſtrong, and affords as much reſiſtance to any dilating power as after birth.

The remarkable revolution at the time of birth, which has been already noticed, occaſions the whole of the blood, which before had partly paſſed to the left cavities of the heart, through the foramen ovale, to remain on the right ſide. During the firſt years of life, the veins ſtill preſerve their relative inferiority to the arteries; and this character ſubſiſts during the whole period of growth. An examination of the cutaneous veins will ſuffice to prove the fact; they are never ſo ſtrongly marked in the infant as in the adult, as a view of the arm of a child compared to that of a man will clearly ſhew at the epocha of puberty. When the growth of the body in length is completed, the veins partake of the general plethora, which characterizes that age. When the increaſe of the body, both in length and ſize, is finiſhed, theſe veſſels become larger, and are conſequently more prominent. The application of a ligature or ſtrong contractions of the muſcles of a limb in a youth and a full-grown man will ſhew this difference.

In old age the veins become very large as compared with their condition in the early periods of exiſtence: ſo that the two extremes of life, preſent in this point an inverſe diſpoſition. Theſe veſſels are more ſenſible on the ſurface of the body; but their ſides are not increaſed in thickneſs. The movement of decompoſition predominates over that of compoſition at this age; and more ſubſtance is carried away from the organs than is added to them. However, the ſlowneſs of the circulation in the veins, by producing dilatation of theſe canals, may have a ſhare in producing this apparent ſuperabundance of black blood, and thus exemplifies a poſition, which has been already ſtated, *viz.* that the capacity of theſe veſſels is in an inverſe ratio to the velocity of the blood's motion in them. Thus the velocity is ſmall and the capacity great in old age, while the oppoſite condition prevails in infancy.

The veins of the lower parts are more dilated in old age than thoſe of the upper; on account of the habitual unfavourable influence of the poſition of the parts. Since the influence producing motion is comparatively weak in this ſyſtem, mechanical cauſes have conſiderable power over the venous circulation: hence the frequency of varices in the lower, and their almoſt entire abſence from the upper parts of the body. Hardly any women, who have had many children, are entirely free from theſe ſwellings. Varices are the common complaint of old age, while aneuriſms are rare: the rupture of the veins, too, has commonly taken place at this or the adult age, but not in infants.

The pulmonary artery of the old ſubject does not undergo a dilatation analogous to that of the veins, with which it forms one ſyſtem. Removed from the operation of external agents, furniſhed at its commencement with a muſcular impelling organ, and formed of a firm and reſiſting tiſſue, it is not expoſed to the cauſes of dilatation.

Two kinds of accidental developement of the venous ſyſtem may be obſerved: 1ſt, in various tumours, which receive a large quantity of venous blood, and from which there muſt be a correſponding quantity of black blood returned. The enlarged ſuperficial veins form a ſtriking character of ſuch ſwellings. 2dly. The veins may be dilated, where the return of blood is obſtructed; as in the diſtended abdominal parietes of a dropſical perſon.

Remarks on the Pulmonary Veſſels.—The pulmonary artery, which is repreſented in the foregoing account as forming part of the ſyſtem of black blood; and the veins which are deſcribed to belong to that of the red blood, belong to thoſe two ſyſtems reſpectively, only inaſmuch as they are lined by the common membranes, of which the nature is the ſame throughout all parts of each ſyſtem. But the tiſſue of the pulmonary artery, although added to the membrane of black blood, is juſt the ſame with that of the aorta and its diviſions, excepting a ſlight difference in thickneſs: and that of the pulmonary veins, although covering the membrane of red blood, correſponds in like manner to that of the general veins. Theſe reſemblances of ſtructure lead to ſimilarity in functions; accordingly, the mechanical laws of the circulation of black blood are the ſame in the pulmonary artery as thoſe of the red are in the aorta; and thoſe which regulate the circulation of the black blood in the general veins, preſide over the motion of the red in the pulmonary veins.

There are ſome modifications dependent on local cauſes; thus, on account of the ſhort courſe deſcribed by the pulmonary veins, gravity has no influence on their blood, and they never become varicous.

The ſame general diſpoſitions are obſerved in the arteries and veins, whether they are ſubſervient to the circulation of red or of black blood. Each artery has a ſingle orifice, neceſſary to the unity of impulſion, and of the blood's courſe in the great veſſels: the veins open by ſeveral iſolated mouths, as the motion of their fluid is not uniform in all parts of their ſyſtem, but may experience local acceleration or retardment.

Abdominal Syſtem of black Blood.—The abdomen contains a ſyſtem of veſſels, in which black blood circulates, abſolutely independent of the preceding, called the vena portarum, and found in moſt animals. It ariſes in that diviſion of the general capillary ſyſtem, which belongs to the ſtomach, inteſtines, omentum, ſpleen, pancreas, in a word to all the abdominal viſcera, which are concerned in digeſtion. Thoſe viſcera contained in this cavity, which have no ſhare in the digeſtive proceſs, as the kidnies and generative organs, &c. ſend their black blood into the general ſyſtem. Ariſing thus from the digeſtive apparatus, this ſyſtem forms two or three trunks, which are ſpeedily united into one, which comes to the under ſurface of the liver. There it branches out again into an infinity of ramifications, which are loſt in the tiſſue of the organ. Thus we have the ſame general diſpoſition as in the preceding ſyſtems;—two trees, of which the trunks are united. Place a muſcular organ at the union of the trunks, and the arrangement will be exactly the ſame. The union of the veſſels in the abdominal portion of this ſyſtem is performed in the ſame manner as in the general veins ; and their ſubdiviſions in the liver offer no peculiarities, except that they do not anaſtomoſe. The circumſtances of their diſtribution in the liver remove all thoſe cauſes of retardation and obſtruction, which affect the courſe of the venous blood in the general ſyſtem. Hence there is no neceſſity for anaſtomoſes, as in the lungs, ſpleen, kidney, &c. In the hepatic portion of the ſyſtem the communications are large and numerous, as the courſe of the blood is expoſed here to frequent cauſes of obſtruction. The circulation is carried on in theſe veſſels, as in the veins, and is conſequently equally expoſed to diſturbing influences. The effect of gravity is as ſtrongly marked here as in the former ſyſtem ; and the hemorrhoidal veins, which, by their poſition are moſt expoſed to this influence, are the moſt frequently varicous.

Whether this ſyſtem communicates with the former, in its minute branches, is not yet aſcertained.

Many authors, and particularly Haller, conſidering that this ſyſtem has no agent of impulſion, have aſcribed to the veſſels a ſuperior degree of ſtrength : but the ſtructure in reality appears the ſame. The exiſtence of fibres is dubious. In the hepatic part of the veſſels there is a greater abundance of cellular tiſſue externally.

The analogy of ſtructure in the abdominal and general ſyſtems of black blood, leads us naturally to expect a correſponding reſemblance in their vital properties, ſympathies, &c. Irritation of the meſenteric veins has preciſely the ſame effects as that of any others in the general ſyſtem. The common membrane of the vena portarum is every where deſtitute of valves. As the courſe of the blood is ſo much ſhorter in this inſtance, there is the leſs need of providing the ſupports furniſhed by thoſe folds : and the abſence of an organ of impulſion is attended with a want of the reflux obſerved in the other veins, ſo that the fluid runs always uniformly in this ſyſtem from one ſet of capillaries to the other, without any retrograde paſſage.

“ This uniformity,” ſays Bichat, “ depends alſo in part on another circumſtance ; *viz.* that the liver preſents to the blood's motion none of thoſe obſtacles which occur ſo frequently in the lungs. The former organ, compoſed of a firm tiſſue, admits only of a general locomotion ; and is therefore inſuſceptible of that dilatation and contraction of its individual component parts, which affect ſo conſiderably the paſſage of the blood through the lungs. From the foregoing peculiarities we underſtand ; 1ſt, why, when the abdomen is opened in a living animal, no reflux is obſerved in the veins of the abdominal ſyſtem ; 2dly, why the quantity of blood is nearly uniform in this ſyſtem, and conſequently, why the dimenſions of the trunk and branches do not exhibit thoſe numerous varieties in ſize obſerved in the other ſyſtem ; and, 3dly, why the volume of the liver varies very little after death. The bulk of the lung is very different in different bodies, and its ſpecific gravity is greater or leſs according as its veſſels are more or leſs diſtended with venous blood ; it preſents the two oppoſite extremes in the deaths by aſphyxia and hæmorrhage. Whatever the kind of death may have been, the hepatic part of the vena portarum contains the ſame proportion of blood. However, the ſyſtem of the hepatic veins varies conſiderably in this reſpect, and that part of the liver conſequently may be more or leſs gorged with blood, according as the paſſage through the lungs has been leſs or more free.

The mechaniſm of the circulation in the abdominal portion of this ſyſtem is exactly the ſame as in the general veins : but that of the hepatic part is unique in the animal economy. It bears no analogy to the courſe of the blood in the arteries, where the action of the heart produces the whole effect. There is much obſcurity in this ſubject, as well as in the courſe of the blood in the general veins, and every judicious mind cannot fail to obſerve that there is a great vacuum to be filled up in both caſes.

In the abdominal, as in the general venous ſyſtem, external forces produce conſiderable effect. The motions of the reſpiratory muſcles, the dilatation and contraction of the hollow viſcera, the locomotion of the moveable abdominal contents, muſt influence the circulation in the vena portarum : and probably the abſence of theſe contributes, with their perpendicular poſition, to retard the blood's courſe in the hemorrhoidal veins, and thereby to occaſion varices. Yet the extent of this influence is exaggerated by Boerhaave, when he repreſents that the circulation cannot be carried on without it. In fact, the blood is ſtill tranſmitted to the liver, when the abdomen is laid open in a living animal ; but this circulation is ſenſibly weakened in a ſhort time, before the general is even languid.”

The abdominal ſyſtem of black blood is not iſolated in the fœtus ; it forms one with the two others, through the communication of the canalis venoſus : hence the fœtus has a ſingle vaſcular ſyſtem, while the infant which has breathed poſſeſſes three ſeparate ſyſtems, two of black and one of red blood. The mode, in which the two ſyſtems communicate in the liver of the fœtus, had been already deſcribed in the article EMBRYO. The abdominal vaſcular ſyſtem is leſs developed at this time, than in the ſequel ; yet the liver is much larger on account of the blood, which arrives at it from the placenta through the umbilical vein. The exceſs of ſize in the liver is the more ſtrongly marked, in proportion as the fœtus is younger ; and this predominance, according to Portal, continues till the ſeventh month. As the blood brought by the umbilical vein and that of the vena portarum are evidently mixed, at leaſt in great part, a queſtion ariſes whether they are of the ſame nature ; and on this ſubject we have no data to form a judgment. At the time of birth, the ſupply of blood from the umbilical vein is cut off, and the liver is the end of the abdominal black blood only. The canalis venoſus becomes cloſed in conſequence of its organic contractility. The differences produced in the hepatic circulation at the time of birth are ; 1ſt, that leſs blood, and that of one kind only, arrives at the liver : 2dly, that all communication between the abdominal and general ſyſtems of black blood is cut off : 3dly, that the proportional bulk of the liver is diminiſhed. Thus the latter organ experiences changes at this time, which are exactly the inverſe of thoſe that occur in the lung. During the age of youth, the abdominal ſyſtem, like the general, is not in a ſtate of great activity ; it is called into greater exertion towards the interval between the thirtieth and fortieth years. That is the age of gaſtric diſeaſes, of hemorrhoids, and of hypochondriac affections, which are cloſely connected with the ſtate of the liver. It is not dilated in old age, like the preceding ſyſtem ; nor does it ever exhibit bony depoſitions.

Of the Capillary Syſtems.—It muſt appear evident, from the preceding deſcription, that there are two of theſe, perfectly diſtinct from each other. One, generally diſperſed over the whole body, contained in all the viſcera and organs of every deſcription, is the ſeat of the change of the blood from red to black ; while, in the other, which is concentrated in the lungs, the blood is again converted from black to red. The circumſtances, which particularly deſerve our notice in the capillary ſyſtem, are, 1ſt, that the circulation in them is regulated by peculiar laws ; 2dly, that moſt of the important functions of the organic life, ſuch as ſecretion, nutrition, exhalation, &c. take place in them ; 3dly, that they are the ſeat of diſeaſes; and 4thly, that animal heat is produced in them.

The general capillary ſyſtem exiſts in all the organs of the body, which in fact are compoſed of a vaſt number of ſuch tubes, divided, united, &c. in a thouſand ways. The larger arteries and veins, lodged in the intervals of the component parts of organs, are foreign to their interior ſtructure, while the capillaries are an eſſential component part of the organ and belong to its tiſſue. In this point of view the body may be regarded as an aſſemblage of veſſels. Hence, the extent of the general capillary ſyſtem muſt be immenſe; it embraces all the ſmalleſt diviſions of our organs, ſo that we can ſcarcely conceive any organic molecules united without capillaries. It is not, therefore, merely ſomething intermediate between the arteries and veins; it gives origin to the exhalants, the excretory tubes, and the veſſels which convey the materials of nutrition. Other fluids beſides the blood circulate in it: many parts of the animal economy poſſeſs only colourleſs fluids. In the muſcular ſyſtem, in the ſpleen, in certain parts of the mucous ſyſtem, as the pituitary membrane, &c. the blood predominates ſo conſiderably in the capillaries, that they ſeem hardly to admit any thing elſe. Hence, arteries and veins are ſeen in great abundance, and the moſt minute injections diſcover no other veſſels. Moſt parts of the animal economy, ſuch as the bones, cellular ſubſtance, ſerous membranes, part of the fibrous ſyſtem, the ſkin, blood-veſſels, glands, &c. have in their capillaries both blood and other fluids.

Expoſe a ſerous membrane in a living animal; its tranſparence will enable you to obſerve, that the capillaries contain very little blood, and the white or greyiſh colour of the part ſeems obviouſly to depend on this circumſtance. After obſerving the quantity of blood contained in the part in its natural ſtate, irritate it by any kind of ſtimulant; it will then become covered by an infinite number of reddiſh ſtreaks, which convert its whiteneſs into the red colour of the mucous ſurfaces. Fine injections in the dead body will penetrate into the capillary ſyſtem of a ſerous membrane, as the peritoneum for example, ſo as to make it ſeem compoſed of an intertexture of veſſels, although very few contain blood in the living ſtate. All the organs juſt enumerated diſplay analogous phenomena: the ſkin, when well injected, is rendered intenſely red; and numerous veſſels are diſtended with blood in bluſhing, which were not before apparent. The progreſs of inflammation in the conjunctiva is another good example. Cellular ſubſtance, when irritated, and conſequently inflamed, in a living animal, or minutely injected, exhibits ſimilar appearances.

The proportions between the blood and the other fluids vary greatly; very little of the former is contained in ſerous membranes; more is ſeen in the ſkin, and a ſtill greater proportion in mucous membranes.

No blood is contained in the capillaries of the tendons, cartilages, hair, certain ligaments, &c. Theſe organs, diſſected in a living animal, do not pour forth a ſingle drop of blood: yet very fine injections will ſometimes ſhew that they contain capillary veſſels, which are alſo demonſtrated by inflammation.

The number of capillaries, as ſhewn by injections, ſeems to be very different in different organs. Bichat explains the difference by obſerving, that organs, in which injections exhibit but few of theſe veſſels, have the buſineſs of nutrition only carried on in them, as the bones, muſcles, cartilages, fibrous ſyſtem, &c.; while in parts, penetrated by greater abundance of fluids, other functions, ſuch as exhalation and ſecretion, are performed in addition to nutrition. The capillary ſyſtem, therefore, of organs is not in proportion to their maſſes; a ſlip of pleura contains more veſſels than a tendon of ten times the bulk.

It muſt be evident from theſe remarks, that fine injections, which are uſeful in ſhewing the capillary ſyſtem of an organ, cannot be depended on for teaching us where blood is contained, and where other fluids circulate. We can acquire this knowledge only by the obſervation of living animals, and by comparing what we ſee in them with the reſult of injections. The latter are alſo uſeful in learning the anatomy of the larger veſſels. In organs, which partly contain blood, and partly other fluids, the proportion of the former to the latter varies infinitely. Numerous cauſes, both in the healthy ſtate, and in that of diſeaſe, by attracting more or leſs fluids towards the organ, may fill its capillaries in various degrees. The whole exterior of the ſkin may exhibit phenomena analogous to that of bluſhing already mentioned. The ſerous and mucous membranes are found in very different ſtates, &c.; yet Bichat makes a diſtinction in this ſubject. An increaſed afflux of blood in the glands occurs only where abundant ſecretion depends on increaſed energy of the vital powers: when, on the contrary, it ariſes from deficient vital force, the gland does not contain a greater quantity of blood. The ſame remark applies alſo to the exhalations. Thus, in a feveriſh attack, more blood is ſent to the ſkin; but when ſweats ariſe from weakneſs, as in phthiſis, this accumulation of blood does not occur. He divides ſecretions and exhalations into active and paſſive; the former are preceded and accompanied by a manifeſt developement of the vital powers, and the latter by an oppoſite condition. Active ſecretions and exhalations are preceded by a more abundant afflux of blood to the part; while thoſe of the paſſive kind are performed in an oppoſite ſtate of the veſſels.

A perfectly free communication exiſts in all parts of the capillary ſyſtem. Obſerve a well injected ſerous membrane; its capillaries form a very minute net-work, in which no vaſcular thread is continued for more than two lines without communicating with the neighbouring ones. Hence the paſſage is conſtantly open, from the part which receives blood, to that which admits other fluids. Organs containing only colourleſs fluids, evidently communicate with thoſe neighbouring parts which admit blood. Hence we muſt regard the capillary ſyſtem as a general net-work, extended over the whole body, communicating throughout each organ, and alſo from one organ to another, ſo that there is a general anaſtomoſis or free communication of the fluids from the head to the feet; and it is in this ſenſe only, that we can form any rational notion of the general permeability of the frame. As the arteries, veins, exhalants, and excretories are all connected to the capillary ſyſtem, all theſe veſſels muſt communicate, ſo that a thin fluid, injected by the firſt, will paſs out at the two latter, and return by the veins after going through the capillaries. Thus an infinite number of paſſages are conſtantly open to the blood: of paſſages opening every where externally, and preſenting no mechanical obſtacles to the blood, which is retained within the limits of the circulation by the vital powers only. Fine injections will exude, in the dead ſubject, on the ſerous and mucous membranes, and even on the ſkin, on the urinary, pancreatic, biliary, ſalivary paſſages, &c.; and even coarſer fluids thrown into the arteries will often return by the veins.

Thus the capillary ſyſtem may be conceived to repreſent a kind of general reſervoir, at which the arteries arrive on one ſide, and from which depart, on the other, the nutritive exhalants in all organs, ſome other peculiar ones in certain parts, as thoſe which ſeparate the ſweat, lymph, fat, &c., and in others the ſecretory veſſels. The red blood enters on one ſide; the black blood, exhalations, ſecretions, &c., are ſent out on the oppoſite.

The general communications of the capillaries explain the colour of parts of the body produced by its poſition after death, and the diſappearance of redneſs from inflamed parts, in conſequence of the blood retained in them by the vital powers, being afterwards actuated merely by phyſical impulſes.

Under the circumſtances of ſuch free communication, as we have already pointed out, how does it happen that blood does not enter into the veſſels conveying other fluids, and *vice verſa?* that it does not paſs out through the exhalants and excretories? This ſeems to depend ſimply on the relation that ſubſiſts between the organic ſenſibility of each part of the capillary ſyſtem, and the fluid which it contains. Why do the lacteals ſelect a particular matter from what comes in contact with them? and why ſhould the ſkin abſorb certain ſubſtances, and reject others? All theſe phenomena depend on the general fact, that each part, each portion of an organ, each organized molecule, has its own mode of ſenſibility, which is in uniſon with one ſubſtance, and rejects all others. But as this may vary, the relation between any organ, and ſubſtances foreign to it, is liable to correſponding changes: thus a part of the capillary ſyſtem, which rejected the blood, admits that fluid when its ſenſibility has been exalted.

A ſeries of organized tubes is regulated by very different laws, from thoſe which govern an aſſemblage of inert pipes. In the latter, mechanical obſtacles only can prevent the communication of fluids. In the living economy, on the contrary, the peculiar vital powers of each canal form the obſtacle, by which the various fluids are limited. "Thus," ſays Bichat, "every organized veſſel is really active: it admits or rejects the fluids which enter according as it is able or not to ſupport their preſſure. Diſproportion of capacity is altogether foreign to this phenomenon; and the veſſel refuſes to admit the fluid merely becauſe it is heterogeneous to its ſenſibility. In this point the theory of Boerhaave was ſtrikingly defective. When this phyſician wrote, the vital powers had not been analized: phyſical forces were reſorted to for the explanation of vital phenomena, and we cannot be ſurpriſed at the weakneſs of his theories. In fact, explanations of living functions, borrowed from the phyſical forces, are as inadequate to their ſolution, as theories drawn from the laws of vital actions would be to the inveſtigation of phyſical phenomena. Would you not laugh at a perſon, who ſhould attempt to explain the motions of the planets, or of rivers, by irritability and ſenſibility? laugh then at thoſe who employ gravity, impulſe, &c., in developing the actions of the animal powers. The phyſical ſciences have made a remarkable progreſs only ſince the ſimple laws, which preſide over their innumerable phenomena, have been analized. In the ſame way, the explanations employed in phyſiology have reſted on a ſolid foundation only ſince the vital laws have been developed, and acknowledged as the ſource of the phenomena in all inſtances. How eaſily are the ſecretions, exhalations, abſorptions, inflammation, capillary circulation, &c., connected to the ſame principles, and derived from the ſame data, when they are all referred to their real cauſe, *viz.* the various modifications of ſenſibility in the organs which execute them. On the contrary, each preſented a new difficulty, when mechanical cauſes alone were adopted for their explanation.

"From what has been ſtated above it follows, that the innumerable variations, in the fluids of the capillary ſyſtem, are preceded and determined by changes of ſenſibility in the vaſcular parietes. Such alterations are not effected in the larger arterial and venous ramifications, where the fluids are in too large maſſes, and too powerfully impelled to be thus immediately influenced by the ſides of the veſſels.

"Although the organic arrangement be the ſame in the living and in the dead ſubject, the paſſage of fluids through the capillary ſyſtem is very different in the two caſes. Place a tube in the aorta of an animal, which we may kill by opening that veſſel, and immediately throw in any animal fluid; you will never find it fill the capillary ſyſtem, and exude through the exhalants, excretories, &c., as it will do when the ſubject has been ſome time dead. The inherent organic ſenſibility of the parts repels the injection, which can penetrate into the larger veſſels only. This experiment I have performed repeatedly without ever ſucceeding in filling the capillaries.

"Buniva has made comparative experiments on injections in living and dead animals with the ſame reſults."

The capillary veſſels are ſo ſmall, that we cannot pretend to poſſeſs any data concerning their ſtructure, founded on actual examination of the individual tubes. Very probably this ſtructure is differently modified in each organ, ſo as to partake of the diſtinctive characters of the part: probably too, the lining of theſe veſſels is of a ſimilar nature to that of the continuous arteries, veins, and exhalants. Moſt likely the various organizations of the capillaries eſſentially influence the differences obſerved in the vital properties, that is, in the organic ſenſibility and the organic inſenſible contractility of each ſyſtem: hence the particular modifications of the diſeaſes dependent on theſe properties, and particularly reſiding in the capillaries, ſuch as inflammations, tumours, hæmorrhage, &c. The diverſities of ſtructure in the capillary ſyſtem are ſometimes manifeſt to the eye: the differences which can be diſcerned in the arrangement of theſe veſſels are ſpecified partly in the article GLAND; to what we have there ſaid, we may add, that every organic ſyſtem in the body has its peculiar character in this reſpect.

The circulation in the capillaries exhibits, according to the arrangement of Bichat, two kinds of phenomena: *viz.* the motion of the fluids, and the changes which they undergo.

"The blood," ſays Bichat, "when it has arrived in the capillary ſyſtem, is manifeſtly out of the ſphere of the heart's influence, and its motion is continued only by the tonic powers or inſenſible contractility of the part. The veſſels which leave this ſyſtem exhibit motions which do not correſpond to thoſe of the arteries, and which cannot therefore be derived from the heart's action. This aſſertion has been already proved with reſpect to the veins; it is equally true of the excretories. The augmentation and diminution of the ſecretions do not coincide with thoſe of the pulſations of the heart; in violent febrile attacks the whole arterial ſyſtem ſeems violently agitated, yet the functions of the glans are obſtructed, and no fluids are formed. The ſweat is moſt copious after the violent ſymptoms of fever have ſubſided. When an unuſual abundance of ſerous fluids is poured out in various dropſies, the heart's action is weak. That the circulation of the veſſels ſubſervient to nutrition is not derived from the contraction of the heart is equally obvious. The latter force, uniform in the whole body, ſends the blood equally to all parts. Nutrition, on the contrary, is extremely irregular: at one age one organ receives a greater ſupply of nutritive matter, and therefore grows faſter: at another time this diſproportion is obſerved in a different part. Moreover, how can we accommodate to the ſingle and uniform impulſion of the heart in all parts, the different kinds of inflammation, of eruptions, &c. in various organs? Would inflammation exhibit ſuch varying external characters if the heart alone preſided over its developement? In this caſe all the diſtinctions of catarrhs, eryſipelas, phlegmon, &c. ſhould diſappear, and the only modifications ſhould be derived from the greater or leſs nearneſs of the heart. When, therefore, the blood has arrived at the capillary ſyſtem, it is moved merely by the tonic influence of the ſolids; and as various cauſes modify their properties, it muſt be ſubject to correſponding irregular motions. Hence ariſe the oſcillations noticed by Haller, Spallanzani and others, in their microſcopical obſervations of the circulation; but as theſe occur only in ſome parts at once, they do not affect the general regularity of the return of the venous blood. And this obſervation may be applied to all the diſordered actions of theſe veſſels. When they are more actively exerted in one ſyſtem, they are more quieſcent in the others, &c. Thus, as one part of the capillaries has its action increaſed at the expence of others, the quantity of blood tranſmitted from the arteries to the veins is always nearly the ſame. When we ſee the glands, and the ſerous, cutaneous and mucous exhalants all pouring out an increaſed quantity of fluid, we may be ſurpriſed that the circulation ſhould ſtill go on with preciſion; we ſhall not be leſs ſurpriſed to ſee all theſe evacuations ſuppreſſed. In all theſe caſes, the capillary ſyſtem, of which the vital forces are variouſly modified in the different organs, keeps up the general equilibrium, which would be inevitably loſt if the heart were the agent for expelling the exhaled and ſecreted fluids, and tranſmitting the black blood into the veins. Probably ſudden changes in the ſtate of the atmoſphere may produce general alterations in the capillaries, at leaſt of the ſurface. The ſwelling, which follows the application of a cupping-glaſs, ſhews that the capillary ſyſtem is influenced by atmoſpheric preſſure; and a leſs conſpicuous general effect may be produced by the variations in the general preſſure on the ſurface. Bleeding influences the quantity of blood contained in the capillary veſſels, but it muſt be that kind which is effected by the employment of leeches, cupping, &c. When an artery or vein is opened, we only diminiſh the quantity of blood in the large trunks; there is ſtill the ſame quantity contained in the capillaries of an inflamed part. On the contrary, the maſs of blood may be increaſed by transfuſion, without any local inflammation ariſing, becauſe a previous irritation is neceſſary to attract the blood towards the part.

The fluids, different from the blood, which are contained in the capillary ſyſtem, are alſo removed from the influence of the heart's action, moved by the tonic powers of the part, and conſequently ſubject to irregularities. The nature of moſt of theſe is unknown, becauſe they cannot be ſubmitted to obſervation.

A remarkable phenomenon is exhibited in the general capillary ſyſtem, in the change of the blood from the red to the black ſtate. For the account of the manner in which this change is ſuppoſed to be effected, ſee Respiration. To the ſame article we refer alſo the ſubject of animal heat, the developement of which belongs to the capillaries, although its explanation has been generally ſought in the chemical changes connected with reſpiration.

Of the pulmonary capillary Syſtem.—This includes all the minute ramifications which are the termination of the black, and commencement of the red blood, which conſequently form the end of the pulmonary artery, and the origin of the pulmonary veins. The capillaries, which intervene between the bronchial arteries and veins belong manifeſtly to the general ſyſtem. On the firſt view of the ſubject it will ſeem difficult to comprehend how the general and pulmonary capillary ſyſtems can exactly correſpond to each other; how the pulmonary can tranſmit, not only what paſſes through the general, but alſo all the lymph abſorbed from the ſerous and cellular ſyſtems, the chyle, &c. In fact, a great part of the general capillaries is filled with fluids different from blood, and a greater quantity ſeems to remain habitually in theſe than in the pulmonary veſſels. The whole contents do not paſs into the veins at each pulſation, but only ſuch a proportion as can circulate through the lungs. Moreover ſeveral cauſes are conſtantly drawing aſide the blood, in the general capillaries, from the direction which leads it into the veins; ſuch are the exhalations, ſecretions, and nutrition. In the lungs, on the contrary, it has one courſe only, from the pulmonary artery to the veins, and cannot be diſturbed by a tendency in any other direction, ſince it is employed in no functions in its paſſage from the black to the red ſtate.

The greater and leſs diſtance from the heart aſſiſt alſo in explaining this ſubject. The longer the courſe, through which the blood muſt paſs, the greater length of time will be occupied in its arriving at, and paſſing through, the capillaries; therefore, that which is expelled from the right ventricle will come ſooner to the left auricle than that from the left to the right auricle. Hence, although the velocity ſhould not be greater in the ſmaller circulation, the ſpace which it paſſes through is leſs, and the time is alſo leſs; therefore, the exceſs of the fluid contained in the diviſions of the aorta, in the general capillaries and veins, over that contained in the artery, veins, and capillaries of the lungs, is compenſated by the greater time employed in the paſſage of the former. Hence we may underſtand why, in theſe animals, where the lungs, as far as regards the circulation, are in oppoſition to the whole of the body, nature has placed thoſe organs near the heart.

The circulation in the pulmonary capillaries goes on in the ſame way as in thoſe of the general ſyſtem. Here the blood undergoes the remarkable change by which it is converted from the black to the red ſtate. On this ſubject, as well as for ſome other remarks concerning the lungs, we refer to Lung and Respiration.

Of the exhalant Syſtem.—Exhalation and ſecretion are two analogous functions, inaſmuch as both ſeparate from the blood fluids different from it; but there are differences between them. In the article Gland the ſubject of ſecretion is conſidered in a general point of view, and many of the remarks are applicable to exhalation as well as ſecretion. We ſhall particularly ſhew the diſtinctions of the two proceſſes on this occaſion.

In exhalation there is no intermediate organ between the arteries and the exhalants, which are ſeparated merely by a capillary net-work; while, on the contrary, an organ always intervenes between the arteries and the excretory canals: in this are found the capillaries where the former end and the latter begin. Thus it appears that the glands are much more complicated in their ſtructure than the exhalant organs; conſequently, the fluids furniſhed by the former, ſuch as bile, urine, ſaliva, &c. differ eſſentially from the blood, and are moreover very compound in their nature, while the products of exhalation, as the ſeroſity of circumſcribed cavities, &c. reſemble conſiderably ſome parts of the blood, and are compoſed of few elements. The exhaled fluids are poured out from an infinite number of ſmall iſolated tubes, while the ſecretions are collected into one or more principal ducts, which diſcharge them on the ſurface for which they are deſigned. The former return into the circulation in great meaſure, while the latter ſeem eſſentially deſtined to be expelled from the body. Exhalations are performed on an abundance of ſurfaces, as the ſerous, mucous, ſynovial, cutaneous,

taneous, cellular, and indeed in all organs for the purpoſe of nutrition; the ſecretions are poured out only on mucous and cutaneous ſurfaces. Hence, both in ſecretion and exhalation, the capillary ſyſtem is interpoſed between the veſſel that brings, and that which carries away; but in the latter caſe there are capillaries only, while in the former there is an additional organ. In ſhort, glands are neceſſary to ſecretion, and exhalation is performed without them.

Phyſiologiſts have entertained very different notions on the ſubject of exhalation. Boerhaave imagined ſucceſſively decreaſing veſſels capable of admitting colourleſs fluids, but excluding the red globules. Theſe have been commonly rejected by more recent anatomiſts, who have referred exhalation to the tranſudation of fluids through inorganic pores, building their opinions chiefly on the tranſudations which are commonly obſerved in the dead ſubject; but the latter is not a phenomenon of life, while exhalation is manifeſtly influenced by the vital powers.

It muſt be difficult to form any clear notion of veſſels, which, from their extreme tenuity, conſtantly elude our obſervation in their natural ſtate; and our opinions therefore cannot be founded on any direct examination. Injections and inflammation prove the exiſtence of a capillary ſyſtem in thoſe parts from which fluids are exhaled, as the ſerous and cutaneous ſurfaces, &c. If the injected fluid be not puſhed far it is confined to the capillaries; but when it paſſes beyond this point it is depoſited, in minute drops, on the exhaling ſurface, in a ſimilar manner to what happens from the living powers of the part during life. That this is not tranſudation, is proved by the circumſtance of its not occurring in the neighbouring tiſſues. Nothing receives the injected fluid except the arteries, capillaries, and exhalants. In active hæmorrhages from theſe ſurfaces, the capillaries, which give origin to the exhalants pouring out the blood, are evidently more full of blood than is uſual. We may therefore aſſume, as proved, the following points, *viz.* that exhaling veſſels exiſt, that they ariſe in the capillaries and terminate by open orifices on their reſpective ſurfaces. If we go further, and attempt to explain their length, form, courſe, and the nature of their orifices, our deſcriptions will become purely imaginary.

Bichat divides the exhalants into three claſſes. The firſt includes thoſe which ſeparate fluids to be thrown out of the economy, ſuch as thoſe of the ſkin, forming the ſweat; thoſe of the various mucous ſurfaces. To the ſecond diviſion belong thoſe, which form fluids remaining for ſome time on certain ſurfaces, or in various cells, afterwards taken up by the abſorbents and conveyed back again into the circulation. Such are the exhalants of ſerous ſurfaces, which pour out fluids in order to lubricate the membranes and facilitate the motions of the organs covered by them; the cellular exhalants, which form the lymph and fat of the cellular interſtices; the medullary exhalants of the bones; and the ſynovial exhalants of the articular membranes, and of the burſæ mucoſæ. Under the third claſs are arranged thoſe veſſels which convey in all organs the nutritive matter; this is depoſited to repair the loſſes or produce the growth of the part, and is again removed by the abſorbents, to be replaced by new depoſitions. This claſſification is exhibited in the following table.

Exhalants.	1. Exterior, opening on	1ſt, The ſkin,	
		2dly, Mucous ſurfaces,	
	2. Interior, opening on	1. Serous ſurfaces.	
		2. The cellular ſyſtem, where they depoſit.	1. Serous fluid.
			2. Fat.
		3. Medullary ſyſtem.	1. Of the ſhort and flat bones, and ends of the long bones.
			2. Of the middle of the long bones.
		4. Synovial ſyſtem.	1. Of the articulations.
			2. Of the tendons.
	3. Nutritive.	Each organized tiſſue has its peculiar exhalants.	

As the exhaling veſſels enter ſo eſſentially into the intimate component ſubſtance of each organ, they muſt differ in each organized tiſſue, but theſe differences do not come under our obſervation.

Properties of the Syſtem, &c.—The veſſels are too fine to admit of our analyſing thoſe properties which depend on their organization. We do not even know whether theſe tubes are enlarged when they admit the red globules, although the fact has been aſſumed by the Boerhaavian ſchool. The expreſſions "groſs" and "ſubtle" fluids are ſtill employed by a multitude of phyſiologiſts, having been introduced by the theory of Boerhaave, and retaining their ground, although that theory has been laid aſide. The exhalants manifeſtly poſſeſs none of the properties of the animal life: they exhibit in a very high degree organic ſenſibility, and the correſponding organic inſenſible contractility, and all their functions are founded in theſe. Yet although the organic ſenſibility be the ſame in its nature in all parts, where exhalants are found, it is ſingularly modified in each ſyſtem: as theſe veſſels are a part of the organic elements, they partake of the properties of each ſyſtem. Hence they ſeparate in every part the peculiar fluids of that part: when much water is contained in the blood, it is diſpoſed of by the cutaneous exhalants; thoſe of ſerous ſurfaces never ſeparate fat, nor the medullary ſerous fluids, although the maſs of blood entering the capillaries is the ſame every where, &c. &c. Thus, too, certain exhalants have a greater tendency than others to admit the blood, and pour it out on their reſpective ſurfaces; as for example, thoſe of the mucous membranes; and ſome of theſe are more diſpoſed to ſuch kind of hæmorrhage than others.

Reſpecting the mode in which exhalation occurs, and the principle on which it depends, we refer the reader to the article GLAND; as there is hitherto no means of diſtinguiſhing between this proceſs and that of ſecretion; in truth we are equally ignorant of the exact nature of the proceſs in both caſes.

When the vital properties of the exhaling veſſels are modified by diſeaſe, they pour out various matters different in their nature and properties from the natural fluids. One of the moſt frequent is blood, and hence ariſes a claſs of hæmorrhages very different from thoſe which ariſe from the rupture of veſſels. The exhalants of the mucous ſurfaces are more particularly diſpoſed to this affection, ſo that it is characteriſtic of that organization. In all ſuch bleedings the membrane is entire, and offers not the ſlighteſt trace of ulceration or eroſion. Menſtruation is a caſe of the ſame kind, in which the blood is tranſmitted through the exhaling veſſels without any rupture or exhalation. Various other fluids paſs through the exhalants, and hence the differences in the produce of the exhaling organs. How greatly does the cutaneous exhalation differ at different times, and what various fluids are found in the peritoneum under circumſtances of diſeaſe. For a further account of this ſubject, which belongs to pathology rather than to phyſiology, we refer to Bichat's Anatomie Generale.

Exhalants are ſometimes accidentally developed, of which the formation of cyſts furniſhes a remarkable example. The internal ſurface of theſe, which is generally ſmooth, pours out different kinds of fluid, according to the particular ſenſibility of the part. This circumſtance forms another ſtriking diſtinction between the exhaled and ſecreted fluids. The latter are never accidentally depoſited in cyſts; we never meet with preternatural collections of urine, ſaliva, ſemen, &c.; while it is not uncommon to find depoſitions of ſerous fluid, as in encyſted dropſies, of fat, as in ſteatomatous and other tumours, of ſynovia, as in ganglia. It would be neceſſary to the production of ſecreted fluids, that glands ſhould be accidentally developed in the body; but their ſtructure is too complicated, and ſuppoſes the exiſtence of too many conditions for us to expect ſuch a phenomenon. On the contrary, the ſimple organization of exhaling ſurfaces, which preſent merely veſſels continuous with the arteries, and no intermediate organs, can be much more readily produced in parts, to which they are naturally extraneous.

Deſcription of the Heart.—This organ, in which the impelling power of the two vaſcular ſyſtems reſides, is placed in the cavity of the cheſt, between the two lungs. Its figure is conical; it is attached at the baſis to the large blood-veſſels, which confine it to a certain ſituation, and is perfectly looſe and unconnected in the reſt of its ſurface. It is contained in a cavity lined by a ſerous membrane called the *pericardium*; which is alſo reflected over its ſurface.

The pericardium lies in the cheſt behind the 5th, 4th, 3d, and 2d, ribs of the left ſide, and between the two pleuræ, which cover it laterally, and adhere to it by means of a looſe cellular ſubſtance. On the front, a very ſmall portion, or even none of its ſurface, is connected by a little cellular membrane to the middle bone of the ſternum. The baſis, which is round, broader towards the right, and narrower on the left, correſponds to the flat ſurface of the heart, and adheres to the middle tendon of the diaphragm, ſlightly in young ſubjects, but ſo firmly in adults that they can hardly be ſeparated. Moreover it is connected to the muſcular part of that muſcle about the cartilage of the 5th or 6th rib.

The bag which it forms is larger than the heart, ſo that this organ can move freely in it. On account of the greater ſize of the thymus in the fœtus, a ſmaller portion of the pericardium is covered by the pleura than in the adult. It ſurrounds the aorta, pulmonary artery, and veins, as we ſhall deſcribe, is reflected over the ſurface of the whole heart, ſo as to form a membranous bag every where cloſed. This bag is lodged in the lower and anterior part of the mediaſtinum. Its ſize is proportionate to that of the heart, and the large blood-veſſels which it contains; and if it appears larger in the dead body than is neceſſary for holding the heart, this is accounted for by the empty ſtate of the cavities of that organ. Its figure is that of a cone, of which the apex is very round, and of which the baſis, correſponding to that of the heart, has a particular elongation ſurrounding the large veſſels. The front region of this bag is covered by the pleura, except at its middle, where the two laminæ of the mediaſtinum are approaching towards each other. It correſponds to the back of the ſternum, and to the cartilages of the laſt true ribs of the left ſide, from which it is ſeparated laterally by the front of the lungs. The poſterior region, which is the ſmalleſt in extent, correſponds immediately to the front of the œſophagus. The lateral regions are covered by the pleuræ, and by the nerves of the diaphragm; and correſpond to the internal ſurface of the lungs. The inferior region correſponds, as we have ſtated already, to the upper ſurface of the diaphragm. In the adult the adheſion between the muſcle and the membrane is ſo ſtrong that the parts cannot be ſeparated without injury; yet Boyer particularly inſiſts that there is no continuation of aponeurotic fibres from the diaphragm to the pericardium, and that the connection is merely of a cellular nature. Traité complet d'Anatomie, tom. iv. p. 274.

Towards the upper and anterior part of the heart, the pericardium is gradually contracted, and forms an obtuſe proceſs, which adheres to the membranes of the large blood-veſſels at the upper part of the ſternum. It is connected to the inferior branch of the right ſuperior pulmonary vein, then to the ſuperior cava, and to the aorta; it then deſcends to the ductus arterioſus, to the left branch of the pulmonary artery, and each branch of the left pulmonary vein. Behind it is attached to both of the right pulmonary veins, to the left auricle, to both the left pulmonary veins, to the inferior cava, to the ſeptum of the auricles, to the right branch of the pulmonary artery, and to the aorta under the origin of its great branches; it embraces the latter veſſel and the contiguous pulmonary artery in the form of a cylindrical ſheath. But three-fourths only of the aorta are ſurrounded, becauſe the remainder, looking towards the pulmonary artery, adheres to that veſſel by means of cellular ſubſtance. It ſurrounds the ſuperior cava in the form of a ring, ſo that the anterior and poſterior portions of the pericardial cavity communicate together between this vein and the aorta. A ſimilar ring ſurrounds the inferior cava. Hence there are from ſix to eight perforations in the membrane; 1, for the ſuperior cava; 2, for the inferior cava; 3, for the left pulmonary artery; 4, for the right pulmonary artery; 5, 6, 7, 8, one or two for the pulmonary veins on each ſide. Yet we ſhould form an erroneous notion of the ſubject, if we ſuppoſed the membrane to be actually penetrated by theſe openings; it is merely folded backwards, or reflected to cover the large veſſels, the auricles and ventricles of the heart. The folds formed at its reflections cover theſe organs by a kind of ſheaths, and there is no opening in the membrane at any part. According to this repreſentation, if the thin production of the membrane could be removed from the large veſſels and the heart, we ſhould have a complete membranous bag, and the parts juſt named would be clearly ſeen to be on its outſide. The membrane, being reflected over theſe veſſels, and deſcending to the heart, gives them an exterior covering near that organ. When it is inflated, the angles of reflection become more evident, and form two anterior and two poſterior cornua. Deſcending from theſe parts, the pericardium becomes much thinner and more delicate, and is firmly fixed by cellular ſubſtance to the whole external ſurface of the heart, ſo as to give it a ſmooth covering. Fat is collected between this membrane and the heart, about the courſe of the coronary veſſels, more plentifully round the large trunks, and more ſparingly about the ſmaller branches, except in very lean ſubjects.

The pericardium is a white, denſe, and very firm membrane,

brane; rough on the outſide from its connection by cellular ſubſtance to the ſurrounding parts; and perfectly poliſhed internally, where it is moiſtened by a ſerous ſecretion. Its ſtrength is ſo conſiderable, that although it is very much thinner than the aorta, it will bear a heavier weight after death, without being torn.

Bichat deſcribes the pericardium as being compoſed of two membranes, a fibrous and a ſerous one. The former ariſes circularly from the middle of the aponeurotic centre of the diaphragm, with which it is perfectly identified, aſcends round the heart, which it embraces as far as the baſis, is continued for ſome length over the origin of the large veſſels, which it conceals, but is ſoon divided into ſeveral diſtinct ſheaths, in order to accompany theſe veſſels to a certain diſtance. It is confounded with the external coverings of the veſſels, and thus ends indiſtinctly. Its organization bears the moſt perfect analogy to that of the dura mater, but is rather thinner. It is formed of whitiſh and irregularly diſpoſed fibres, croſſing in various directions, ſometimes iſolated, and ſometimes collected into large faſciculi. Theſe are continued below with the aponeurotic fibres of the diaphragm; and they ſeparate to be prolonged over the veſſels above. The ſerous membrane lines the former, and is prolonged over the heart. It is ſo intimately connected to the fibrous, that the two may be ſaid to be conſolidated, and cannot even be ſeparated, except at the very ſmall ſpaces where the ſerous is reflected. The latter adheres by a looſe cellular ſubſtance to the veſſels, but more cloſely to the heart. The internal ſurface of this, every where in contact with itſelf, ſecretes the ſerous fluid of the pericardium. On the whole the pericardium belongs to Bichat's claſs of fibro-ſerous membranes. He compares the two portions of which it conſiſts, in their relation to the heart, to the dura mater and arachnoid coat in the head. Anatomie deſcriptive, tome iv.

The arteries of the pericardium are ſmall twigs derived from the internal mammary, phrenic, coronary, &c.; and the veins join the correſponding trunks. The abſorbents enter the glands, which lie near the aorta and ſuperior cava. It receives no nerves.

The pericardium poſſeſſes the extenſibility and contractility, derived from organization. Hence it is accommodated to the varying ſize of the heart; and hence it yields even if the heart ſhould be diſtended much more than uſual. Its extenſion in hydrops pericardii proves alſo its extenſibility. Beſides the organic ſenſibility required for the purpoſes of its nutrition, it poſſeſſes a ſtill higher degree which regulates the depoſition of fluid from its exhalant arteries. Theſe depoſit a moiſture, which lubricates the oppoſed ſurfaces of the heart, and its containing bag, and facilitates their motions, which is conſtantly removed by the abſorbents during life, but is collected after death, when abſorption has ceaſed into a few drops of a clear yellowiſh fluid. At a longer time after death this *liquor pericardii* is conſiderably increaſed in quantity, by the tranſudation of the ſerum ſeparated from the blood contained in the cavities of the heart. In many ſubjects it exiſts in great abundance, having been depoſited ſo copiouſly in conſequence of diſeaſe during life; and in this caſe its properties are often altered.

In Nicholſon's Journal, vol. 14, a chemical analyſis of this fluid is given by Dr. Boſtock. He obtained it from the pericardium of a boy who died ſuddenly. It reſembled the ſerum of the blood in colour and appearance, and left a reſidue of $\frac{1}{13}$, when evaporated to dryneſs. The heat of boiling water made it opaque and thready. Oxymuriate of mercury produced copious precipitation; but when the fluid had been boiled, evaporated to dryneſs, and re-diſſolved, the ſolution was not affected by the oxymuriate of mercury. Theſe experiments ſhew that it contained albumen. When it was ſaturated with oxymuriate of mercury, infuſion of galls produced no effect, indicating the abſence of gelatine. Neutral acetate of lead produced a copious precipitate, even after the fluid had been boiled to dryneſs, and re-diſſolved in water. Nitrate of ſilver indicated the preſence of muriatic acid. According to theſe experiments 100 parts contain,

Of Water	92.0
— Albumen	5.5
— Mucus	2.0
— Muriate of ſoda	0.5.

Phyſiologiſts generally repreſent the uſe of the pericardium, to be that of confining the heart in its ſituation, ſecluding it from the ſurrounding parts, and facilitating its motions by its lubricating exhalation. Dr. Baillie met with an inſtance in which this covering did not exiſt; the pleuræ covered the heart, and there was no reaſon to ſuppoſe that any imperfection in the functions of the organ had exiſted during life. Examples are not uncommon, of complete adheſion between the bag of the pericardium, and the reflected portion of the membrane, without any remarkable influence on the heart's action.

Haller particularly inſiſts on the effects of the pericardium, in beſtowing ſteadineſs and preciſion on the heart's motions. "We can eaſily ſee in a living animal, what confuſion takes place in the motions of the heart, as ſoon as it has loſt the ſupport of the pericardium. So long as the membrane is entire, the heart is moved equably, each contraction is ſimilar to the preceding ones, and the motions are all executed within the ſame limits. If the pericardium be divided and removed, every thing is immediately diſturbed; the heart in its motions wanders out of its accuſtomed track, and does not execute two pulſations alike." Elem. Phyſiol. tom. i. p. 291.

The heart, which is the central organ of the circulating ſyſtems, is a hollow muſcle, the contractions of which propel the blood into all the arteries of the body. It is ſituated in the ſeparation of the two laminæ of the mediaſtinum, and encloſed, together with a certain portion of the trunks of the large blood-veſſels connected with it, in the pericardium.

The heart lies behind the ſternum, and the cartilages of the laſt true ribs on the left ſide; in front of the œſophagus, of the deſcending aorta, and of the vertebral column, above the diaphragm; below the aorta and pulmonary artery; and between the two lungs which encloſe it nearly on every ſide. It is fixed in its ſituation by the pericardium, and by the large blood-veſſels, over which this membrane is reflected.

Yet its ſituation undergoes certain changes: reſting on the aponeurotic portion of the diaphragm, which is its point of ſupport, the heart follows the motions of this muſcle. It deſcends and paſſes ſlightly backwards in inſpiration, aſcends and comes a little forwards again at the moment of expiration. Obeying the force of gravity, it paſſes backwards, and falls, if we may uſe the expreſſion, againſt the aorta, when we lie horizontally on the back; in the oppoſite or prone poſition of the trunk, it comes towards the ſternum. When we reſt on the right ſide, the heart inclines towards the right ribs and lung, and liberates the left lung, and *vice verſa*. That theſe changes do actually take place, may be eaſily proved by placing the hand on the left ſide of the ſternum, when the beating of the heart can be felt, inſpiring deeply and then expiring, or changing the attitude of the trunk ſo as to place it in the various poſtures juſt mentioned. The beating is increaſed, diminiſhed, or apparently ceaſes altogether, according to theſe alterations. Yet we muſt obſerve, that the changes produced in the ſituation of the heart by its weight only, are very limited, and that when its pulſations are ſenſible in a very conſiderable extent, or in a different ſituation from what we have deſcribed, the cauſe muſt be ſome diſeaſed affection. A diſtended ſtate of the ſtomach may urge the point of the heart upwards; and the whole organ may aſcend, when the gravid uterus or any other cauſe of diſtenſion affecting the whole abdomen, acts on the diaphragm in that direction. When the fluid of aſcites is ſuddenly withdrawn, it deſcends again, makes different angles with the large veſſels, and carries the aorta down with it.

Inſtances have occurred, but rarely, in which the ſituation of the heart has been inverted; ſo that its point extended to the ribs of the right ſide, and its baſis was towards the left; at the ſame time a ſimilar unnatural poſition has been obſerved in all the large veſſels, and the abdominal viſcera. This unuſual formation does not affect the functions of the organs, which are in every reſpect as perfect as in the more common arrangement.

The volume of the heart, in ſubjects of the ſame age, preſents ſuch numerous varieties, that it cannot be determined with any exactneſs. Soemmerring ſays, that it weighs, together with the pericardium, from 10 to 20 ounces. It is generally larger in proportion to the body, as the ſubject is younger.

The figure of the heart is ſomewhat conical, or it reſembles rather the ſection of a cone, divided by a perpendicular plane carried through it from the baſis to the apex. The point is rounded, and two muſcular and membranous bags of very irregular figures, and in contact with each other, are placed at its baſis. This cone lies obliquely on the diaphragm, with its baſe turned backwards, upwards, and towards the right; and its apex pointing downwards, forwards, and to the left. We diſtinguiſh in this organ a ſuperior and inferior ſurface, a right and left margin, a baſis and an apex.

The ſuperior ſurface (facies major or gibba) is gently convex. That portion of it which belongs to the right ventricle is much broader than that belonging to the left, and the two are ſeparated by a ſuperficial longitudinal groove, continued from the baſis to the apex, and lodging a branch of the left coronary artery. This groove correſponds to the ſuperior margin of the ſeptum ventriculorum. The inferior ſurface (facies minor or plana) is flat and horizontal, and reſts on that part of the pericardium which is attached to the diaphragm. Here the left ventricle occupies a larger ſpace than the right, and is not ſo flat; the two are ſeparated by a groove continued from the baſis to the apex, where it is continuous with that of the ſuperior ſurface. This groove contains the right coronary artery, and a large vein.

The right edge, rather longer than the left, is very ſharp, and inclined forwards and downwards; the left margin is very thick, and turned a little backwards.

The baſis of the heart, turned backwards, upwards, and to the right, adheres to the pericardium by means of the arteries which ariſe from, and of the veins which terminate in this viſcus. The apex, turned forwards, downwards, and to the left, is obtuſe, particularly in the fœtus, of which the two ventricles are nearly equal, while in the adult the left is longer than the right. This apex is almoſt always bifid from the meeting of the grooves of the upper and lower ſurfaces. Of the two parts, into which the point is divided, the anterior, belonging to the right ventricle, is thinner and ſhorter than the poſterior, which is formed by the left. In order to ſee theſe diſtinctly it is neceſſary to remove the fat.

The heart contains four cavities, which are named the ventricles and the auricles. The former conſtitute the largeſt portion of the organ, and ſeem properly to make up the heart; while the auricles are mere appendages placed at the baſis. There is an auricle and a ventricle on each ſide of the heart; and they are diſtinguiſhed by the epithets right and left. But as the heart is placed obliquely, the right ventricle and auricle are turned towards the front of the cheſt, while the left cavities are directed backwards: hence the epithets anterior and poſterior expreſs the ſituation of theſe organs more correctly than right and left. In the early ages of anatomy, when there were no opportunities of examining human bodies, the carcaſes of brutes were employed for the purpoſes of anatomical inveſtigation; in them the poſition of the heart is ſtraight inſtead of oblique, ſo that the two ſides are right and left in their poſition. Theſe names have been transferred to human anatomy, and are now ſo firmly eſtabliſhed in general uſe, that the more correct ones of anterior and poſterior will probably not ſuperſede them.

The auricles communicate with the ventricles by openings, of which the ſize, form, and ſtructure will be deſcribed hereafter. They receive the blood returned from the various parts of the body by the veins: the ventricles expel it again through the arteries. The right auricle (ſinus dexter or anterior, auris or auricula dextra, atrium cordis dextrum, ſinus venarum cavarum) correſponds to the two venæ cavæ and the coronary vein of the heart: the left (ſinus ſiniſter or poſterior, auris or auricula ſiniſtra, atrium ſiniſtrum, ſinus venarum pulmonalium) to the four pulmonary veins. The right ventricle (ventriculus dexter, or anterior or pulmonalis) gives origin to the pulmonary artery; and the left (ventriculus ſiniſter, poſterior, or aorticus) to the aorta. Both the auricles and the ventricles are ſo cloſely connected together, as to form, on external appearance, a ſingle organ: but they are divided on the inſide by a complete partition. The right auricle and ventricle form the right half, or ſide of the heart (cor dextrum); and the other cavities the left ſide (cor ſiniſtrum).

Each auricle and ventricle poſſeſſes two kinds of openings; by thoſe of one deſcription the auricles receive the blood from the veins, and theſe are more than one in each cavity; by the others they tranſmit this blood into the ventricles. In like manner, each ventricle has an opening, through which blood arrives in its cavity, and another, by which it propels this blood into its correſponding artery: the apertures in the auricles then are venous and ventricular; thoſe in the venticles, auricular and arterial.

The ſtructure of the auricles and ventricles is very different; and this is eaſily explained by a comparative view of their functions. The former cavities propel their blood into the latter through the openings of communication;—conſequently through a very ſhort courſe, which can be accompliſhed by the ſlighteſt impelling power. Hence, theſe cavities are furniſhed with a very ſmall proportion of muſcular fibres, and look almoſt like membranous bags. By the ventricles the blood is to be urged through the arterial ſyſtem which includes, from its origin to its termination, a paſſage of conſiderable length. They are rendered capable of this more powerful exertion by conſiderable muſcular ſtrength, and poſſeſs ſo much larger a quantity of muſcular fibres as to be entirely unlike the auricles. The two ventricles themſelves are very diſſimilar in their thickneſs and ſtrength; the right, which ſends the blood only through the lungs, being much weaker than the left, which has to propel it to the moſt diſtant parts of the body.

The right auricle is placed at the baſis of the correſponding ventricle, and in cloſe appoſition to the left auricle from which it is ſeparated by a thin ſeptum. It is broader and larger than the left; but this inequality, which is ſufficiently obvious in the adult, is ſcarcely perceptible in the fœtus and newly-born child. It is oblong from above downwards, and when diſtended nearly reſembles in figure the fourth part of an oval. We deſcribe in it an external and an internal ſide, an anterior ſide, a ſuperior and an inferior extremity. The external ſide, convex and ſmooth, is contiguous to the pericardium; the internal is confounded with the left auricle, and the anterior is united to the baſis of the right ventricle. The upper extremity receives behind the ſuperior vena cava, which has a courſe of ſome length within the pericardium, and deſcends rather obliquely from right to left, and from behind forwards. On the front this extremity preſents a narrow prolongation, or appendix, of a flattened form, terminating in a point, and having very irregular jagged edges; it is placed nearly tranſverſely between the aorta and the right ventricle. A compariſon of this looſe proceſs to a dog's ear gave uſe to the appellation of auricula, which was firſt given to this part only, but has ſince been extended to the whole cavity. By Latin writers the auricula is ſtill often diſtinguiſhed from the ſinus of the venæ cavæ. The inferior extremity receives the inferior vena cava at its lower and inner part: this vein is much larger than the ſuperior, and does not continue for any length within the pericardium, as it opens into the auricle immediately after penetrating the diaphragm. Its direction is rather oblique from right to left, and from before backwards.

On the interior of the auricle, the external ſide preſents a great number of projections, formed by muſcular faſciculi, which are ſeparated from each other by intervals of various length and breadth. They are for the moſt part parallel, ſo as to have been compared to the teeth of a comb, and hence named muſculi pectinati: they are directed from behind forwards, and communicate together by other ſmaller faſciculi diſpoſed obliquely in their intervals. The internal ſide is formed by the ſeptum, which divides the two auricles. In the adult it preſents, below its middle, a depreſſion which is named foſſa ovalis, although its outline is very nearly circular: here the auricular ſeptum is very thin, being compoſed of the internal lining only. This depreſſion is deepeſt above, but its depth gradually diminiſhes downwards, and it is completely loſt below, where the ſurface is continuous with the inferior vena cava. Towards its upper part, an opening of various ſizes, by which the two auricles communicate, is frequently ſeen; but this is not conſtant. We have ſpoken further on this ſubject in the account of the developement of the circulating ſyſtem of red blood. The ſurface of the foſſa ovalis is ſometimes ſmooth, ſometimes irregular, and, as it were, reticulated. The foſſa ovalis is circumſcribed by a projecting muſcular arch, (annulus ovalis, iſthmus Vieuſſenii,) tolerably thick at its upper and middle part, but ſo much diminiſhed towards its extremities, or cornua, that it is entirely effaced. Theſe extremities, which are turned downwards, and ſeparated by a ſmall interval, are diſtinguiſhed by the names anterior and poſterior: the former is turned towards the right, is the thickeſt, and ſeparates the foſſa ovalis from the orifice of the coronary veins; the latter is much leſs prominent.

The anterior ſide of the auricle preſents a large opening, which communicates with the ventricle, and is circular when the heart is diſtended, elliptical when it is collapſed. Its edge is formed by a firm and whitiſh zone (tendo cordis venoſus), which has been regarded as one of the tendons of the heart, but on accurate examination does not ſeem to contain any tendinous or muſcular fibres. In their deſcriptions of this part anatomiſts have varied greatly. Some place a tendon here, and derive the muſcular fibres of the ventricle from it; others deſcribe circular muſcular fibres compoſing a ſphincter. Senac admits a tendinous ſtructure particularly in old ſubjects; while Morgagni could hardly diſcern any thing of that kind even in the bullock. Haller, deſcribing it, ſays, "firma, pene calloſa, ſubcærulea celluloſa ſtria nudam auris membranam cum nuda ventriculi membrana conjungit:" and adds in another place "ego vero lineam reperi, nullum veſtigium muſculi tendiniſve hic reperio."

On the front the ſuperior extremity preſents the entrance of the auricular appendix deſcribed above: behind is the opening of the ſuperior vena cava. Muſcular projecting columns of unequal ſizes, curved, firmly attached to the ſides of the auricle, and variouſly interwoven form the internal ſurface of the appendix. The opening of the ſuperior cava is placed perpendicularly over the inferior; and the interval between the two is occupied externally by a thick muſcular faſciculus, which has no connection to the fibres of the veins. The ſides of the auricle project internally between the two veins in the ſituation of the faſciculus, but not to any conſiderable extent: this is the part deſcribed by the name of tuberculum Loweri, which, according to the account given by that anatomiſt, cannot be diſcovered in the heart.

The inferior extremity of the right auricle preſents the orifice of the inferior vena cava, and that of the great coronary vein. On its anterior and left part the former vein is furniſhed with a ſmall membranous fold, named valvula Euſtachii, or nobilis, of which the ſize varies in different ſubjects, but is never ſufficient to cover the whole of the opening. It is generally larger in the fœtus than in the adult; after birth it not only diminiſhes in ſize, relatively to the other parts, but often becomes reticulated at its looſe edge, whence it has been deſcribed by the name of valvula reticularis: The fold is ſo inconſiderable in ſome ſubjects, that it may be ſaid to be entirely deficient. Its poſition is nearly vertical, and its figure is that of a creſcent. We diſtinguiſh in it two ſurfaces, two edges, and two extremities, or cornua. One of its ſurfaces is turned backwards, and to the right, and correſponds to the orifice of the vena cava; the other, facing forwards, and to the left, correſponds to the ſides of the cavity. One edge is adherent, and the other looſe: the firſt, placed downwards, and rather forwards, is attached to the anterior and left part of the opening of the inferior vena cava; the latter, directed upwards and backwards, is extremely thin, and more or leſs concave. One extremity is turned towards the left, and a little backwards and upwards; the other to the right forwards, and a little downwards. The former is atached to the middle and upper part of the anterior column of the anulus ovalis, the latter to the front of the opening of the inferior cava. The Euſtachian valve is formed by a fold of the membranes, which lines the right auricle; but in many ſubjects its looſe edge forms a kind of net-work. The office of this valve ſeems to be connected with the fœtal circulation, as the ſize of the fold is ſo much more conſiderable at that time.

The mouth of the great coronary vein is placed between that of the inferior cava, and the aperture of communication with the ventricle, and near to the ſeptum of the auricles. It is furniſhed with a ſufficiently large valve to cover it entirely. The form of this valve is like a creſcent, with the convex edge attached, and the concave margin looſe; the latter is frequently reticulated. It ſerves to prevent the reflux of the blood from the auricle into the coronary vein. Beſides this there are ſeveral other openings from ſmaller veins, unprovided with valves, into the right auricle.

The left auricle, rather ſmaller than the right, has nearly the figure of a cube, and offers ſix ſides to our conſideration. The anterior is connected to the baſis of the left ventricle: the internal is confounded with the oppoſite auricle: the poſterior, ſuperior, and external are ſmooth and contiguous to the pericardium. From the upper part of the inner ſide an auricular appendix is continued, as in the right auricle; it is ſmaller than on the right ſide, turns forwards, and a little to the right, on the left ventricle, where it lies looſely at the left of the origin of the pulmonary artery. Its figure is nearly triangular, and the ſides are jagged.

The four pulmonary veins, of which two are on each ſide, open into the upper and back part of the auricle. The two of the left ſide are the moſt eaſily ſeen in the pericardium: the right are concealed by the ſuperior cava, and by the neighbouring part of the right auricle.

On the inſide the anterior ſide of the left auricle preſents a circular opening of communication, with the ventricle, ſmaller than that of the oppoſite ſide, and furniſhed like it with a denſe whitiſh circle of a ſuppoſed tendinous nature. The poſterior ſide exhibits the openings of the four pulmonary veins; and the internal contributes to the ſeptum of the auricles. When an opening in the foſſa ovalis leads from the right to the left ventricle, it is ſeen on this ſurface. In the upper edge is ſeen the opening of the appendicular cavity, the ſurface of which exhibits projecting muſcular columns varying conſiderably in number, ſize, and direction, but much leſs numerous and conſiderable than on the oppoſite ſide. The inferior and external ſides are ſmooth, and, as well as the reſt of the auricle, preſent no columns.

The ſides of the auricles have very litle thickneſs: thoſe of the right, thinner than thoſe of the left, are ſemi-tranſparent, and appear merely membranous in many places in the intervals between the muſcular faſciculi, where the ſerous and internal linings are in contact. They are formed of muſcular fibres, placed between two membranes; of which the external is a reflection of the pericardium, and the internal continuous with the lining of the veins, and of the ventricles, which has been already noticed. The muſcular fibres are generally torn when we attempt to ſeparate them from the membrane between which they lie; and are ſo intricately interwoven with each other, that it would be as difficult as uſeleſs to attempt at unravelling and minutely deſcribing their arrangement.

The right ventricle reſembles a triangular pyramid, and offers for our obſervation a ſuperior, an inferior, and a left ſurface; a baſis and an apex. The ſuperior ſurface, conſiderably broader than the inferior, is inclined forwards and to the right; the inferior forms part of the flat ſurface of the heart; both are ſmooth, and contiguous to the pericardium. The left ſurface is confounded with the oppoſite ventricle in a common ſeptum, of which we ſhall ſpeak below. The baſis is joined to the left auricle; the ſuperior and left part gives origin to the pulmonary artery.

On the interior the left ſurface is formed by the ſeptum, which is thicker towards the baſis than the apex of the heart, and perforated by no opening. The ſuperior, inferior, and left ſurfaces, are tolerably ſmooth towards the baſis of the heart, but in the reſt of their extent they exhibit a great number of fleſhy columns (columnæ carneæ), formed by the moſt interior fibres of the ventricle, and varying much in ſize, length, and direction. Three kinds of theſe columns may be diſtinguiſhed. Thoſe of the firſt ſpecies are fixed by one extremity to the ſide of the ventricle, and by the other to the looſe edge of the tricuſpidal valve, by means of ſmall tendinous threads (chordæ tendineæ.) The columns of the ſecond kind are attached by both ends to the ventricle; and thoſe of the third are fixed in their whole length.

The number of the firſt claſs varies very conſiderably in different individuals: often they amount to eight or nine. Their ſize and length are equally uncertain. Some are ſhort, ſo as to reſemble nipples: the longer ones are generally cylindrical, and rounded at the end; and ſome are joined together in various ways: all theſe are directed from the apex towards the baſis of the heart, and they are attached to the inner ſurface of the ventricle more or leſs near to its apex: their points, bifurcated or divided into three portions, give origin to ſeveral tendinous threads, which diverge like the branches of a fan, are, for the moſt part, attached to the tricuſpidal valve, but terminate partly in the ſides of the ventricle. Some of theſe communicate together; and they are ſometimes ſeen to paſs from one column to another. The tendinous threads either go ſtraight to the valve, or they are divided in their progreſs into ſmaller filaments: the ſhorter ones terminate on the looſe edge of the valve, while the longer are continued for a greater or leſs extent upon that ſurface of the valve, which is turned towards the ſide of the ventricle.

The ſecond claſs of columns occupies particularly the anterior or lower third of the ventricle, and is tolerably numerous: they decuſſate each other, and are variouſly connected, ſo as to form a kind of net-work. Thoſe of the third kind are the moſt numerous: they have every variety of ſize and direction, and connection to each other, ſo as to render nearly the whole ventricle very irregular on its ſurface. More or leſs deep depreſſions of various figures are left between them. From this diſpoſition of the muſcular columns, it appears that the ventricle is not ſo much a cavity as an aſſemblage of cavities, or of compartments formed by the interweaving of the muſcular faſciculi, of which the number is very great.

The baſis of the right ventricle has two openings; of which the largeſt, placed downwards and to the right, forms its communication with the auricle, and is called the auricular or auriculo-ventricular orifice (oſtium venoſum): the other, ſmaller and higher, communicating with the pulmonary artery, is named the arterial orifice (oſtium arterioſum.) Theſe are ſeparated by an interval of about an inch.

The auricular opening is furniſhed with a valve, called the tricuſpidal or triglochine, formed by a circular fold of membrane produced from the ſides of the opening towards the point of the ventricle (anulus valvuloſus), and divided at its inferior or looſe edge into ſeveral portions, three of which are generally more conſiderable than the others, and have been repreſented as three diſtinct valves. It preſents two edges, of which one is adherent, and the other looſe and moveable; and two ſurfaces. Of the latter, one is turned towards the ſides of the ventricle, and the other towards the auricular orifice. The adherent edge is attached to the ſides of the opening in its whole circumference; and here the valve is compoſed of a ſingle circular membranous production. The looſe margin is attached to the fleſhy columns of the firſt kind by means of the tendinous threads already deſcribed, and is divided into ſeveral pointed portions, varying conſiderably in number and appearance; three of which are however almoſt conſtantly more conſpicuous than the others, ſo as to have given a name to the valve: of theſe diviſions one, conſiderably broader and longer than the other, is placed upwards and forwards, towards the orifice of the pulmonary artery, which it covers in great meaſure, when it is applied againſt the ſide of the ventricle. This is named by Lieutaud the valvular ſeptum, and is repreſented by him to ſeparate the ventricle into two cavities, of which one, correſponding to the auricle, is named the auricular ; the other, correſponding to the pulmonary artery, is named the arterial ; one of the other two portions is turned downwards and forwards, towards the inferior ſurface and ſharp edge of the ventricle : the other is placed backwards and to the left, towards the ſeptum.

This valve is made up of two membranons layers adhering moſt cloſely to each other : one is a continuation of the lining of the right auricle, the other of the ventricle. They are ſtrengthened by the expanſion of the tendinous threads on their ſurface.

The uſe of this valve is to prevent the blood from flowing back again into the auricle when the ventricle contracts. It lies againſt the ſide of the cavity, where the blood paſſes through the auricular opening ; but when the ventricle contracts, the three portions are raiſed from this ſituation, and meet together ſo as to cloſe the opening : theſe facts may be obſerved by injecting any fluid in the dead ſubject contrary to the courſe of the blood.

The arterial opening of the right ventricle (oſtium arterioſum) is much ſmaller than the preceding, and is marked by a callous ring (tendo cordis arterioſus), which terminates the fleſhy part of the heart, and marks out the origin of the artery. We have already deſcribed, in the account of the arterial ſyſtem, how the artery and ventricle are united. The entrance of the pulmonary artery is furniſhed with three valves, called the ſigmoid or ſemilunar, which exactly reſemble, in their ſtructure and diſpoſition, the valves of the veins deſcribed in a former part of this article. As they are deſigned to prevent the reflux of the blood towards the heart, their attached edge is turned towards the ventricle, and their looſe margin towards the trunk of the artery. The looſe edge is rather thicker than the reſt of the valve, and has a ſmall tubercle about its middle (corpora ſeſamoidea, or Arantii.) This part is not always equally evident, and even ſeems to be entirely deficient in ſome caſes. The ſigmoid valves in the adult are ſometimes ſtrengthened by whitiſh ſhining fibres, which appear to ariſe from the cornua of the valve, and extend to various diſtances on the ſurface. The action of theſe valves is completely mechanical, and may be obſerved in the dead body by injecting contrary to the blood's courſe. They lie againſt the ſide of the artery, where the ventricle contracts ; and are ſo thin as not to interfere with the tranſmiſſion of the blood through the opening. When any fluid comes in the oppoſite direction, it raiſes their looſe edges, fills the ſacs intercepted between the valves and the artery, and preſſes the margins together, ſo as completely to prevent all paſſage in this unnatural courſe.

The left ventricle is longer than the right, and extends rather further at the apex of the heart. Its figure is that of a cone a little flattened on the ſide by which it is united to the right ventricle. We conſider in it a right and left ſurface, an apex, and a baſis. The right ſurface is confounded with the right ventricle ; the left, contiguous to the pericardium, makes part of the upper and lower ſurfaces of the heart. The apex is obtuſe, and forms the largeſt part of the point of the heart : the baſis is joined to the correſponding auricle. The upper and right part gives origin to the aorta.

The cavity of this ventricle preſents the ſame three kinds of muſcular columns as have been mentioned in the deſcription of the right. Thoſe of the firſt kind are larger but leſs numerous than in the right ventricle : their apices are more conſtantly bifurcated, or even divided into three portions. The tendinous threads are very numerous, and are of a ſize proportioned to that of the columns. They diverge in a fanlike manner, and are attached to the looſe edge of the mitral valve ; but ſome are connected to the ſides of the ventricle. Of theſe, which are attached to the valves, ſome paſs without any alteration from their origin to their inſertion : others divide into ſeveral branches, and ſome communicate together ſo as to form a kind of net-work. The length of theſe threads is not uniform : ſome exceed an inch, while others are more than two or three lines in length. The columns of the ſecond and third kinds are much leſs numerous and large than in the right ventricle. They are altogether deficient near the orifice of the aorta, where the ſurface of the ventricle is ſmooth. The baſis of this ventricle poſſeſſes two orifices correſponding to thoſe of the oppoſite ſide : *viz.* a larger auricular, and a ſmaller arterial opening.

The auricular orifice, (oſtium venoſum,) ſmaller than that of the right ventricle, is bounded like it by a kind of whitiſh zone, from which there is a membranous production, deſcending into the cavity of the ventricle, where it is divided into two portions, and conſequently named the mitral valve, which, in all the eſſential parts of its conſtruction, reſembles the tricuſpidal ; like that it has two ſurfaces, one turned towards the ſides of the cavity, and the other towards the auricular orifice ; it has alſo two edges, of which the adherent one is attached to the whole circumference of the auricular orifice, and the looſe one is connected by the tendinous threads to the fleſhy columns of the ventricle. The latter margin is conſtantly divided into two portions, an inferior and ſmaller, a ſuperior and larger one, correſponding to the mouth of the aorta, which it covers almoſt entirely, when the ventricle is dilated.

The latter is the valvular ſeptum of Lieutaud, who conceives that it divides the cavity of the ventricle into an auricular and an arterial portion. Between theſe two portions the mitral valve is not more than one or two lines broad. The mitral valve is conſiderably thicker than the tricuſpidal, and often beſet at its looſe edge with ſmall, callous, and hard tubercles. Its uſe is juſt the ſame on the left, as that of the tricuſpidal valve is on the right ſide of the heart.

The arterial orifice of the ventricle is ſeparated from the auricular only by the attachment of the large portion of the mitral valve ; and from that of the pulmonary artery, merely by the thickneſs of the ventricular ſeptum. It is marked by a callous ring, as on the oppoſite ſide, to which its arrangement is ſimilar in every reſpect. Three ſigmoid or ſemilunar valves are placed at the mouth of the aorta, as in the pulmonary artery : they are larger and thicker than thoſe of the latter, and have more conſiderable tubercles on their looſe edges. Their office is juſt the ſame in the aorta, as that of the others in the pulmonary artery. The ſides of the aorta, oppoſite to the ſituation of the valves, ſwell into three ſmall tumours, and there are the ſame number of ſmall cavities on the inſide, called the ſmall ſinuſes of the aorta ; as theſe do not exiſt in the fœtus, they may be conſidered to ariſe from the efforts of the blood againſt the veſſel.

The two ventricles are ſeparated by a muſcular partition, which is thickeſt at the baſis, and grows gradually thinner to its termination at the apex of the heart. In this the fibres of the two ventricles are mixed together, ſo that it does not belong entirely to the left. It projects into the cavity of the right ventricle. Its whole ſurface has a reticulated appearance, in conſequence of its poſſeſſing fleſhy columns like thoſe already deſcribed ; and there are little depreſſions in the intervals of theſe, which were conſidered by the older anatomiſts to be openings of communication between the two cavities. The latter opinion is now completely exploded, and the partition is allowed to be perfect.

It has been the generally received opinion, that the right ventricle is more capacious than the left; but this point has been controverted. Anatomiſts have endeavoured to decide the queſtion by meaſuring the quantity of fluid which can be introduced by the way of injection; and in theſe experiments Haller has ſometimes found that the right would hold 24 drams, when the left would contain little more than eight. Winſlow and Senac agree with Haller in aſſigning a greater capacity to the right ventricle, as well as to the correſponding auricle. However, Sabatier refers the apparently greater ſize of the right after death to the congeſtion in the right cavities, which occur at the time of death, and aſſerts, that the left will be the largeſt, if the animal be ſo killed as to produce a congeſtion on that ſide, and liberate the right.

The fleſhy fibres of the ventricles are very cloſely arranged, ſo that the heart contains a greater quantity of fibres, under a given bulk, than any other muſcular organ in the body. Theſe fibres are connected by a very ſhort and denſe cellular ſubſtance; are not collected into diſtinct faſciculi ſurrounded by a looſer medium, as in other muſcles; and are interwoven with each other in ſo inextricable a manner, that the deſcription of their direction and arrangement becomes very difficult. They are all more or leſs oblique, but in ſuch a manner that they approach more nearly to the tranſverſe than to the longitudinal direction; and none extend directly from the baſis to the apex of the heart. Their origin cannot be ſettled: they are not continuous in their courſe from the baſis to the apex of the heart: and their inſertion is equally uncertain. They ariſe from all points of the ſurface of the ventricles, and they ſeem to terminate as generally. Thoſe of the two ſides decuſſate at acute angles in the ſeptum. Towards the interior numerous portions are detached to form the fleſhy columns already deſcribed. The fibres of the ventricles are every where ſo cloſely connected, that the various ſtrata which they form cannot be ſeparated and uncovered without lacerating them conſiderably.

The ſurface of the ventricles is covered by a delicate membrane, which is the reflection of the pericardium in a very thin ſtate, much thinner indeed than upon the auricles. Its external ſurface is ſmooth, conſtantly moiſtened by a ſerous exhalation, and contiguous to the bag of the pericardium. Its internal ſurface is united to the ſubſtance of the ventricles by a very fine cellular membrane, in which fat is collected. This fat, of which the quantity varies in different ſubjects, is more abundant at the baſis and apex of the heart, and in the courſe of the coronary arteries, than elſewhere. It is found in much ſmaller quantity on the auricles than on the ventricles. It hardly exiſts in the heart of the fœtus; and ſometimes is not obſerved at all on the ventricles of ſubjects three or four years old. It becomes depoſited more abundantly as the individual advances in life; and is always ſeen in conſiderable quantity in old perſons. It varies conſiderably in the hearts of younger individuals, which are almoſt free from fat when the ſubject has been emaciated or anaſarcous, and as remarkably loaded in the corpulent.

The cavities of the ventricles are lined by continuations of the membranes, which cover the inner ſurface of the auricles, and which have been generally deſcribed in the account of the organization of the two circulating ſyſtems. It is extremely thin in the heart, where it ſeems merely deſigned to give a ſmooth ſurface for the paſſage of the blood, without contributing at all to the ſtrength of the organs. It is moſt cloſely attached to the ſurface of the muſcular fibres, both in the ventricles and auricles, by a very fine and ſhort cellular ſubſtance, in which no fat is ever obſerved. The extent of the membrane is very conſiderable, as it is folded to form the different valves of the heart, covers all the projecting columns, and deſcends into the excavations between theſe.

The arteries of the heart are two in number, and named the coronary: they are the two firſt branches of the aorta, ariſing about oppoſite to the looſe edges of the ſigmoid valves. The exact ſituation of their origin has been much diſputed; with reference to a peculiar opinion concerning the action of the heart. "In numerous examples," ſays Haller, "I have conſtantly found the origins of theſe arteries higher or further from the heart than the ſinuſes of the anterior and poſterior valves, in which cavities ſome have ſtated that they ariſe. In the dead ſubject it is not eaſy to extend the valves ſufficiently to cover the openings of theſe veſſels. The callous white line, which bounds the upper edge of the valvular ſinuſes, and correſponds to the looſe edges of the valves, is placed under the orifices of the coronary arteries. If the aortic valves covered theſe openings, the coronary arteries would receive their blood at a different time from the other branches of the aorta; the blood paſſing through the aorta would preſs the valves againſt the ſide of the canal, and cloſe the coronary arteries, which muſt therefore be filled by the retrograde blood, and conſequently have their ſtream of blood accelerated, when the heart is dilated. Now this is not the caſe: we can eaſily ſee in living animals, that the veſſels of the heart pulſate with the other arteries; and if one of them be opened, the jet of blood is increaſed when the heart contracts, and falls lower when it is dilated." (Element. Phyſiol. lib. 4, ſect. 3, § 30.) The diſtribution of theſe arteries is deſcribed in the article Artery. The veins of the heart, of which nearly the whole unite into the great coronary vein, which opens into the right auricle, are deſcribed under Vein. It has been aſſerted, both of the coronary arteries and veins, that many of their minute branches, and particularly thoſe of the latter, open on the ſurface of the various cavities, eſpecially of the auricles. This was firſt ſtated by Vieuſſens, who affirmed that air, water, or quickſilver would be tranſmitted through theſe openings. Thebeſius wrote a particular work on the ſubject, and the openings in queſtion have ſometimes been named after him foramina Thebeſii. Senac, Duverney, and others aſſert that injected fluids will not take this courſe. Haller admits that there is an exudation on the internal ſurface of the cavities, ſimilar to what occurs in other parts of the body; and conſequently, if we repoſe any faith in theſe experiments, and conſider them to afford a legitimate foundation for inferences concerning the ſtate of parts during life, we muſt allow that there is an exhalation into the cavities of the heart, of which, however, we have no direct proof.

The heart and pericardium have numerous abſorbing veſſels, which take up the fluid depoſited by the exhalants of that membrane; we do not know whether they abſorb any thing from the internal ſurfaces of the cavities.

The nerves of the heart are derived from the par vagum and from the great ſympathetic. They are ſmaller than thoſe of any muſcles in the body: the cardiac nerves in fact are diſtributed upon the aorta and the coronary arteries. See Nerve.

Fœtal Heart.—This organ is one of the firſt viſcera ſeen in the embryo, as we find in it the cauſe of life, and of the circulation, and conſequently the immediate ſource of the formation, growth, and nouriſhment of parts. The motion, ſays Haller, which is perceived at the end of the ſecond day in the incubated chick, at that time white and colourleſs, is diſcovered, by the alternate riſing and falling, to be derived from the heart. Before all the other viſcera, the heart exhibits its conical figure, firmneſs of ſtructure and irritability, and ſeems alone to fill the cheſt, when the brain is like whey, the lung hardly viſible, the ſtomach, liver, inteſtines, and kidnies confuſed together, under the appearance of a white jelly; when there are no appearances of extremities, very few veſſels, and rather ſome kind of paſſages delineated in the umbilical membrane, than true blood veſſels; when in ſhort all other parts are comparatively ſmall and imperfect. Hence the proportion of the heart to the reſt of the body in the fœtus is very conſiderable; and particularly ſo in the incubated chick, the heart of which is a little leſs than the head at the end of the ſecond day, but thicker than the whole body, of which it forms about $\frac{1}{5}$, or a larger ſhare. At a more advanced period of fœtal exiſtence, this organ is ſtill very large, and occupies the greateſt portion of the cheſt. It is broader and not ſo long as in the adult, and conſequently has a more rounded figure. On opening the cheſt it is immediately ſeen, covering and hiding the lungs, which on the contrary ſurround it almoſt entirely in the adult. The pericardium is thin, tender, and tranſparent, and eaſily ſeparable from the diaphragm. The auricles are larger than the ventricles, whereas, after birth, the latter cavities very much exceed the former in ſize. Wriſberg found the auricles ſo large in the embryo of three months as to cover the greateſt part of the heart.

The left ventricle is more advanced in its formation at an early period than the right, as it receives the blood of the inferior cava through the foramen ovale and the left auricle. The younger the fœtus, the ſmaller is the right, and the larger is the left ventricle. As the time of birth approaches, the relation of ſize between theſe parts is altered, and the two are nearly equal. The right ventricle is as long as the left, ſo as to make the point of the heart very obtuſe.

The muſcular thickneſs of the two cavities is nearly equal in the fœtus: the right propels its blood through the canalis arterioſus into the general arterial ſyſtem, and therefore requires greater ſtrength than is neceſſary after the obliteration of that canal, where it tranſmits the blood only through the ramifications of the pulmonary artery. A large opening of an elongated oval figure (foramen ovale or Botalli) is found in the ſeptum of the auricles, and forms a communication between thoſe two cavities. Its poſition is oblique, one end of the oval being directed upwards, forwards, and to the right; the other downwards, backwards, and to the left. The margin of this aperture is rather thicker than the reſt of the ſeptum, and repreſents a ring (the limbus foraminis ovalis or iſthmus of Vieuſſens, ſphincter of Mery, anulus ovalis of Haller) incomplete at the part which looks towards the inferior vena cava, and compoſed of curved muſcular fibres, covered by the internal membrane of the heart, which at the margin of the foramen is continued from one auricle to the other. In ſome inſtances the ring is complete. The younger the fœtus is, the larger is this opening, ſo that there ſeems to be ſcarcely any auricular ſeptum. A valve of a ſemilunar figure (valvula foraminis ovalis), with its looſe edge in the left auricle, occupies this opening. The convex edge of this valve is fixed to the inferior and lateral portions of the foramen; the ſmaller concave and looſe margin is contiguous to the upper part of the ring, and the interval between the two conſtitutes the oval opening. The extremities of the creſcent, formed by the looſe edge of the valve, called by Haller cornicula, are turned upwards, attached to the two ſides of the opening in the left auricle, and ſeparated by an interval of about four lines in the fœtus at full time. The valve is a fold of the internal lining of the auricles, its two ſurfaces being prolongations of the membranes of the cavities towards which they are placed, and being continuous with each other at the looſe concave edge. It is ſo thin as to be nearly tranſparent, and conſequently differs from the reſt of the auricular ſeptum. Sometimes muſcular fibres may be diſcovered within the duplicature of the membrane. The valve preſents very different appearances at different periods of time before birth: in the very early times there are no traces of it. In the third and fourth months we firſt obſerve its rudiments, but it is narrow. As it grows broader, its edge approaches the margin of the foramen ovale, and is as high as that in the ſixth month; in the ſeventh the whole concave edge has paſſed above the margin of the ring, ſo that the foramen is completely covered by it. In the mature embryo the cornicula reach two or three lines above the opening, and the valve itſelf is one or two lines larger than the aperture: hence, when the parts are ſtretched, there ſeems to be no opening, but when the valve is left to itſelf, it yields towards the left auricle, and an elliptical ſpace is left between its edge and that of the opening. Preſſure on its ſurface from the left auricle only applies it againſt the margin of the aperture, ſo as to prevent all communication. At this time then the foramen ovale is a ſpace included between two concave edges, of which one (that of the anulus ovalis) has its cornua turned downwards, the other (that of the valve) has them directed upwards. So long as there is a preſſure from the right auricle, theſe margins may be ſeparated, and fluid may paſs; but when the force is equal on both ſides, the opening is cloſed, and the blood does not get through, although the margins are ſimply contiguous and not adherent. They do, however, in general, adhere ſoon after birth.

The Euſtachian valve is moſt perfect and large in the fœtus, in which it is never reticulated. Hence we conclude that its office is particularly connected with the peculiarities of the fœtal circulation. Its ſtructure and direction lead us to aſcribe to it the office of conducting the blood from the inferior cava to the foramen ovale, and oppoſing its entrance into the right auricle. Hence this valve has been found unuſually large and ſtrong when the foramen ovale is open in the adult. Soemmerring de corporis hum. fab. t. 5. p. 16.

The general diſpoſition of this opening ſhews that the courſe of the blood through it muſt be from the right to the left; the reflux is mechanically prevented. This view of the matter coincides with the inferences which would be drawn from the ſmallneſs of the lungs and the want of reſpiration, and the conſequently ſmall quantity of blood arriving through the pulmonary circulation at the left auricle. The communication by the foramen ovale opens a direct paſſage for the blood of the umbilical vein to the left ſide of the heart. In this general ſtatement all phyſiologiſts agree; but ſome ſuppoſe that the blood of the inferior cava in particular goes through the opening, while others do not make this diſtinction. An account of the former, which is the opinion of Sabatier, will be ſeen in the article CIRCULATION.

Various unuſual formations occur in this eſſential part of the circulating ſyſtem. In ſome rare caſes the heart has been entirely wanting, (ſee Mem. de l'Academie des Sciences, 1740, where an example is mentioned by Winſlow, the ſame work in the year 1720, where there is a caſe by Petit, and the Philoſophical Tranſactions for 1809). The details of the anatomy of the circulating organs in theſe inſtances have not been ſtated with ſufficient minuteneſs to enable us to underſtand how the circulation was carried on without this eſſential organ. All the children came into the world dead.

A more common kind of malformation conſiſts of ſuch arrangements as produce a mixture of the red and black blood, and are conſequently attended with the moſt unfavourable effects on the general economy. Of this kind are openings in the baſis of the ventricular ſeptum, over which the aorta uſually ariſes in ſuch caſes. In theſe inſtances the communication of the pulmonary artery with the right ventricle is generally by an unnaturally ſmall aperture. Sometimes the aorta has ariſen out of the right ventricle, and the pulmonary artery from the left. In ſome of theſe caſes the canalis arterioſus is more or leſs pervious. Theſe deviations from the natural ſtructure of the parts muſt be attended with a great derangement of the functions of circulation and reſpiration; the red blood, which ought to be perfectly ſeparated from the black, is more or leſs mingled with it, and the two are ſent together to all the organs of the body. Hence there is a lividity and coldneſs of the whole frame, and a languor in all the functions. In many inſtances, too, the quantity of blood ſent to the lungs is much leſs than uſual, and all the inconveniences are therefore neceſſarily aggravated. The individuals in whom theſe malformations occur, are ſubject to fits of every difficult breathing, and great anxiety and general diſtreſs whenever any cauſe tends to accelerate the circulation. The duration of their lives ſeldom extends beyond a few months; but it may be protracted to ſome years where the malformation allows a conſiderable portion of red blood to be circulated in the body. See the Medical Obſervations and Inquiries, vol. vi.; Medical Tranſactions, vol. iii.; Sandifort's Obſervationes Anatomicæ; and Dr. Baillie's Morbid Anatomy.

On the ſubject of the properties of the heart, we muſt refer the reader to the general account of the organic muſcles, under the article Muscle. We have a few remarks only to make here.

The extenſibility of the heart is ſeen in its dilatation to an unuſual ſize, when a larger quantity of blood than is natural is contained in any of its cavities. This we ſee very commonly in the right auricle and ventricle, which are found full of blood at the inſtant of death, becauſe this fluid finds an obſtacle to its tranſmiſſion through the lungs, and is conſequently accumulated on the right ſide of the heart, as it arrives from all parts of the body. Very few hearts do not preſent theſe dilatations in various degrees; and we may increaſe or diminiſh them, according to the kind of death by which we kill an animal. We ſhall ſcarcely ſee two hearts of exactly the ſame dimenſions in the dead body; and theſe varieties depend on the greater or leſs difficulty experienced by the blood in the laſt moment in paſſing through the lungs. Hence, in affections of the heart, we have no natural type to which the diſeaſed bulk can be compared. This phenomenon, which ariſes merely from the extenſion of the undiſeaſed cardiac cavities, muſt not be confounded with the aneuriſmatic enlargements of the heart. The left ſide of the viſcus often exhibits twice or three times its natural volume, and is at the ſame time increaſed in thickneſs; here there is an unnatural growth, and the enlargement is produced by nutrition, not by diſtenſion. When the latter cauſe acts, there is no additional ſubſtance; there is a loſs of thickneſs correſponding to the increaſed ſize. When the diſtended heart is punctured, the eſcape of the contained fluid is followed by a reduction of ſize; but the aneuriſmatic heart does not regain its natural dimenſions on the evacuation of its contents.

The contractility of the heart makes it contract when the diſtending cauſe ceaſes to act. Thus, when an animal dies of hæmorrhage, all the blood is withdrawn from the heart; its cavities contract to the utmoſt, in conſequence of being quite empty, and the organ appears very ſmall. When much blood diſtends the cavities, as in aſphyxia, an oppoſite condition of the organ is obſerved; and there is every intermediate degree between theſe.

That the heart does not poſſeſs animal ſenſibility is obvious from the reſult of experiments, in which animals do not ſhew ſigns of pain, when the organ is injured. It has been alſo proved, that the irritation or diviſion of its nerves does not affect its action. The nerves of the eighth pair, and the trunks of the great ſympathetics, have been many times divided; the animals die after a longer or ſhorter interval from the derangement of other functions; but the action of the heart is continued as long as they live, perhaps for one, two, or three days. The ſame reſult has been obtained from dividing the medulla ſpinalis in the neck. It does not appear in theſe caſes that death begins in the heart; the moſt ſtriking circumſtances are obſervable in the reſpiratory functions, which are performed with great difficulty. Accordingly, we may conclude that the brain does not influence the heart's action; and this correſponds to the integrity of its functions in apoplexy, compreſſion, &c. where all the organs deriving their powers from this part have their offices ſuſpended.

The ſympathies of the heart are ſtrongly marked and very univerſal; every impreſſion of any magnitude in the economy almoſt inſtantly affects the motions of this organ, which are often deranged, even by a ſlight wound or an inconſiderable degree of pain. Theſe derangements are of two kinds: in one caſe the action of the part is momentarily arreſted, and ſyncope enſues, which often appears under the impreſſion of conſiderable and ſudden pain. It happens, however, moſt frequently, that the heart's action is accelerated; hence the frequency of febrile affections in all local diſeaſes; theſe are purely ſympathetic, and ceaſe when their cauſe is no longer preſent. In many inflammations, the cauſe is too local to allow of our admitting with Boerhaave an obſtacle to the blood's courſe, which excites the heart to increaſed exertion in order to ſurmount it. Moreover, if there ſhould be no obſtruction, but merely pain, and febrile irritation ſupervenes, the effect muſt be ſympathetic. That the increaſed action of the heart may depend on the admixture of a foreign ſubſtance with the blood, which renders it more irritating, cannot be denied; but in the greater number of caſes it is more conſonant to the general laws of the economy to refer it to that unknown influence, which unites all the organs, which connects together all their actions, and holds them in a ſtate of reciprocal dependence.

In the article Circulation we have mentioned, as the cauſe of the heart's dilatation, the admiſſion of a freſh portion of blood into its cavities; on which ſuppoſition the organ appears to be paſſive in its enlargement. But the following arguments of Bichat render it doubtful whether this ſuppoſition be altogether juſt. Expoſe the heart and empty it, if a ſtimulus be applied, it will ſtill contract and dilate alternately, as if it were full. Puncture all the large veſſels connected with the organ, ſo as to evacuate it entirely; the alternate contractions and dilatations ſtill continue for ſome time. Remove two hearts of equal volume from two living animals, place the fingers in the ventricles of one, and graſp the other in the oppoſite hand, you will then find that the effort of the latter, in its dilatation, is as forcible as that of the former in its contraction. When the heart is irritated with the point of a knife it uſually contracts; but ſometimes it dilates firſt, and contracts ſubſequently.

Motions of the Heart.—The common definition of this organ, that it is a hollow muſcle, leads us to conclude beforehand, that all its motions are for the purpoſe of contracting or enlarging its cavities—the common function of all muſcles. So long as life continues this contraction goes on with conſiderable celerity and force; when the animal languiſhes it becomes weaker, and ceaſes altogether at the time of death; ſo that it is the offspring and attendant of the vital powers, "vitæ filia viriumque animalium," in the language of Haller. The contraction of the heart (ſyſtole), in which the ſides are approximated ſo as to efface the cavities, is performed for the purpoſe of expelling its contents. When this is completed, the organ paſſes into the ſtate of dilatation or remiſſion (diaſtole), in order to admit a freſh ſupply of blood. This interval between two contractions has been generally regarded as a paſſive ſtate; and Haller identifies it completely with the condition of the organ after death, obſerving that the only difference is, that the cavities are full in the one caſe and empty in the other. "Hoc alterum cordis ſtadium in vivo animale alterna requies, in cadavere mortis et inertiæ ſtatus eſt." The arguments adduced in the preceding paragraph render it doubtful how far this is true, and lead us to conclude that the dilatation, as well as the contraction, is the reſult of ſome active power; at all events, we ſhall not be likely to admit that the ſtate of the living heart between two contractions is the ſame with that of the organ after death. The contraction then muſt be regarded as the moſt active part of the phenomena; the dilatation having for its object only the production of new contractions.

In whatever part we obſerve the muſcular fibres of the heart, we ſee them croſſing irregularly in all directions. This general decuſſation, apparent at firſt ſight in the right auricle, where the muſcular faſciculi are in great meaſure inſulated, and very obvious on the internal ſurface of the ventricles, where they project, is rendered manifeſt by the aid of diſſection in the ſubſtance of the parietes both of the ventricles and of the left auricle. Hence we infer that the cavities are contracted, and equally diminiſhed in ſize in all directions at once. But a common ſeptum ſeparates the auricles, and a common ſeptum ſeparates the ventricles. Theſe correſpond to each other, are continued together, and form the boundary dividing the two ſides of the organ. The blood arrives at the ſame inſtant through the venæ cavæ at the right auricle, and through the pulmonary veins at the left; conſequently, the two ventricles are filled at the ſame inſtant. Hence the two auricles contract together, and the two ventricles contract together in the next period of time. In both cavities the blood is preſſed from all ſides, and with an equal force againſt the common ſeptum; which cannot be carried towards one ſide or the other, but remains motionleſs, and experiences only a diminution of its breadth. Thus, the firſt remarkable fact exhibited to us in the motions of the heart taken altogether, is, that the proper parts of the cavities approximate to their common part, which is the central and fixed point.

When the contractions of the ventricles are obſerved in living animals, the external fibres are corrugated, and theſe wrinkles are attended with tremor and palpitation, particularly when the animal is in a weak ſtate, at which time they often begin in ſeparate portions, which appear to unite into a general contraction. But, where the powers have not been exhauſted, the whole of each ventricle is contracted at once; and the circumference approaches to the ſeptum. At the ſame time the apex is attracted towards the baſis, becomes ſhorter and more obtuſe, and is ſlightly turned forwards; conſequently, the whole heart is ſhortened. This latter fact, which was formerly conteſted, is now univerſally received. The motion begins from the apex, and is propagated towards the baſis, which deſcends a little; this, compared to the aſcent of the apex, is in an inverſe ratio to the firmneſs with which they are fixed in their reſpective ſituations. On opening the heart, it will be ſeen that the ſeptum is rendered ſhorter; and that the columns attached to the valves are ſhortened, and brought nearer to the auricular openings, ſo that the tendinous threads are relaxed.

The heart does not undergo merely a change of figure in its ſyſtole, but is alſo moved in its ſituation;—experiences a general locomotion. The apex, in approaching to the baſis, deſcribes an arc of a circle about the baſis, which is fixed towards the right and front, as the extremity of a radius moves upon its centre, and ſtrikes at the end of this motion the fifth or ſixth rib. That this happens on the ſyſtole of the ventricles is clearly aſcertained; and Harvey had an opportunity of obſerving in the human ſubject that the organ ſtrikes againſt the cheſt when it is contracted. The explanation of this phenomenon is given in the article CIRCULATION.

In the contraction of the right auricle all its dimenſions are reduced. The upper portion is corrugated, and depreſſed towards the heart; and the motion of the whole cavity is from above downwards, as it is ſtrongly connected to the baſis of the heart in one direction, and unattached in the other. This is the reverſe of what happens in the ventricles, where the motion is from below upwards. The auricular appendix is at the ſame time erected and curved: the convexity of the organ is deſtroyed, and the part, which formed the arc of a circle, made nearly ſtraight; hence the right ſide of the cavity is drawn towards the left, and the tranſverſe diameter conſequently diminiſhed. The ſame phenomena occur on the left ſide.

Since all the diameters of the cardiac cavities are reduced in the contraction of the organ, theſe receptacles muſt be leſſened, and their contained fluids expelled. It is very obvious that this takes place in living animals; and the finger introduced into the ventricle, at the time of its contraction, experiences conſiderable preſſure. Whether the heart expels its whole contents is doubtful. In animals dying under the hand of the experimentaliſt, ſome blood certainly remains behind, and conſiderable quantities are found in the heart after death. Haller conſiders, that in a living and healthy animal the whole contents are driven out, and that the appearances in experiments, where the cheſt is opened, and the creature exhauſted by tortures, cannot afford a criterion of the natural proceſs. He ſtates, that if a ſmall quantity remained behind, it would excite perpetual irritation, and excite a conſtant exertion of the organ, which would prevent the accuſtomed relaxation from taking place. For the ſmalleſt portion of froth produces an inceſſant contraction of the heart in a frog; and when the ventricles in a living animal were evacuated, as completely as poſſible, by preſſure, the ſmall quantity left behind prevented the heart from reſting. In cold blooded animals the heart becomes pale in its ſyſtole, which could not happen, unleſs the red blood were completely expelled. The auricles too of warm blooded animals, which are of a violet colour, on account of their thinneſs, when diſtended with blood, are pale and colourleſs when contracted. Laſtly, ſays Haller, in numerous experiments on the incubated chick, where the blood is intenſely red, I conſtantly found that it was ſo completely expelled from the white and pellucid heart, that the organ remained colourleſs.

In deſcribing the ſyſtole of the heart, we may be conſidered as repreſenting the diaſtole alſo; for in the latter an oppoſite condition prevails in every reſpect. The wrinkles of the fibres are loſt, and the whole viſcus becomes ſmooth, level, and ſoft: it is extended into a greater length, the baſis retreating from the apex, and the apex from the baſis, and at the ſame time turning backwards, and to the left. The fleſhy ſides of the ventricles ſeparate from the ſeptum. The auricles paſs into their former ſtate, their convex ſurfaces aſcending, and being again ſtretched out. In this relaxed ſtate of the fibres, the ſides of the cavities offer no reſiſtance to the newly arriving quantity of blood. Air very gently impelled, or the current of blood from the veins, is ſufficient to accompliſh the filling of the cavities.

After theſe general obſervations, we proceed to detail the motions of the individual parts ſeparately. A ſmall portion of the two cavæ, near the right auricle, is muſcular, and contracts on irritation. Theſe veſſels expel their blood by a ſtrong and manifeſt contraction into the auricle, and are then dilated by the current arriving from behind. The right auricle is diſtended by the blood received from the venæ cavæ, becomes turgid, and has a violet colour from the darkneſs of the contained fluid. It is contracted immediately after, expels its contents, and becomes pale again. The blood takes two courſes from this cavity; as there are no valves at the mouths of the veins, it flows back into the cavæ, and the reflux, which we have already ſpoken of in a former part of this article, extends to various lengths from the heart. In a living and healthy animal, the reflux is probably not conſiderable, as it is oppoſed by the weight of the column contained in the whole venous ſyſtem, and conſtantly preſſing forwards to the heart; but that it does take place occaſionally, even in the natural ſtate of the function, is obvious from the phenomena of ſtraining, when the veſſels of the head become diſtended with blood, in conſequence of the temporary obſtacle to the tranſmiſſion of the fluid through the lungs.

The ſecond and principal paſſage of the blood from the auricle, is into the ventricle, through the oſtium venoſum. The membranous valvular ring offers a circular open paſſage; its looſe edge yields to the current of the blood, and is preſſed by it againſt the ſides of the cavity, ſo as to enlarge the opening: the orifice of the pulmonary artery is at this time completely cloſed by the large diviſion of the tricuſpidal valve, which is placed againſt that aperture, ſo that the auricle has no effect on that veſſel. At the time when the contracted auricle expels its blood, the ventricle is looſe and relaxed; for if the latter were ſtill in its ſyſtole, its ſuperior ſtrength would prevent it from being diſtended by the weak auricle. The blood arrives therefore in the ventricle, fills and dilates it: and the meaſure of its diſtenſion amounts to the two or three ounces expelled from the auricle. The ventricle, excited by the preſence of the blood, which diſtends it, immediately contracts; and there are two paſſages by which the blood may eſcape; it may flow back into the auricle whence it has arrived, or it may be ſent into the pulmonary artery. The tricuſpidal valve prevents the firſt of theſe effects. The blood, impelled towards the axis of the cavity by the contraction of its ſides, carries the floating membranous valve in that direction, until it is brought to right angles with the axis, where it occupies the whole area of the oſtium venoſum. It cannot give way any further, or be driven into the auricle, becauſe the fleſhy columns, which are rendered ſhorter at the ſame time, retain it. The meaſure of the valve is ſuch, that when expanded it perfectly cloſes the communication, and prevents regurgitation from the ventricle into the auricle. The more forcibly any liquor is impelled in a direction contrary to the blood's courſe, the more completely is the opening ſhut. Haller conſtantly found waxen injection, thrown into the pulmonary artery, retained by this apparatus in the right ventricle. Yet the very elevation of the tricuſpidal valve muſt force back a certain portion of blood into the auricle. The circle of the anulus valvuloſus contains a certain portion of blood within the conical ſpace circumſcribed by its three diviſions, when the ventricle is diſtended. The action of the ventricle, by bringing the valve into the ſame plane with the oſtium venoſum, deſtroys this conical area, and puſhes the cone of blood contained in it into the auricle.

But the paſſage, which the blood principally takes, and which is ſuitable to the natural order of the functions, is through the arterial opening of the right ventricle, into the pulmonary artery. At the time that the elevation of the valve cloſes the auricular orifice, the large diviſion of the valve, which covers the mouth of the pulmonary artery, ſo long as its point is extended towards the apex of the heart, is removed from that ſituation, and leaves the entrance into the veſſel free. The blood eaſily finds its way through the ſigmoid valves, preſſing them againſt the ſide of the canal, and deſtroying their cavities; they obſtruct the mouths of the veſſel only in proportion to their thickneſs, which is a mere line, and even this impediment is avoided by their being received into the ſinuſes of the artery. The ventricle, being now empty, is relaxed, and paſſes into the ſtate of diaſtole.

The artery, diſtended by the blood impelled into its cavity from the ventricle, immediately afterwards recovers its former diameter; and muſt at this time repel the contained fluid towards the heart. But when it is urged in this direction, it meets with the open orifices of the valvular ſinuſes, enters and fills them, ſeparates thoſe floating folds from the ſides of the artery, and urges them towards its axis: when the three are fully expanded, they cloſe the opening completely, and entirely intercept the reflux of the blood towards the heart, as their ſize correſponds to the area of the veſſel. The tendinous fibres increaſe the ſtrength of theſe membranes, and enable them to ſuſtain better the impetus of the returning wave. In the dead ſubject they prevent the paſſage of waxen injection, or of air impelled towards the heart, and are ſaid by Haller to ſuſtain a weight of 63 pounds before they give way. When the aorta is tied in a living animal, it remains diſtended, as theſe valves prevent the blood from eſcaping into the heart.

After having paſſed through the pulmonary arteries and veins, the blood arrives at the left auricle: and the ſame obſervations may be made concerning thoſe veins, the left auricle, the mitral valve, the left ventricle, and the ſigmoid valves of the aorta, as we have already delivered concerning the correſponding organs on the right ſide. The two ſyſtems perfectly reſemble each other in their actions, and make two diſtinct hearts, between which the paſſage of the blood through the lungs intervenes.

Haller gives the following account of the ſucceſſion of motions in the different parts of the heart, and of the phenomena obſerved when the actions of theſe parts ceaſe. The venæ cavæ and pulmonary veins are contracted in the firſt point of time, and fill the auricles. The different parts of theſe cavities muſt be diſtended ſucceſſively; but the ſucceſſion is ſo rapid, not occupying more than a ſecond in a man who has the ſloweſt pulſe, that the whole auricle appears to be diſtended at once. In the ſecond portion of time theſe cavities expel their blood into the ventricles, acting perfectly together. In experiments on living animals their contraction is not always ſynchronous; but the irregularity generally occurs when the animal is exhauſted, and in the agonies of death; under circumſtances, which will not allow us to draw any inferences as to the natural order of the contractions. Diaſtole of the ventricles accompanies this contraction of the auricles. The latter is followed very quickly in a healthy animal by contraction of the ventricles, and this third period is the ſame with the firſt; that is, the veins ſill the auricles at the ſame moment that the ventricles expel their contents into the arteries.

"The contractions of the heart become gradually weaker, as the animal languiſhes previouſly to death: they become at the ſame time more frequent, and hence the pulſe of perſons near their death is ſo ſmall and rapid, that it cannot be counted. Intervals are then obſerved between the contractions of the heart, and are indicated by intermiſſions of the pulſe, and irregularity in the reſpirations: theſe are of two or more ſeconds, or even a minute in living animals. I have obſerved in the incubated chick, as it grew weak, firſt ten, then ſix, four, and two pulſations in a minute. The left cavities of the heart then ceaſe to act, the ventricle firſt, and then the auricle. The pulſation of the right ventricle laſt longer; it contracts leſs frequently than the auricle, and gradually becomes quiet; irregular pulſation being ſtill occaſionally obſerved on the ſurface. The apex retains its irritability longer than any other part of the ventricles, and the ſeptum comes next in this reſpect. Motion generally continues for ſome time in the right auricle, after it has ceaſed in the ventricle, even for ſome hours. This part of the heart was therefore rightly called by Galen and Harvey the ultimum moriens. It may be excited from a ſtate of reſt into motion for the longeſt time, and the moſt quickly; and in this promptitude of action, when excited by throwing in warm water or air, or in any other way, it very much exceeds the ventricle. Its motion is very lively, and the pulſations are more frequent than thoſe of the left. In ſome caſes it has ceaſed to move firſt, before its own ventricle, and before the left cavities of the heart; but theſe inſtances are rare, and may be referred to an immoveable congeſtion of blood, or other cauſes foreign to the natural condition of the parts. Its contractions occur at longer intervals before they ceaſe altogether. That part of the venæ cavæ, which joins the auricle, always continues to pulſate for a long time, and ſometimes holds out even longer than the auricle. On the left ſide, the ventricle ceaſes before the auricle, and the pulmonary veins ſtill move after the other parts are at reſt. The latter have a ſynchronous motion with the venæ cavæ, ſo long as they continue to act; but when the motions grow feeble, the vena cava has the ſuperiority, both in the frequency and the duration of the pulſations."

In no part of the animal frame do we obſerve ſo conſpicuouſly as in the heart the conſtant exertion, without any intermiſſion, from the earlieſt period of exiſtence to the moment of death, of ſo conſiderable a contractile power. As the important functions dependent on the circulation, ſuch as nutrition, ſecretion, exhalation, and the expoſure of the blood to the air can only be carried on while the heart's motions are continued, we readily underſtand why that is the part firſt obſerved to move in the embryo, and why the uninterrupted continuance of its action is neceſſary to the ſupport of life: hence we ſhall think that Haller has hardly exaggerated its importance in the following paſſage of his Elementa Phyſiologiæ. "Denique ſæpe pullum contemplatus, qui ovo incubato continetur, comparavi miram vivacitatem et igneam vim corculi, ſub finem ſecundi diei duriuſculi, firmi et terminati, cum pigro et diffluente muco, quo reliquum corpuſculum conſtat, et cum ſumma mollitie arteriolarum, quæ in eo muco artuum, viſcerumve, aut in cerebri aqua cogitari poſſunt; facillimum enim Harveii experimentum repetii, quo languens pulli corculum ſtimulo, guttave aquæ calidæ, ad celerrimum inque omnes arterias etiam membranarum propagatum motum ſuſcitatur, cum nullo alio modo nulla irritatione arteriarum, viſcerumque quidquam vel eminus ſimile aut minimum motum excitare liceat. Sed etiam in homine, aut animale calido, naturam ſumme irritabilem cordis, ignaviæ vis contractilis arteriarum, et perfectæ in frigidis beſtiis inertiæ, et immobili corpori reliquarum partium omnium oppoſui. Aptitudinem denique ad motum, et tenacitatem vitæ expendi, quæ in corde eſt, et quam, præter inteſtina, nulla alia pars machinæ animalis adtingit. His omnibus conſideratis præcipuam, et parum ab unica diſtantem, motus omnis in corpore ſcaturiginem in corde reperio." Lib. 4. ſect. 4. § 28.

In the article DEATH, we have mentioned that the functions of the brain, the heart, and the lungs, are ſo connected together, that the interruption of either is followed by that of the others; and we have given a general ſketch of the manner in which that effect is produced. The details of this ſubject belong to the preſent article, that on the LUNG, and on the NERVOUS *ſyſtem*, and are derived from the "Recerches Phyſiologiques ſur la Vie et la Mort" of Bichat.

In conſidering how the brain can be influenced by the heart, this author firſt eſtabliſhes the point, that it cannot be by means of the nerves: the ſection, or ligature, of thoſe organs (the cardiac nerves) does not influence the functions of the brain; and they only modify indirectly the action of the heart. Conſequently the veſſels muſt be the excluſive agents of the heart's influence on the brain.

The heart, which propels the red blood, affects the brain, in the firſt place, by the motion which it communicates to the organ. If the arrival of this fluid be completely intercepted, the motion of the brain ceaſes, and life is extinguiſhed when the carotids alone are tied, the vertebral arteries ſtill keep up the movement, and no ill effect is produced. Compreſſion acts by preventing the organ from obeying the impulſe communicated to it by the arteries. The motion, which is very obſcure in the other viſcera, is very conſiderable in the encephalon. All the large arteries placed at its baſis, and between it and the bony parietes of the cranium, experience at the time of their pulſation a reſiſtance from the latter, which throws the whole of the motion on the brain, ſo that it is elevated, as tumours are, when ſituated over a conſiderable artery, ſupported on its oppoſite ſurface by a reſiſting plane. If water be thrown gently into the carotid, the animal is not injured: but if it be puſhed in impetuouſly, ſo as to derange the ordinary motions of the organ, the action of the brain is diſturbed, and various effects are produced even as far as death, according to the violence employed. On the other hand, if the brain be expoſed and an artery opened, the motion of the organ is diminiſhed in proportion as the blood arrives at it with leſs force, and is then entirely loſt.

The ſecond mode of influence, in this caſe, is derived from the nature of the fluid which the heart of red blood ſends to the brain. We refer on this ſubject to LUNG, as it is in that organ that the changes are produced in the blood, which is conveyed through the heart without any alteration.

The heart of black blood cannot immediately influence the brain. A ſpecies of death, which has generally been referred to this part of the organ, *viz.* by the injection of air into the veins, is explained by Bichat as ariſing in the brain. When air is introduced into the veins, even in ſmall quantity, the heart's contractions are accelerated, the animal is agitated, howls as if ſuffering pain, is ſeized with convulſive motions, loſes the powers of ſenſation and voluntary motion, and ſoon ceaſes to exiſt entirely. Bichat adduces the following proofs that the brain is firſt affected in this caſe. The heart ſtill beats after the animal life is ſuſpended. Injection of air into the carotid produces analogous effects, with the exception of the acceleration of the heart's action. In animals killed by this proceſs, the left cavities of the heart, as well as the right, are full of frothy blood, and the arteries and veins of the brain contain the ſame kind of fluid; ſo that the ſimple contact of air with the right cavities is not ſuddenly fatal. If the brain ceaſed to act from a diſcontinuance of the heart's contractions, death would enſue, as in ſyncope, and in copious arterial hæmorrhages; *i. e.* without any well marked convulſive motions. In this inſtance, on the contrary, the convulſions are often extremely violent, and announce irritation of the brain, which can be produced only through the medium of the air which is ſent to that organ with the blood.

The functions of the lungs conſiſt in producing a certain change in the blood received from the right ſide of the heart: the latter, therefore, influences the former moſt powerfully, as it ſupplies the blood in which theſe changes are produced; and, conſequently, the interruption of its action, by cutting off that ſupply, puts a ſtop to the chemical phenomena of the lungs. The heart of red blood, by acting on the brain, affects the muſcles concerned in reſpiration; and thereby influences the mechanical phænomena of that function.

The heart has no leſs influence over the organs of the body in general, than over the brain and lungs. By the motion which it communicates to the former, that is maintained in a ſtate of activity, and enabled to receive ſenſations from external bodies, and to produce voluntary motions; hence the latter functions are immediately ſtopped when the heart of red blood ceaſes to act. The ceſſation is ſudden, as when the encephalon has experienced a violent commotion annihilating its action. In this manner a wound of the heart, or the burſting of an aneuriſm, ſuddenly ſuſpend our relations to external objects. The organs of ſenſation and voluntary motion are alſo influenced by the heart of red blood in another manner, which is common to them with thoſe of the organic life: they experience an habitual agitation, an inteſtine impulſe, produced by the diviſion of the arteries in their ſubſtance, and neceſſary to the execution of their functions. The functions of the organic life, ſuch as nutrition, exhalation, &c. receive all their materials from the heart of red blood: hence they muſt be ſoon ſuſpended after that ceaſes to act. In theſe conſiderations we do not take into account the nature of the blood ſent to the organs, whether it be black or red; that circumſtance belongs to the account of the pulmonary functions.

“Whenever,” ſays Bichat, “the heart ceaſes to act, general death comes on in the following manner; the action of the brain is annihilated at firſt for want of excitation: hence the ſenſations, locomotion, and the voice, which are under the immediate influence of the brain, are interrupted. Moreover, the organs of theſe functions would ceaſe to act from want of excitation by the blood, even if the brain were unaffected, and could ſtill exert its ordinary influence upon them. All the animal life is ſuddenly ſuſpended, and, at the inſtant of the heart's death, man ceaſes to exiſt with relation to ſurrounding objects. The interruption of the organic life, which has commenced with the circulation, goes on at the ſame time in the function of reſpiration. No more mechanical phenomena in the lungs, after the brain has ceaſed to act; becauſe the reſpiratory muſcles are under the influence of the latter organ. No more chemical phenomena, as ſoon as the heart can neither receive nor propel the materials neceſſary for their developement; ſo that in injuries of the heart, the latter phenomena are interrupted directly, while the former ceaſe indirectly, and through the medium of the brain. General death then goes on gradually by the interruption of the ſecretions, the exhalations and nutrition. The latter ceaſes firſt in thoſe parts which receive blood habitually; becauſe the excitation, produced by this fluid, and neceſſary for its ſupport, ceaſes: it ſtops ſubſequently in the white organs, which are leſs ſubject to the influence of the heart.

“In this ſucceſſive termination of the phenomena of internal life, its powers ſtill ſubſiſt ſome time after the functions have ceaſed; the organic ſenſibility, and the organic contractilities ſurvive the phenomena of digeſtion, nutrition, &c. How does it happen that the vital powers ſtill continue for ſome time in the internal life, while thoſe of the external are ſuddenly extinguiſhed? Becauſe the powers of feeling and moving organically do not ſuppoſe the exiſtence of a common centre; while, on the contrary, the influence of the brain is neceſſary in the ſenſations and voluntary motions.

“This is the order in which the phenomena of general death ſucceed each other, when they depend on the burſting of an aneuriſm, on a wound of the heart, or any large blood-veſſel, or on any cauſe affecting this organ. We die in the ſame manner from any ſtrong mental affections. Where an individual expires at the news of an event which tranſports him with joy, or plunges him into deſpair, at the ſight of an object which inſpires him with terror, or of a rival, whoſe ſucceſs irritates his jealouſy, the heart ceaſes firſt to act; and its death is followed by that of the other organs.” The author goes on to ſhew that the heart is the part affected in the caſe of ſyncope; and that the brain is influenced in a ſecondary manner. The faintings produced by lively mental emotions are analogous, in all their phenomena, to thoſe cauſed by organic affections of the heart, which obviouſly owe their origin to this organ. Theſe mental cauſes very often give riſe to diſeaſes of the heart, but not to thoſe of the brain. The brain has no direct influence on the circulation; there is no reciprocity between them. Affections of the former do not produce analogous affections of the latter; while the latter modify the former eſſentially in the manner already deſcribed. If the influence of the paſſions be not carried ſo far as entirely to ſuſpend the circulation, and conſequently to produce ſyncope, palpitations, and other irregular motions, frequently reſult from it. Theſe ſecondary effects are always found in the heart, and never in the brain: here the affected organ is readily diſtinguiſhed, becauſe a ſingle part is acted on, and all are not troubled as in ſyncope.

“In ſyncope, aſphyxia, and apoplexy, general death begins reſpectively in the heart, lungs, and brain. In that which ends diſeaſe, the circulation, reſpiration, or the cerebral action ceaſe; and the interruption of the other functions is a neceſſary conſequence. The heart is but rarely the firſt part of which the action ſtops: this, however, happens ſometimes, as after long continued ſevere pains, extenſive ſuppurations, hæmorrhages, dropſies, certain fevers, &c. where ſyncope has appeared at certain intervals, and a more violent attack carries the patient off. Whatever part may have been affected in ſuch inſtances, the phenomena of death begin in the heart, and ſucceed each other in the order we have already explained, as occurring in the ſudden deaths which begin with a leſion of that organ.

“In other caſes the functions of the heart do not ceaſe till after thoſe of other parts: it is the ultimum moriens. In general, the cheſt becomes affected much more commonly in the various morbid affections, whether chronic or acute, and the commencement of death in the lungs is more frequent than in the heart or brain. When diſeaſe is ended by ſyncope, the lungs are conſtantly found almoſt entirely empty in the dead ſubject; they are never loaded with blood. If no diſeaſe exiſted in them previouſly, they are collapſed, do not fill the cavity of the cheſt, and poſſeſs their natural colour. A ſimple reaſon may be aſſigned for this anatomical fact. The circulation being ſuddenly interrupted, inſtead of gradually weakened, there is no time for the pulmonary veſſels to become diſtended, as when general death begins in the lung, or in the brain. I have already collected numerous inſtances of perſons who have died by ſyncope, in whom the lungs were found in this empty ſtate. In general, whenever death has begun in the heart or large veſſels, and has been ſudden, the emptineſs of the pulmonary veſſels may be regarded as a general phenomenon: it is ſeen in deaths from the hæmorrhage of large wounds, from aneuriſmal ruptures, violent emotions, &c. I have obſerved it in the bodies of perſons guillotined; and it is equally viſible in animals ſlaughtered for food."

The influence of the lungs on the heart will be conſidered under Lung.

The heart's action is ſubject to that of the brain, ſo that the ceſſation of the latter interrupts the former. In explaining how this takes place, Bichat obſerves that "moſt phyſicians ſpeak too vaguely of nervous influence, and do not determine with ſufficient preciſion its extent and limits with reſpect to the various organs. Every thing concurs to prove that the brain exerts no immediate influence on the heart, while the latter preſerves the former in a ſtate of dependance by the motion which it communicates. This aſſertion is not new: all good phyſiologiſts admit it; but as ſeveral medical opinions proceed on an oppoſite aſſumption, I ſhall demonſtrate it by ſome obſervations and experiments. 1ſt. Any conſiderable irritation of the brain, produced either by a ſplinter of bone, by blood, or by any other cauſe, almoſt always cauſes general or partial convulſions of the voluntary muſcles: the muſcles of the organic life, and particularly the heart, are not affected. 2dly. Compreſſion of the brain produces paralyſis of the voluntary muſcles; but if thoſe of the cheſt be not affected, the heart's action is not diminiſhed. 3dly. Opium and wine, in a certain doſe, have a temporary effect in diminiſhing the cerebral energy, and rendering it leſs capable of executing the functions of the animal life: the heart continues to act as uſual, and ſometimes its contractions are increaſed. 4thly. Palpitations, and various irregular motions of the heart, are not derived from the brain, which is in a perfactly natural ſtate. 5thly. The numerous phemomena of apoplexy, epilepſy, catalepſy, narcotiſm, concuſſion, &c. which have their chief ſource in the brain, throw great light on the independance of the heart's action. 6thly. All organs ſubject to the direct influence of the brain are thereby voluntary. I believe that, in ſpite of Stahl's obſervation, nobody continues to rank the heart among organs of that deſcription. What would be the tenure of life, if we could ſuſpend at pleaſure the action of the organ which is its main ſource? Death might be then brought on by a ſimple act of volition. Thus mere obſervation would authorize us in inferring, without much fear of error, that the ceſſation of the heart's action, conſequent on the interruption of the cerebral functions, does not ariſe from any immediate influence. But we can give a further ſupport to this fundamental poſition of phyſiology and pathology by direct experiments. 1ſt. By irritating the brain in a living animal by various mechanical or chemical agents, or by compreſſing it, various effects are produced on the organs of the animal life; but the functions of the heart are unimpaired, ſo long as the pectoral muſcles are not paralyſed. 2dly. The reſult of ſimilar experiments on the ſpinal marrow laid bare in the neck, is perfectly analogous. 3dly. The heart's action is not accelerated by irritating the nerves of the eighth pair; nor is it arreſted by dividing the trunks of thoſe nerves. Thoſe, who perform ſuch experiments, muſt carefully diſtinguiſh the effects of the various feelings produced in the animal by his ſufferings from the reſult of the irritation or ſection of the nerves. 4thly. The ſame trials on the cardiac branches of the great ſympathetic have exactly the ſame effect. Galvanic experiments, performed with the moſt ſcrupulous attention, have confirmed the inferences which may be drawn from the preceding account. I armed the brain and medulla ſpinalis of frogs with lead, and placed a plate of zinc in contact with the heart and ſome voluntary muſcles; on forming the communication the latter were thrown into motion, while the former was not affected. In ſubjects, who had been guillotined, and in whom galvaniſm produced contractions of the voluntary muſcles, I could not diſcern the leaſt motion of the heart, when the ſpinal marrow, or the cardiac branches of the ganglia or the par vagum on one ſide, and the heart on the other were armed, and the communication made between them. Yet mechanical irritation cauſed contraction of the heart. The ſame experiments on dogs and guinea-pigs, in which the brain alſo was tried, had the ſame reſult: when the communication was made between the two metals, it neither accelerated the heart's motion if it ſtill continued, nor reanimated it if it had ceaſed. Experiments on the cardiac nerves and the heart of two living dogs produced no very apparent motions.

Humboldt ſtates, that when the heart is detached ſuddenly, ſo as to leave ſome of its nerves inſulated, contractions may be produced by arming them with one metal, and touching this with another. I have tried this unſucceſsfully many times: yet it appeared to ſucceed once. The only certain method of producing galvanic phenomena in the heart, with efficacy and clearneſs, is to remove the organ in a warm-blooded animal; to put it in contact with two metals at two different points, and then make the communication. But this does not bear at all on the point in queſtion, *viz.* whether the brain exerts any direct influence on the heart.

I have repeated all theſe experiments on galvaniſm many times, and with the moſt minute precautions: yet I do not pretend to throw any doubt on the different reſults which ſome celebrated enquirers have obtained. Every one knows how variable are the effects of experiments on the vital powers. Moreover, if the reports of other experimenters be received, it will be impoſſible to overlook the ſtriking difference between the muſcles of the animal and organic lives in reſpect to galvanic excitation. An excellent method of obſerving this is, when we are trying what effect is produced on the heart or inteſtines, to uſe alſo ſome voluntary muſcles, and thus to eſtabliſh a parallel between the two kinds of organs.

Suppoſe, for a moment, that the galvanic influence had juſt the ſame effects on both kinds of muſcles: what would this prove, except that the galvanic phenomena follow laws completely oppoſite to thoſe of the appearances reſulting from common irritation of theſe parts?

Since then the ceſſation of the heart's action, conſequent on great leſions of the brain, is not direct, although it comes on immediately, there muſt be an intermediate organ, the interruption of whoſe action is the proximate cauſe ſought. This organ is the lung: and the following is the ſucceſſion of the phenomena. 1. Interruption of the action of the brain; 2, paralyſis of all the voluntary muſcles, and conſequently of the diaphragm and intercoſtals; 3, ſuſpenſion of the mechanical phenomena of reſpiration; 4, of the chemical phenomena; 5, arrival of black blood at the fibres of the heart; 6, debilitation of thoſe fibres and ceſſation of action.

The death, which ſucceeds ſerious injuries of the brain, has therefore conſiderable analogy to the different aſphyxiæ;

it is only more prompt, for the reaſons which I ſhall adduce. The following experiments prove inconteſtibly that the phenomena of death in this caſe are connected in the order juſt deſcribed.

1. I have conſtantly found black blood in the red-blooded ſyſtem of all animals killed by concuſſion or compreſſion of the brain: their heart is livid, and all the ſurfaces are coloured nearly as in aſphyxia.

2. I have opened the carotid in a dog, and red blood immediately flowed: the artery was then tied, and the animal killed by a violent blow on the occiput. The animal life was inſtantaneouſly annihilated; all voluntary motion ceaſed; the mechanical, and conſequently the chemical phenomena of reſpiration were arreſted. When the artery was now ſet at liberty, it poured out black blood with a feeble jet; this gradually diminiſhed, and the motion of the heart ceaſed after a few minutes.

3. I have always obtained a ſimilar reſult by opening an artery in various animals, and killing them afterwards, either by a ſection of the medulla ſpinalis, between the firſt vertebra and the occiput, by compreſſing ſtrongly the brain previouſly laid bare, or by the deſtruction of that organ. Animals die in the ſame manner when noxious matters are injected into the carotid.

4. The preceding experiments explain the blackneſs of the blood flowing from the arteries, when they are opened after an animal has been knocked down as in the ordinary mode of ſlaughtering. If the blow on the head be very violent, the blood runs out quite of the venous colour: if it ſhould only weaken the diaphragm and intercoſtals, the colour of the blood is not ſo deep.

The ſtate of reſpiration, which may be affected by various cauſes during a copious hæmorrhage, produces conſiderable variations in the colour of the diſcharged blood: when the breathing goes on naturally, the arterial blood is red, and it has a browniſh tint when that function is impeded.

If any individual has been able, by a voluntary exertion, to ſuſpend the pulſation of the heart, this fact does not prove, as the diſciples of Stahl aſſerted, the influence of the ſoul on the motions of the organic life, but merely on the mechanical phenomena of reſpiration, which, as well as the chemical phenomena, muſt have been previouſly ſtopped. In cold blooded animals the death of the heart does not follow that of the brain ſo rapidly. Circulation will continue for a conſiderable time in the frog and ſalamander, after the the brain has been removed, as I have aſcertained by repeated experiments. This will be explained by the well-known fact that reſpiration may be ſuſpended for a long time in theſe animals, without the motions of the heart being ſtopped. In fact, ſince the heart's action, according to our explanation, ceaſes, after that of the brain is interrupted, only becauſe the lung dies previouſly, there ought to exiſt, between the death of the brain and that of the heart, an interval equal to the time during which reſpiration may be ſuſpended in the natural ſtate.

See the Traité de la Structure, de l'Action, et des Maladies du Cœur, par Senac; tom. 2. 4to. 2d edition, Paris 1783. Haller, Elementa Phyſiologiæ, lib. 4; and lib. 29, ſect. 4, §. 43 to 56. Soemmerring de Corporis Humani Fabrica, tom. 6. Bichat, Recherches Phyſiologiques ſur la Vie et la Mort; and his Anatomie deſcriptive, tom. 4. Boyer, Traité complet d'Anatomie, tom. 4. Bichat, Anatomie Generale, 2de partie.

Heart-*burn*. See Cardialgia.

Heart, *Enlargement of*. See Cardiogmus.

Heart *of Fiſh*. See Fish.

Heart *of Inſects*. See Entomology.

Heart, *Inflammation of*. See Carditis.

Heart *of a Tree*, the middle part thereof, taken longitudinally, is called ſo.

Heart, in the *Manege*. A horſe that works in the manege with conſtraint and reſolution, and cannot be brought to conſent to it, is ſaid to be a horſe of two hearts.

Heart, in *Sea Language*, is a peculiar ſort of dead-eye, ſomewhat reſembling the ſhape of a heart, but differing from the common dead-eyes, inaſmuch as it is only furniſhed with one large hole in the middle, whereas the common dead-eyes have always three holes. They are principally uſed to contain the laniards, by which the ſtays are extended.

Heart's *Eaſe*, in *Botany*. See Viola.

Heart *Pea*, or *Heart-ſeed*. See Cardiospermum.

Heart-*ſhaped Leaf*, in *Botany*, *ſolium cordatum*, a leaf whoſe outline anſwers to the vulgar idea of the ſhape of an human heart. See Leaf.

Heart-*ſhells*, *Conchæ cordiformes*, in *Natural Hiſtory*. See Cardium under Conchology.

Heart *of Stone*, in *Mining*, is the name, in the neighbourhood of Bath, particularly 3½ miles E. of the town at Warley Rocks, for the caſt of a ſhell reſembling the genus Mya, of which, as well as the caſt, figures are given in Walcot's "Petrifactions," figs. 5 and 16. In other ſituations, where ſtones are ſubject to hard places in them, frequently of a different colour from the maſs, they are called hearts of the ſtone, or cores.

HEARTH, Focus. See Fire, Chimney, &c.

Hearth-*money*. See Chimney-*money*.

Hearth-*ſtone*. See Fire-*ſtone*.

Hearth, in *Mining*, is applied, in Derbyſhire, to the ancient lead-ſmelting furnaces, which were like a blackſmith's forge on a large ſcale, blown by bellows worked by water. Since cupolas or low reverberatory furnaces have been generally adopted, a few only of the ancient hearths have been retained, and called ſlag-hearths, for re-melting the black or drawn ſlag of the cupolas. See Mr. Farey's Report on Derbyſhire. The lining of the iron furnaces, or that in which the moſt intenſe heat is excited, is called the hearth, and is compoſed of large blocks of *Fire-ſtone*. See that article.

HEAT is a term uſed by ſome writers to ſignify the cauſe which produces in us the ſenſation of warmth. In this ſenſe it is ſynonymous with *fire* and *caloric*. It is alſo uſed to denote the ſenſation itſelf of warmth, in which caſe it is oppoſed to *cold*.

Heat, in the firſt ſenſe, is now commonly conceived to be an extremely ſubtile and elaſtic fluid, ſtrongly attracted by other matter, and of inſenſible gravity; but ſome ſuppoſe it to be merely a property of matter, and to conſiſt in a ſort of vibration of its ultimate particles. Theſe different opinions will be found diſcuſſed, and ſome of the general properties of heat pointed out, under the head Caloric.

Heat is unqueſtionably one of the moſt important agents employed by nature in forming the conſtitution of bodies, and in producing that unceaſing change obſervable in the animal, the vegetable, and the mineral kingdoms. There is ſcarcely any department of phyſical ſcience in which the nature and properties of heat do not in ſome way enter into our conſideration. Of courſe this ſubject demands an extenſive developement, and many of its branches muſt be diſplayed under their reſpective heads. See Capacity *for Heat*, Cold, Combustion, Excitation *of Heat*, Expansion, Fire, and Temperature.

On ſome of the above articles we ſhall now make a few additional obſervations, partly in conſequence of recent diſcoveries; and next advert to the following ſubdiviſions, namely, *Animal* HEAT, CALORIMETER, *Communication of* HEAT, *Free* or *Senſible* HEAT, and *Latent* HEAT.

Capacity for HEAT, or *Specific* HEAT.—That bodies of the ſame weight and temperature contain unequal quantities of heat has been ſhewn under the heads CAPACITY and COLD. It is of importance to aſcertain the ſpecific heats of different bodies, or the ratios of the quantities of heat neceſſary to raiſe them a given interval of temperature. This has been made the ſubject of experimental inquiry by ſeveral authors, as Black, Irvine, Crawford, Gadolin, Wilcke, Lavoiſier, Meyer, Leſlie, and Dalton. The following table of the capacities of certain bodies is derived from their reſults, the more objectionable ones being omitted.

TABLE of the ſpecific Heats of various Bodies.

	Equal Weights.	Equal Bulks.
Gaſes.		
Hydrogen - - - -	21.40*	.002
Oxygen - - - -	4.75*	.006
Common air - - -	1.79*	.002
Carbonic acid - - -	1.05*	.002
Azotic gas - - - -	.79*	.001
Aqueous vapour - - -	1.55*	.001
Liquids.		
Water - - - -	1.00	1.00
Arterial blood - - -	1.03*	
Milk (1.026 ſp. gr.) - -	.98	1.00
Carbonate of ammonia (1.035)	.95	.98
Carbonate of potaſh (1.30) -	.75	.98
Solution of ammonia (.948) -	1.03	.98
Common vinegar (1.02) -	.92	.94
Venous blood - - -	.89*	
Solut. com. ſalt (1.197) -	.78	.93
Solution of ſugar (1.17) -	.77	.90
Nitric acid (1.20) - -	.76	.96
Nitric acid (1.30) - -	.68	.88
Nitric acid (1.36) - -	.63	.85
Nitrate of lime (1.40) - -	.62	.87
Sulph. acid and water equal bulks	.52	.80
Muriatic acid (1.153) - -	.60	.70
Acetic acid (1.056) - -	.66	.70
Sulphuric acid (1.844) - -	.35	.65
Alcohol (85) - - -	.76	.65
Ditto (.817) - -	.70	.57
Sulphuric ether (.76) - -	.66	.50
Spermaceti oil (.87) - -	.52	.45
Mercury - - - -	.04	.55
Solids.		
Ice - - - - -	.90?	.83?
Dried woods, and other vegetable ſubſtances, from .45 to	.65	
Quicklime - - -	.30	
Pit-coal (1.27) - -	.28	.36
Charcoal - - - -	.26*	
Chalk - - - -	.27	.67
Hydrate of lime - -	.25	
Flint glaſs (2.87) - -	.19	.55
Muriate of ſoda - -	.23	
Sulphur - - -	.19	
Iron - - - - -	.13	1.00
Braſs - - - -	.11	.97
Copper - - - -	.11	.98
Nickel - - - -	.10	.78
Zinc - - - - -	.10	.69
Silver - - - -	.08	.84
Tin - - - - -	.07	.51
Antimony - - -	.06	.40
Gold - - - -	.05	.97
Lead - - - -	.04	.45
Biſmuth - - - -	.04	.40
Oxyds of the metals ſurpaſs the metals themſelves, according to Crawford.		

Thoſe marked * are entirely on Crawford's authority. There is reaſon to doubt of the accuracy of his reſults reſpecting the gaſes, from the extremely great difficulties which they preſent in regard to this inquiry. Mr. Dalton has given a theory or hypotheſis for the ſpecific heat of gaſes in general, which as ſuch merits attention. It may be ſeen under the article GAS. The manner in which the ſpecific heats above given are obtained may be ſeen in the articles CAPACITY and COLD, and in the works of the above mentioned authors. It is believed that the capacity of bodies is not quite permanent at all temperatures, even while they retain their form, though the variation of the capacity is probably ſmall in general; it is ſuppoſed to increaſe with the temperature. Mr. Dalton ſeems to think the capacity of boiling water may be to that of water at the freezing temperature, as 102, or perhaps 105, to 100. See his New Syſtem of Chemiſtry, p. 51.

COLD.—To the reſults of experiments already related, which have been made with a view to aſcertain the point of *abſolute cold,* may be added thoſe of Mr. Dalton, given in a ſection on the natural zero of temperature, or abſolute privation of heat.

	Zero below 32° Fahrenheit.
From a mixture of 5.77 ſulph. acid and 1 water, by weight -	6400°
——————— 1.6 ——————— 1 ——————— -	4150
——————— 1 ——————— 2 ——————— -	6000
——————— 3 lime ——— 1 ——————— -	4260
——————— 7 nitric acid —— 1 lime ——— -	11000
From the combuſtion of hydrogen - - - -	5400
——————— phoſphorus - - - -	5400
——————— charcoal - - - -	6000
——————— oil, wax, and tallow - - -	6900
——————— ether - - - -	6000

The mean of all theſe is 6150°. From this Mr. Dalton concludes the zero to be about 6000° below the temperature of freezing water; but he allows that the differences in theſe reſults, though much leſs than had been made before, are ſtill ſuch as to throw ſome doubt upon the concluſion, and to require further inveſtigation.

COMBUSTION, *heat produced by*.—The quantity of heat liberated or detached during combuſtion, forms an important ſubject of inquiry. The calorimeter, an inſtrument invented by Lavoiſier and Meuſnier, was intended for this purpoſe; and the reſults of Lavoiſier and La Place, derived from this inſtrument, are detailed in the Elements of Chemiſtry, publiſhed by the former. Dr. Crawford has inveſtigated this ſubject with his uſual ingenuity, and without the aid of the calorimeter, the reſults of which are given in his Eſſay on Animal Heat and Combuſtion. More recently, Mr. Dalton has added ſomething to the knowledge on this ſubject by a ſeries of experiments publiſhed in his chemiſtry. The quantity of heat diſengaged by the combuſtion of a given weight of any combuſtible has been eſtimated by the number of pounds of ice which it would melt, this ſort of meaſure being adopted through the uſe of the calorimeter. For the manner of executing the experiments relating to this ſubject, we muſt refer to the works above mentioned. The following are the reſults obtained by the different authors.

	According to Lavoiſier.		According to Crawford.	
1 lb. of hydrogen, by combuſtion, melts	295	lbs. ice.	480	lbs. ice.
—— phoſphorus ——————	100	——	—	——
—— charcoal ——————	96.5	——	69	——
—— wax ——————	133	——	97	——
—— oil ——————	148	——	89	——

Dalton's Reſults on Combuſtion are as follow.

1 lb. hydrogen	takes	7	lbs.	oxygen;	produce	8	lbs.	water;	melts	320	lbs.	ice.
—— carbur. hyd.	——	4	—	——	——	5	—	wat. and car acid.	——	85	—	—
—— olefiant gas	——	3.5	—	——	——	4 5	—	——	——	88	—	—
—— carb. oxyd	——	.58	—	——	——	1.58	—	carb. acid.	——	25	—	—
—— oil, wax, and tallow	——	3.5	—	——	——	4.5	—	wat. and car. acid.	——	104	—	—
—— oil of turp.	——	——	—	——	——	——	—	——	——	60	—	—
—— alcohol	——	——	—	——	——	——	—	——	——	58	—	—
—— ether	——	3	—	——	——	4	—	——	——	62	—	—
—— phoſphorus	——	1.5	—	——	——	2.5	—	phoſ. acid.	——	60	—	—
—— charcoal	——	2.8	—	——	——	3.8	—	carb. acid.	——	40	—	—
—— ſulphur	——	——	—	——	——	——	—	ſulphurous acid	——	20	—	—
—— camphor	——	——	—	——	——	——	—	wat. and car. acid.	——	70	—	—
—— caoutchouc	——	——	—	——	——	——	—	——	——	42	—	—

This author adds, that the heat given out by the combuſtion of 1lb. of charcoal, and perhaps alſo of pitcoal, is ſufficient (if there was no loſs) to raiſe 45 or 50lbs. of water from the freezing to the boiling temperature, or it is ſufficient to convert 7 or 8lbs. of water into ſteam.

EXPANSION. We have before given the expanſion of ſolids, of liquids, and of aeriform fluids by heat, from which it appears that if the common thermometer be deemed an accurate meaſure of temperature, there is nothing like a general law of expanſion to be found either applicable to ſolids or to fluids. Few experiments have been made on the progreſſive expanſion of ſolids; they are believed to expand nearly in a uniform manner. De Luc has ſhewn that liquids expand increaſingly with the temperature. Gay Luſſac contends that air expands uniformly, or in arithmetical progreſſion with the temperature from 32° to 212°; but in this reſpect he is oppoſed by every one elſe. Dalton maintains that the expanſion of pure liquids, ſuch as mercury and water, is in proportion, not to the temperature, but to the ſquare of the temperature reckoned from the freezing point, or rather the point of maximum denſity of the liquids; conſequently he concludes the common equal diviſion of the thermometer to be erroneous. He aſſerts that a thermometer of water and one of mercury, graduated upon the above principle, will agree with each other; alſo that the expanſion of air will be in geometrical progreſſion to the degrees of ſuch thermometer; that the expanſive force of ſteam over water will likewiſe conſtitute a geometrical progreſſion; and laſtly, that the refrigeration of heated bodies will obſerve a ſimilar law; that is, the decreaſe in temperature will be geometrical for equal intervals of time, provided the temperature be eſtimated by a thermometer of the new graduation. Theſe very important concluſions are derived from experience, and have not yet been controverted. (See TEMPERATURE and STEAM). He determines the maximum denſity of water to be at 36°, and not at 40°, as has been lately believed, and that it expands equally by the addition or abſtraction of temperature, from that point till congelation takes place.

CALORIMETER was the name given to an inſtrument invented by Lavoiſier and La Place, and deſcribed in the Elements of Chemiſtry of the former, and in the Memoirs of the Academy for 1780. The calorimeter is repreſented in plate 6. of the Elements (tranſlated by Kerr). It is ſhewn in perſpective at *fig.* 1, and its interior ſtructure is engraved at *figs.* 2 and 3, the former being a horizontal and the latter a perpendicular ſection. Its capacity or cavity is divided into three parts, which, for better diſtinction, may be named the interior, middle, and external cavities. The interior cavity *ffff*, *fig.* 4, into which the ſubſtances ſubmitted to experiment are put, is compoſed of a grating or cage, of iron wire, ſupported by ſeveral iron bars; its opening or mouth L M, is covered by the lid H G, which is compoſed of the ſame materials. The middle cavity *b b b b*, *figs.* 2 and 3, is intended to contain the ice which ſurrounds the interior cavity, and which is intended to be melted by the caloric of the ſubſtances employed in the experiment. The ice is ſupported by the grate *m m* at the bottom of the cavity, under which is placed the ſieve *n n*. Theſe two are repreſented ſeparately in *figs.* 5 and 6. In proportion as the ice contained in the middle cavity is melted by the caloric diſengaged from the body, placed in the interior cavity, the water runs through the grate and ſieve, and falls through the conical funnel *c c d*, *fig.* 3, and the tube *x y*, into the receiver F, *fig.* 1. This water may be retained or let out at pleaſure, by means of the ſtop-cock *u*. The external cavity *a a a a*, *figs.* 2 and 3, is filled with ice, to prevent any effect upon the ice in the middle cavity from the heat of the ſurrounding air, and the water produced from it is carried off through the pipe S T, which ſhuts by means of the ſtop-cock *r*. The whole machine is covered by the lid F F, *fig.* 7, which is made of tin, and painted with oil colour, to prevent ruſt. When this machine is employed, the middle cavity *b b b b*, *figs.* 2 and 3, the lid G H, *fig.* 4, of the interior cavity, the external cavity *a a a a*, *figs.* 2 and 3, and the general lid F F, *fig.* 7, are all filled with pounded ice, well rammed, ſo that no void ſpaces remain, and the ice of the middle cavity is allowed to drain. The machine is then opened, and the ſubſtance ſubmitted to experiment being placed in the interior cavity, it is inſtantly cloſed. After waiting till the included body is completely cooled to the freezing point, and the whole melted ice has drained from the middle cavity, the water collected in the veſſel F, *fig.* 1, is accurately weighed. The weight of the water produced during the experiment, is an exact meaſure of the caloric diſengaged during the cooling of the included body, as the heat diſengaged is evidently ſpent in converting part of the interior ice into water, at the rate of 135° or 140° for each pound of water. That is, as much heat is required to melt a pound of ice as would raiſe a pound of water 140°. The ſubſtances to be operated upon are placed in the thin iron bucket, *fig.* 8, the cover of which has an opening fitted with a cork, into which a ſmall thermometer is fixed, or ſometimes a matraſs, *fig.* 10, with a ſimilar thermometer, which ſtands in the interior cavity upon the ſmall cylindrical ſupport R S, *fig.* 10. Care muſt be taken that no communication ſubſiſt between the middle and external cavities of the calorimeter; leſt the ice melted by the external air ſhould mix with that melted by the ſubject of the experiment. The ice employed ſhould not be under 32°, and the air ſhould be ſomewhat above 32°, in the place where the experiment is performed. When the inſtrument is to be applied to find the heat given off by animals, and by combuſtion, &c. two ſmall tubes are neceſſary to be connected with the inſtrument, the one to convey freſh air into the interior, and the other to take off the uſed air. When the capacities of bodies for heat are to be found by this inſtrument, the heated ſolid or liquid (due allowance being made for the containing veſſel) is placed in the interior capacity of the calorimeter, and ſuffered to remain till it attains the temperature of 32°; then the weight of the melted ice being found $= w$, and the weight of the body being denoted by s, and the number of degrees of temperature it is reduced by n, we have this formula; $\frac{140\,w}{n\,s} =$ the capacity of the body, that of water being unity. For example, Lavoiſier and La Place found 7.7lbs. of iron heated to 207°.5, melted 1.11lbs. of ice; here $w = 1.11$, $s = 7.7$, and $n = 207°.5 - 32° = 175°.5$; whence $\frac{140 \times 1.11}{175.5 \times 7.7}$ $= .115$ for the ſpecific heat of iron.

The calorimeter, though a promiſing inſtrument in theory, has not anſwered expectation in practice; it is liable to ſome uncertainties, particularly with regard to the quantity of water which may remain adhering to the pounded ice of the inner veſſel on the principle of capillary attraction, and to the obſtruction of its deſcent by an agglutination of the fragments of ice in the lower part of the veſſel. See Wedgwood, Philoſ. Tranſ. vol. 74.

Communication of HEAT, including its *radiation, refraction, reflection,* &c.—The communication of heat from one body to another, or from one part to another of the ſame body, or the motion of heat in general, forms one of its moſt intereſting characters. Many important facts have recently been aſcertained on this ſubject by count Rumford, Dr. Herſchel, and Mr. Leſlie. That rays of heat come from the ſun along with the rays of light, but capable of being ſeparated from them by the refraction of a priſm, has been ſhewn by Dr. Herſchel. (See REFRACTION.) He has ſhewn that the rays of heat are leſs refrangible than thoſe of light and that by a priſm they are refracted to the red end of the ſpectrum principally, and are moſt denſe and powerful ſomewhat beyond the red extremity. The velocity of the ſolar heat is probably much the ſame as that of light. This heat is ſubject to reflection, as is evinced by placing a body on the focus of a concave mirror expoſed to the ſun. It is remarkable that culinary heat is equally ſubject to reflection as ſolar heat, but not to refraction. Mr. Leſlie is of opinion, that the velocity of reflected heat is the ſame as that of ſound, and that the reflected heat is conveyed through the air by pulſations, like ſound, &c. but this opinion does not ſeem well founded.

There are two modes of communicating heat, which to all appearances are eſſentially different, though perhaps the difference may not be real; the one called *radiation*, is that by which the ſun and all ignited and hot bodies diſperſe their heat in every direction, when ſurrounded by an elaſtic medium or a vacuum; the other, the flow and gradual communication of heat, ſuch as is experienced along a bar of iron when one end of it is put into a fire; the heat appears to travel from one molecule to another till it arrives at the extremity, and is then thrown off or radiated into the air.

The laws of the radiation of heat and the ſubſequent reflection of it, have lately been inveſtigated with great ſkill by Mr. Leſlie, and ſome new and unexpected reſults have been obtained. See his "Enquiry on Heat." 1ſt. The quantity of heat which radiates from a body depends in great part on the ſurface of the body; if the body is covered with black paint, paper, &c. it will radiate eight times as much heat as if the ſurface was metallic. 2dly. If the bulb of a thermometer be covered with tinfoil, the impreſſion of radiant heat upon it is only $\frac{1}{5}$ of what it would be upon the glaſs ſurface of the thermometer. 3dly. A metallic mirror reflects 10 times as much heat from an ordinary fire, or from any heated body, as a ſimilar glaſs mirror does. The laſt too reflects the heat from its *anterior* ſurface, and not from the quickſilvered one. This circumſtance exhibits a difference between ſolar and culinary heat. From theſe facts it ſhould ſeem that metals are eminently diſpoſed to *reflect* radiant heat, and of courſe not to abſorb it; whereas black paint, paper, glaſs, &c. are diſpoſed to *abſorb* and not to reflect it; but when elevated in temperature they are eminently diſpoſed to *radiate* heat. In fact this power is probably proportional to their capacity for heat. 4thly. Screens of glaſs, paper, tinfoil, &c. being placed between the radiating body and the reflector, were proved to intercept the radiant heat completely; but being heated themſelves by the direct radiant heat, in time the thermometer was affected by their radiation. The heat radiating from hot water, does not then ſeem capable of being tranſmitted through glaſs, like the ſolar heat. 5thly. Radiant heat ſuffers no ſenſible loſs in its paſſage through the air; a greater or leſs radiant body produces the ſame effect, provided it ſubtends the ſame angle at the reflector, agreeing with light in this reſpect. 6thly. The intenſity of reflected heat diminiſhes inverſely as the diſtance; that is, the denſity of heat reflected from a concave mirror in any point of the focus, is inverſely as the diſtance of the hot body from the mirror; whereas in regard to light, the denſity is known to be uniformly the ſame, or ſubject to no change on account of diſtance. The focus of heat, too, differs from that of light, being nearer to the reflector. The heating effect diminiſhes rapidly in going out, but ſlowly in going inward towards the reflector. Theſe are new and unexpected facts, which, if eſtabliſhed, will afford ſome remarkable differences betwixt heat and light. 7thly. The quantity of heat which a ſtrongly radiating ſurface throws off, is ſomewhat more than that which is carried off by the atmoſphere according to Mr. Leſlie; but Mr. Dalton infers it to be ſomewhat leſs.

For the law obſerved in the cooling of bodies, ſee REFRIGERATION.

2. The ſlow and gradual communication of heat from particle to particle, is a phenomenon which appears under two very different points of view, as we contemplate it in a fluid or ſolid body. In a fluid, the particles are no ſooner heated than they become ſpecifically lighter, and immediately commence an aſcending motion in the fluid (if they are not already on the ſurface). By theſe means the circulation or diffuſion of the heat is infinitely accelerated. The fact has been finely elucidated by the experiments of count Rumford, in his ſeventh eſſay. But in the caſe of ſolid bodies, the particles of which are fixed, the heat muſt be propagated from one to another, *ſeriatim*. Whether this communication is by radiation, as in the former caſe, is not very eaſy to decide; perhaps the ſlowneſs of the progreſs of heat may depend upon the infinite number of ſucceſſive radiations from particle to particle. Some ſolids conduct heat much quicker than others. See CONDUCTORS *of heat*.

Free or Senſible HEAT.—This phraſe was lately common amongſt writers on the ſubject of heat, and is ſtill uſed by ſome; whenever heat is added to or taken from a body, and a proportionate change of temperature is obſerved in the body, then the heat is ſaid to be *free* or *ſenſible* to the thermometer.

Latent HEAT.—This phraſe was firſt uſed by Dr. Black. It was ſuggeſted from the diſcovery, that a large quantity of heat ſometimes diſappears, or is abſorbed by a body, without any increaſe of temperature. This commonly happens when a body from a ſolid becomes liquid, or from a liquid becomes aeriform: and ſometimes, when two bodies of the ſame temperature combine, a great degree of cold is produced, but when a due portion of heat is acquired from the ſurrounding bodies, the temperature is reſtored. The heat which diſappears in theſe caſes is called *latent*. The expreſſion was perfectly proper and unexceptionable in the firſt inſtance, as ſimply denoting a fact, and perhaps was never underſtood in any other ſenſe by Dr. Black; but his pupils ſoon began to perceive that latent heat muſt, in all probability, be chemically combined with the body, and on this account, in a ſtate different from the ſenſible or common heat which thoſe bodies give or receive upon a change of temperature. This notion might have been right, but ſucceeding experience has ſhewn it to be otherwiſe. The heat ſo abſorbed has been found in moſt, if not all caſes, to be employed in enlarging the capacity of the new-formed body for heat, and is therefore preciſely in the ſame ſituation as the reſt of the heat in the body. The phraſes *free* and *ſenſible* heat, and *latent* heat are now therefore diſuſed by the moſt diſtinguiſhed writers, as calculated to ſuggeſt incorrect views of the ſubject.

Animal HEAT.—The exceſs of temperature which certain animals poſſeſs above that of the ſurrounding medium is called *animal heat*. The cauſe of this has been an object of eager enquiry amongſt phyſiologiſts. We owe the principal elucidation of this obſcure ſubject to the modern diſcoveries in pneumatic chemiſtry, and in the general principles of heat, and more particularly to the ſagacity and acute obſervations of the late Dr. Crawford, whoſe experiments on animal heat, and the inflammation of combuſtible bodies, may be conſidered as forming an era in phyſiological and chemical ſcience.

The temperature of the vital parts of the human body is at a medium about 98° of Fahrenheit. It is obſerved to be much the ſame in all ſeaſons and climates; but during an inflammatory fever it has been known to be elevated 10 or 12°. Several of the warm-blooded animals poſſeſs nearly the ſame temperature as man. This temperature, as is well known, is far above the common temperature of the atmoſphere; it becomes an object of enquiry then, what is the ſource of heat in animals, which ſupplies the conſtant waſte occaſioned by the cooling power of the atmoſphere. The conjectures and opinions on this head have been various, and moſt of them improbable, as was likely before the properties of heat and elaſtic fluids were developed. Some have aſcribed animal heat to the attrition of the particles of the blood againſt the coats of the arteries in the courſe of circulation; others imagine the ſource of heat to be in the change the aliment undergoes in the proceſs of digeſtion; others ſuppoſe a gradual evolution of phlogiſton in the vaſcular ſyſtem to take place, and to be accompanied with heat. Dr. Black was of opinion that reſpiration was the cauſe of animal heat, which was generated in the lungs and diffuſed over the reſt of the body by means of the circulation. This opinion Dr. Crawford ſucceeded in eſtabliſhing, by a maſterly train of reaſoning and experience, of which we ſhall now give an abſtract, with ſuch modifications as ſucceeding diſcoveries have induced. See Crawford on Animal Heat, 2d edit.

The circumſtances that warm-blooded animals are furniſhed with lungs, and that, in breathing, carbonic acid is generated, could not fail to ſuggeſt to Dr. Black an analogy betwixt the combuſtion of charcoal and reſpiration; but not following up the views which his diſcoveries on heat had opened, he ſuffered Drs. Irvine and Crawford to anticipate him in explaining the phenomena of what he called *latent heat*. Irvine held that the appearance or diſappearance of heat, or rather temperature, was owing to a change in the capacities of bodies, produced by chemical or other means; whereas the language of Black was calculated to convey the notion of heat exiſting in bodies in two diſtinct modes, namely, as *ſenſible* and *latent*, or *free* and *combined* heat, terms which have been adopted ſince by many writers to convey ſuch ſignification. (Which ſee below.) Crawford purſued the path pointed out by Irvine. He lays down a number of general facts concerning heat, which he ſupports by appropriate obſervations, namely, 1. That heat has a tendency to diffuſe itſelf. 2. That the quantity of heat in a body is limited. 3. That the quantity of heat in an homogeneous body of a given temperature is as its bulk. 4. That the variations in the quantity of abſolute heat in an homogeneous body, while it retains its form, are nearly proportional to its variations of temperature, as meaſured by a mercurial thermometer. 5. That the capacities of bodies for containing heat are nearly permanent, while they retain their form. 6. That when, by expoſure to heat, ſolid bodies become fluid, they abſorb a portion of heat which is neceſſary to their fluidity, and which does not increaſe their temperature; and when, by expoſure to cold, they become ſolid again, they part with the heat which they had before abſorbed,—that when water is converted into vapour, a quantity of heat is abſorbed, which does not increaſe the temperature. And, 7. That unequal quantities of abſolute heat are neceſſary, to produce equal changes of temperature in heterogeneous bodies.

Though ſeveral of theſe facts are ſufficiently evident to be admitted as axioms, yet others are not ſo, and even ſome queſtion ſtill exiſts as to their accuracy; but ſuppoſing that doubtful, the circumſtance will ſcarcely affect the general concluſions reſpecting the origin and diffuſion of animal heat.

Crawford advances the following ſeries of propoſitions: 1. That the quantity of abſolute heat contained in pure air (oxygenous gas) is diminiſhed by the change which it undergoes in the lungs of animals, and the quantity of heat in any kind of air that is fit for reſpiration, is nearly proportional to its power of ſupporting animal life. This propoſition is ſupported by the reſults of a great variety of very ingenious but delicate experiments on the heat imparted by elaſtic fluids. The former part of the propoſition is the only one eſſential to the theory; the latter part is probably incorrect, as neither the nature nor number of elaſtic fluids was well known at that time. His ſecond propoſition is, that the blood which paſſes from the lungs to the heart, by the pulmonary vein, contains more abſolute heat than that which paſſes from the heart to the lungs by the pulmonary artery. To eſtabliſh this, experiments were made on mixtures of given weights of water and arterial blood, and water and venous blood; from which it appeared that more heat was imparted by arterial blood to water than by venous blood, all other circumſtances being the ſame. In the experiments with the blood of a ſheep, the comparative heats of the arterial and venous blood were as 115 to 100; in thoſe of a dog, as 114 to 100. The third propoſition is, that the comparative quantities of heat in bodies ſuppoſed to contain phlogiſton (combuſtible) are increaſed by the changes which they undergo in the proceſſes of calcination and combuſtion. This propoſition, relating more immediately to the theory of combuſtion, than to that of animal heat, needs no animadverſion here. But though he confirms the fact by various experiments, as far as regards the particular bodies operated upon, it does not ſeem probable that the propoſition is univerſally true. The fourth propoſition is, that when an animal is placed in a warm medium, the colour of the venous blood approaches more nearly to that of the arterial, than when it is placed in a cold medium; the quantity of reſpirable air which it phlogiſticates (that is oxygen, which it converts into carbonic acid) in a given time, in the former inſtance, is leſs than that which it phlogiſticates, during an equal ſpace of time, in the latter; and the quantity of heat produced when a given portion of pure air is altered by the reſpiration of an animal is nearly equal to that which is produced when the ſame quantity of air is altered by the burning of wax or charcoal. This extenſive and important propoſition is ſupported by the reſults of 18 experiments. The firſt conſiſts in immerſing a dog into a warm medium (water or air) for a due time, and then drawing a quantity of blood from an artery and a vein; when the venous blood was found nearly as florid a red as the arterial: but when a dog had been confined for a time, in a cold medium, the venous blood was of a much darker hue than in the former caſe. The ſecond, third, fourth, fifth, ſixth, and ſeventh experiments ſhew that a ſmall animal, ſuch as a guinea-pig, requires more oxygen, and produces more carbonic acid, when placed in a cold than in a warm medium. The eighth ſhews the quantity of heat produced by the combuſtion of a given weight of wax, and the ninth the quantity of oxygen required, or which diſappears in the proceſs. The tenth ſhews the quantity of heat produced by a guinea-pig in a given time, and the eleventh the quantity of oxygen ſpent in the ſame time. The twelfth ſhews the heat produced by the combuſtion of a given weight of charcoal, and the thirteenth and fourteenth the quantity of oxygen which diſappears, and is found in the carbonic acid. From this it appears that the weight of the charcoal is to that of the oxygen as 1 to 2 nearly; but more recent and accurate experiments of other authors find the ratio 1 to 2.6 nearly. In the fifteenth experiment, wax was again burnt to determine whether aqueous vapour was produced in quantity, which appeared to be the caſe; and the ſixteenth and ſeventeenth go to prove, that in the combuſtion of charcoal nothing but carbonic acid is produced. The eighteenth experiment ſeems to prove that in the reſpiration of a guinea-pig ſome of the oxygen is ſpent in producing aqueous vapour; but other experiments, ſince made in more favourable circumſtances, do not warrant this concluſion. Collecting and comparing ſome of theſe reſults it appeared that the heat communicated to 31lb. 7oz. of water was as follows:

100 ounce meaſures of pure air altered	by the combuſtion of wax imparts 21°
	by the combuſtion of charcoal imparts 19°.3
	by the reſpiration of a guinea-pig 17°.3

Upon a review of the preceding facts and propoſitions it ſeems warrantable to conclude, 1ſt. That the air inſpired by animals contains more abſolute heat than the air expired. 2dly. That the blood in the lungs receives the difference of heat, but without any material change of temperature, the capacity of the blood for heat being immediately enlarged, juſt ſo much as to receive the additional heat, without any change of temperature. 3dly. That the blood, during the circulation through the body, gradually changes its capacity from a greater to a leſs, giving out heat to the body to ſupply the waſte, till it again arrives at the lungs, where it parts with charcoal, and receives more heat. 4thly. That the expenditure of heat in an animal is proportional to the carbonic acid produced or loſs of oxygen, and is accurately or nearly the ſame as would be given out by the combuſtion of charcoal in a quantity ſufficient to produce the ſame acid. And, 5thly. That the changes in the capacity and other qualities of the blood are greater, when an animal is placed in a cold than in a warm medium. Hence if theſe concluſions be admitted, the ſource of animal heat, and the mode of its diſtribution to the various parts of the body, muſt be conſidered as ſufficiently demonſtrated.

We ſhall here ſubjoin ſome additional obſervations and facts with regard to animal heat.

The heat of animals is very various, both according to the variety of their kinds and the difference of the ſeaſons: accordingly, zoologiſts have divided them into hot and cold, reckoning thoſe to be hot which are near our own temperature, and all others cold whoſe heat is much below our's, and, conſequently, affects us with the ſenſe of cold; though, by their *vis vitæ*, they are kept ſomewhat warmer than the medium in which they live. To this latter claſs writers have commonly referred the whole inſect tribe; though Dr. Martine obſerves with reſpect to bees, that the heat of a ſwarm raiſed a thermometer buried among them above 97°, indicating a degree of heat ſcarce, if at all, inferior to our own. To this claſs alſo belong muſcles and oyſters, the bronchial fiſhes, ſnails, frogs, land and ſea tortoiſes, toads, vipers, and all the ſerpent kind.

The human kind forms the loweſt gradation in the claſs of hot animals: the heat of the human body, in its natural ſtate, according to Dr. Boerhaave, is ſuch as to raiſe the mercury in the thermometer to 92°, agreeing with Dr. Pitcairn's obſervation of the heat of the human ſkin, or at moſt to 94°. M. Amontons, by ſeveral trials, found the heat communicated to the human-body to be 91°, 92°, and 93°. Sir Iſaac Newton makes the external heat of the human body of the ſame temperature with that of a bird hatching eggs, to be 95°.5. Fahrenheit ſtates the heat of the human body and blood at 96°, which Muſchenbroek aſſigns to be the degree of heat communicated to the thermometer when immerged in the blood flowing from an animal. Dr. Martine infers, from a great number of trials, that the mean heat of the human ſkin is about 97° or 98°; being a little higher in ſome ſubjects, and a little lower in others; and the heat of the human urine, by which we may judge of that of the neighbouring viſcera, he ſays, is ſcarcely a degree hotter than the ſkin. Dr. Hales found the heat of his ſkin to be about 97°, and the heat of urine newly made about 103°. Mr. Hunter found, by ſinking the ball of the thermometer under his tongue, and keeping it there for ſome minutes, that the mercury roſe to 97°: in another experiment, he introduced the ball of the thermometer into the urethra about an inch, and when it had remained there a minute, the quickſilver roſe only to 92°; at two inches it roſe to 93°; at four inches to 94°; and when the ball had got as far as the bulb of the urethra, the quickſilver roſe to 97°. The heat of the rectum was 98°½ exactly.

With reſpect to ordinary quadrupeds, ſuch as dogs, cats, ſheep, oxen, ſwine, &c. the heat of their ſkin raiſes the thermometer four or five diviſions higher than that of the human kind, *viz.* to 100°, 101°, 102°, and ſome to 103°, and a little more. The cetaceous fiſhes are as hot as theſe; and the bird kind, as lord Bacon has long ſince obſerved, are warmer by three or four degrees than quadrupeds: for Dr. Martine has found, by lodging the bulb of the thermometer in the groin of ducks, geeſe, hens, &c. that the mercury was raiſed to 103°, 104°, 105°, 106°, and 107°, and in a hen hatching eggs he once found the height to be 108°. Dr. Crawford has collected the following obſervations relating to this ſubject; that thoſe animals which are furniſhed with lungs, and which continually reſpire the freſh air in great quantities, have the power of keeping themſelves at a temperature conſiderably higher than the ſurrounding atmoſphere: but animals that are not furniſhed with reſpiratory organs, are very nearly of the ſame temperature with the medium in which they live: the former, according to his theory, which is explained in the courſe of this article, continually abſorbing heat from the air, for which purpoſe they are provided with a pulmonary ſyſtem and double circulation. Farther, among the hot animals, thoſe are the warmeſt which have the largeſt reſpiratory organs, and which, conſequently, breathe the greateſt quantity of air in proportion to their bulk: thus, the reſpiratory organs of birds, compared with their ſize, are more extenſive than thoſe of any other animal; and birds are known to have the greateſt degree of animal heat. This fact is likewiſe explained by the ſame theory, and affords a confirmation of it; for, if animal heat depends upon a change which the air undergoes in the lungs, it is evident that, all other circumſtances being equal, the greater the quantity of air which is changed in a given time, the greater muſt be the heat produced. Moreover, in the ſame animal, the degree of heat is in ſome meaſure proportionable to the quantity of air inſpired in a given time: thus, we find that animal heat is increaſed by exerciſe, and by whatever accelerates reſpiration.

But it is obſerved, that the heat of animals varies in different individuals, and likewiſe in the ſame animals at different times; for, though in a healthful ſtate the variations are not great, yet, by accidents and diſeaſes, they may be much altered, and brought conſiderably above and below the natural ſtandard. Dr. Hales ſuppoſes the heat of the human blood in high fevers to be about 136°½; and Dr. Boerhaave relates certain experiments of Fahrenheit and others, from which it appears that animals were very ſoon deſtroyed in a heat of 146°; a ſparrow having died in leſs than ſeven minutes, a cat in about fifteen, and a dog in twenty-eight: and he concludes in general, that the ſerum of the blood may be coagulated by a degree of heat not much above 100°; whence Dr. Hales and Dr. Arbuthnot have been led to affirm, that the natural heat of the blood of a human creature approaches very near the degree of coagulation. But Dr. Martine obſerves, that he has found the blood to be heated five or ſix degrees above 100°, without any ſuch pernicious effects; and that the ſerum of blood and the white of an egg have continued thin and liquid, till the thermometer had indicated a degree of heat equal to 156°, which he ſuppoſes to extend beyond any thing that can ever be experienced by a living animal. The late ingenious Mr. Hewſon infers, from ſeveral experiments, that the lymph of the human blood coagulates at a degree of heat between 114° and 120½; and that the ſerum does not coagulate without 160° of heat: there is, therefore, no ground for the apprehenſion of Boerhaave and others, that the blood ſhould be coagulated by the animal heat, even whilſt it is circulating in the blood-veſſels; ſince the animal heat is naturally only 98 or 100°, and in the moſt ardent fever it is not raiſed above 112°. Phil. Tranſ. vol. lx. art. 33.

From ſome experiments made by Dr. Dobſon in a heated room it appears, that the white of an egg, incloſed in its own film, remained fluid in a heat of 224°, but coagulated in the ſame heat when contained in a tin veſſel or its own ſhell: he offers ſeveral conjectures for the explication of this phenomenon; the moſt probable of which ſeems to be, that tin is a more powerful conductor of fire from air, and robs this medium of its heat more readily than the film can do.

Philoſophers, miſled by the opinion of Boerhaave and the experiments above recited, had very generally imagined, that animals were incapable of enduring, without danger, any very conſiderable degree of heat: however, governor Ellis had obſerved, as long ago as the year 1758, that a man can live in air of a greater heat than that of his own body, and that the body in this ſituation continues its own cold. Phil. Tranſ. vol. l. p. 755.

Nevertheleſs, it was ſcarce conceivable, by reaſoning *à priori*, and in oppoſition to a ſuppoſed fact, that the human body could be ſafely expoſed to a heat only of the degree which proved fatal to the animals in the experiments related by Boerhaave. Accident, we may ſay, firſt led to the diſcovery of the fallacy of the general opinion on this ſubject. Meſſrs. Du Hamel and Tillet being employed in the years 1760 and 1761, in deſtroying an inſect which conſumed the grain of the province of Angoumois, contrived, for this purpoſe, to expoſe the affected corn, with the inſects included in it, in an oven, the heat of which was ſufficient to kill them without injuring the grain. With a view of aſcertaining the heat of this oven, they conveyed into it a thermometer, and being deſirous of knowing the preciſe heat of the mercury whilſt the thermometer remained in the oven, a girl, one of the attendants on the oven, entered it, and marked the thermometer with a pencil, after ſtaying two or three minutes, and the heat was found to be near 260° of Fahrenheit's ſcale; ſhe afterwards remained there ten minutes longer, the mercury in the thermometer ſtanding at 288°, or 76° above that of boiling water; and when ſhe came out of the oven, her complexion was conſiderably heightened, but her reſpiration was by no means quick and laborious. Theſe experiments were afterwards repeated, when another girl remained in the oven without much inconvenience, and under the ſame degree of heat, as long as the former, and even breathed in air heated to about 325° for the ſpace of five minutes. Theſe girls, ſays M. Tillet, were protected from the external action of the heat by their cloaths, which are bad conductors of heat, and enabled to breathe the air, thus violently heated, for a long time, without great inconvenience: to which we may add, ſays an ingenious anonymous remarker on this experiment, that the bulk of their bodies might alſo contribute to their ſecurity; and as in common reſpiration, the blood in its paſſage through the lungs is cooled by being brought into contact with the external inſpired air: in the preſent caſe, on the contrary, the veſicles and veſſels of the lungs, receiving at each inſpiration an air heated to 300°, muſt have been continually cooled and refreſhed, as well as the ſubcutaneous veſſels, by the ſucceſſive arrival of the whole maſs of blood contained in the interior parts of the body, whoſe heat might be ſuppoſed, at the beginning of the experiment, not to exceed 100°. Hiſt. Acad. Scienc. 1764, mem. ii.

Theſe extraordinary facts might poſſibly lead philoſophers into a new train of reaſoning and experiment on the ſubject of heat: accordingly, we find that Dr. Cullen has long ago ſuggeſted many arguments to ſhew, that living animals have a power of generating heat, independently of any common chemical or mechanical means either of friction or fermentation, and alſo of generating co'd or deſtroying heat, when the heat of the atmoſphere exceeded the proper temperature of their bodies. In order to examine and aſcertain this theory, Dr. George Fordyce prepared a ſuit of three rooms heated by flues in the floor; in one of which the air was in a dry ſtate, and in another loaded with moiſture, by pouring boiling water on the floor. In the firſt room the higheſt thermometer ſtood at 120°, and the loweſt at 110°; in the ſecond the heat was from 90° to 85°; and the third room felt moderately warm, whilſt the external air was below the freezing point. Dr. Fordyce, having undreſſed himſelf to his ſhirt in the third room, entered the ſecond room, and ſtaid five minutes in a heat of 90°; he then entered the firſt room, and having remained in the part heated to 110° for ten minutes, the water running down in ſtreams over his whole body, he removed to the part of the room heated to 120°, and after ſtaying there twenty minutes, he found that the thermometer, placed under his tongue and held in his hand, ſtood juſt at 100°, and that his urine was of the ſame temperature; his pulſe had gradually riſen till it made 145 pulſations in a minute; the external circulation was greatly increaſed, but his reſpiration little affected. The moiſture of his ſkin, he apprehended, was chiefly owing to the condenſation of the vapour in the room upon his body. In the ſecond experiment, the higheſt thermometer in the firſt room varied from 132° to 130°, and the loweſt ſtood at 119°. Having undreſſed in an adjoining chamber, he went firſt into the heat of 119°, and in half a minute the water flowed down over his whole body in ſtreams; having remained here fifteen minutes, he went into the heat of 130°; at this time the heat of his body was 100°, and his pulſe beat 126 times in a minute; in this ſituation a Florence flaſk, filled with water, heated to 100°, and wiped dry, became wet, and ſtreams of water continued to run down its ſides, till the heat of the water within had riſen to 122°. In this heat he remained fifteen minutes, and juſt before he left the room his pulſe made 139 beats in a minute, but the heat under his tongue, in his hand, and of his urine, did not exceed 100°.

Dr. Fordyce obſerves, on this experiment, that there was no evaporation, but conſtantly a condenſation of vapours on his body, and no cold was generated but by the animal powers. Having continued much longer in a much greater dry heat without being ſo much affected, he takes occaſion to infer, from this circumſtance, that dry air does not communicate its heat like air ſaturated with moiſture; and that the evaporation from the body, which takes place when the air is dry, aſſiſts its living powers in producing cold.

In another experiment, Dr. Fordyce, accompanied with four other gentlemen, went into the heated chamber where the air was dry, without taking off their clothes. When they firſt entered the room, the quickſilver ſtood above 150°, and they continued in it more than twenty minutes, in which time the heat had riſen about 12°. In another period of this experiment, the quickſilver ſtood at 198°, and they continued in this heat about ten minutes; but finding that the thermometer ſunk very faſt when they went together, they agreed to go in ſeparately. Dr. Solander ſtood in the room heated to 210° for three minutes, during which time the quickſilver ſunk to 196; and Mr. Banks (ſir Joſeph) remained ſeven minutes in the heat of 211°, in which time the quickſilver had ſunk to 198°. The heat of their bodies in theſe ſeveral experiments roſe very little above its uſual ſtate; and many ſtriking effects proceeded from their power of preſerving their natural temperature. Whenever they breathed on the thermometer, the mercury ſunk ſeveral degrees; every expiration afforded a pleaſant cooling impreſſion to the noſtrils, and their cold breath cooled their fingers. Dr. Blagden, on touching his ſide, found that it felt like a corpſe, though the actual heat of his body was 98°. When the heat of the air began to approach the higheſt degree which the apparatus made uſe of was capable of producing, their bodies in the room prevented it from riſing any higher; and when it had been previouſly raiſed above that point, immediately ſunk it. Theſe, and other circumſtances attending the experiments, clearly prove, that the body has a power of deſtroying heat; but, in eſtimating the heat which we are capable of reſiſting, it is neceſſary to conſider not only what degree of heat would be communicated to our bodies, if they poſſeſſed no reſiſting power, by the heated body, before the equilibrium of heat was affected, but alſo what time that heat would take in paſſing from the heated body into our bodies. On this principle, we bear very different degrees of heat in different mediums; and it appears, by other experiments, that the ſame perſon, who felt no inconvenience from air heated to 211°, could not bear quickſilver at 120°, and could juſt bear rectified ſpirit of wine at 130°, *i. e.* quickſilver heated to 120° furniſhed, in a given time, more heat for the living powers to deſtroy than ſpirits heated to 130°, or air to 211°. Accordingly, when they were in the heated rooms, their watch-chains and other pieces of metal felt ſo hot, that they could ſcarcely touch them;

whilſt the air, from which the metal derived all its heat, was only unpleaſant. From theſe experiments, it is concluded that no attrition, fermentation, or whatever elſe the mechanical and chemical phyſicians have deviſed, can explain a power capable of producing or deſtroying heat, juſt as the circumſtances of the ſituation require; this power muſt be referred to the principle of life itſelf; and yet this is only giving a name to a ſtill unknown cauſe. This power, however it acts, ſeems to attend life very univerſally; Mr. Hunter found a carp preſerve a coat of fluid water round him long after all the other water in the veſſel had been congealed by a freezing mixture; and he has alſo ſhewn, that vegetables poſſeſs ſome degree of this property of generating heat. The ſudden melting of ſnow on graſs, whilſt that on the gravel walk continues unthawed, and many other ſimilar phenomena, can be adequately explained only on this principle.

In ſubſequent experiments, the heat of the room was raiſed to 240°, and ſometimes to 260°; theſe exceſſive heats were borne for a conſiderable time with little inconvenience by the gentlemen, who expoſed themſelves to them, both naked and with their clothes on; nor was the heat of Dr. Blagden's body at all increaſed, though the velocity of his pulſe was, in one inſtance, more than doubled. A blaſt of the heated air from a pair of bellows was ſcarcely to be endured for the following obvious reaſon: when the ſame air remained for any time in contact with the body, part of its heat was deſtroyed, and, conſequently, the body was ſurrounded with a colder medium than the air of the room; whereas, when freſh portions of the air were applied to the body in ſuch a quick ſucceſſion, that no part of it could remain in contact a ſufficient time to be cooled, the heat muſt be ſenſibly greater. On this occaſion the gentlemen evinced the fallacy of the experiment related by Boerhaave, and which has been already mentioned; they ſhut up a bitch in the heated room, when the thermometer had riſen to 220°; in this ſituation ſhe was ſuffered to remain, without being immoderately affected, for 32′, and when ſhe was releaſed, and brought again into the cold air, ſhe appeared not to have received the leaſt injury. In the ſame heated air, which they breathed, eggs were roaſted quite hard in 20′, and beef-ſtakes were dreſſed in 33′; and by blowing the air upon ſome of them, in 13′.

The effect of evaporation, in preventing certain bodies, and particularly fluids, from receiving a degree of heat equal to that of the air, is ſhewn by ſome of theſe experiments to be very conſiderable. In the great heat juſt mentioned, pure water, expoſed in an earthen veſſel during an hour and a half, acquired only a heat of 140°, and afterwards continued ſtationary above an hour, at a degree much below the boiling point; but when its power of evaporating was checked, by dropping a ſmall quantity of oil on its ſurface, it boiled very briſkly. A ſaturated ſolution of ſea-ſalt acquired a heat of 230°, and was, conſequently, brought into a briſk ebullition, on covering its ſurface with a layer of oil.

Dr. Dobſon has alſo publiſhed an account of ſimilar experiments made by him in the ſweating-room of the hoſpital at Liverpool; the reſults of which are conformable to thoſe that have been already recited. It appears from theſe, as well as from the former experiments, that the pulſe is conſiderably accelerated by heated air, whilſt the animal heat varies little from its natural ſtandard; a fact which, as Dr. Dobſon obſerves, contradicts the opinion that has been generally received with regard to the cauſe of animal heat, *viz.* that it is produced by the attrition of the globules of the circulating fluids againſt the ſides of the containing veſſels; whereas it is ſeen, that the circulation may be amazingly quickened, whilſt there is little increaſe of the animal heat.

We may conclude in general, from the experiments and obſervations already recited, that man is ſo framed as to poſſeſs a power of keeping nearly the ſame tenor of heat in all the variations of the temperature of the air in ſummer and winter, in hot and cold climates; and, conſequently, changes his ſituation on the ſurface of the globe with much leſs inconvenience or injury than he could otherwiſe have done. The ſame power likewiſe happily adapts different animals to their reſpective deſtinations; the lizard and the cameleon remain cool under the equator, whilſt the whale and porpoiſe retain a degree of heat above that of the human body, though ſurrounded with the waters of the coldeſt northern ſeas, and amidſt mountains of ice, in the neighbourhood of the Pole.

Dr. Crawford obſerves, with regard to the power above illuſtrated, which animals poſſeſs, of producing cold, that, by the heat of the ſurrounding medium, the evaporation from the lungs is increaſed: and that if this increaſe to ſuch a degree as to carry off the whole of the heat which is detached from the air, the arterial blood, when it returns by the pulmonary vein, will have its ſenſible heat greatly diminiſhed, and will, conſequently, abſorb heat, from the veſſels which are in contact with it, and from the parts adjacent. And thus the ſame proceſs, which in one caſe ſupplies the animal with heat, according to Dr. Crawford's theory, will now become the inſtrument of producing cold; and the quantity of cold produced will be in proportion to the velocity of the blood through the lungs, and the fulneſs and frequency of the reſpiration. Thus, in winter ſeaſons, and cold climates, the veſſels on the ſurface of the body are conſtricted, the blood is determined to the lungs, and the pulſe and reſpiration are rendered full and frequent; ſo that the quantity of heat abſorbed from the air is proportionably increaſed. But in ſummer, the blood is determined to the ſurface, the velocity of the circulation through the lungs is diminiſhed, and the quantity of heat abſorbed is diminiſhed: beſides, if the quantity of heat abſorbed by the vapour exhaled in reſpiration be ſo great, as that the remaining portion of the heat depoſited by the air is not ſufficient to ſupport the temperature of the arterial blood, ſome degree of cold will be produced in conſequence of the change which the blood undergoes in the lungs. Martine's Eſſay, Eſſ. vi. Phil. Tranſ. vol. lxv. part i. art. 12. Id. ibid. part ii. art. 43. art. 45. art. 47. Id. vol. lxviii. part i. art. 2. Crawford on Heat, &c. p. 31. 80, &c.

Heat, in *Geography*. The diverſity of the heat of climes and ſeaſons ariſes from the different angles under which the ſun's rays ſtrike upon the earth's ſurface.

It is ſhewn in mechanics, that a moving body ſtriking perpendicularly on another, acts on it with all its force; and that a body ſtriking obliquely, acts with the leſs force, the more it deviates from the perpendicular. Now fire, moving in right lines, muſt obſerve the ſame mechanical law as other bodies; and conſequently its action muſt be meaſured by the ſine of the angle of incidence: and hence fire, ſtriking on any obſtacle in a direction parallel thereto, has no ſenſible effect, becauſe the ratio is almoſt infinite, *i. e.* it is nothing. Accordingly, the ſun, radiating on the earth in the morning, ſcarcely produces any warmth at all.

Hence Dr. Halley gives a mathematical computation of the effect of the ſun under different ſeaſons and climates; proceeding on this principle, that the ſimple action of the ſun, as all other impulſes or ſtrokes, is more or leſs forcible, according to the ſines of the angles of incidence, or to the perpendiculars let fall on the plane; whence, the vertical ray (which is of the greateſt heat) being put for radius, the force of the ſun on the horizontal ſurface of the earth will be to that, as the ſines of the ſun's altitude at any other time.

Hence it follows, that the time of the continuance of the ſun's ſhining being taken for a baſis, and the ſines of the ſun's altitude erected on it as perpendiculars, and a curve drawn through the extremities of thoſe perpendiculars, the area comprehended will be proportionate to the collection of the heat of all the ſun's beams in that ſpace of time.

Hence it will follow likewiſe, that under the pole the collection of all the heat of a tropical day is proportionate to a rectangle of the ſine of 23 degrees and a half into 24 hours, or the circumference of a circle; that is, the ſine of 23 degrees and a half being nearly $\frac{4}{10}$ of radius, as $\frac{8}{10}$ into 12 hours. Or, the polar heat is equal to that of the ſun continuing 12 hours above the horizon at 53 degrees height; than which the ſun is not five hours more elevated under the equinoctial.

But whereas the nature of heat is to remain in the ſubject, after the luminary that occaſioned its being heated is removed, and particularly in the air, under the equinoctial the twelve hours abſence of the ſun does but little diminiſh the motion impreſſed by the paſt action of his ray wherein heat conſiſts, before he riſes again; but under the pole, the long abſence of the ſun for ſix months, wherein the extremity of cold does obtain, hath ſo chilled the air, that it is, as it were, frozen, and cannot, before the ſun has got far towards it, be any ways ſenſible of his preſence, his beams being obſtructed by thick clouds, and perpetual fogs and miſts.

That heat and cold very much depend on the clearneſs or opacity of the ſky, is atteſted by facts; for the winter cold in South America is very ſharp, becauſe the atmoſphere is loaded with clouds and icy particles, which intercept the ſolar rays. At Lima, in lat. 12° ſouth, where the ſky is never free from vapours, the heat is moderate, but at the diſtance of a few miles the ſky is more ſerene, and there the heat is greater; and at Carthagena, in lat. 11° north, the heat is, principally on this account, intolerable. Add, that the different degrees of heat and cold, in different places, depend, in a very great meaſure, upon the accidents of ſituation, with regard to mountains or vallies, rivers, ſeas, and woods, and the nature and colour of the ſoil, &c. The firſt, eſpecially when they are lofty and covered with ſnow, greatly help to chill the air by the winds which come over them, and which blow in eddies through the levels beyond. Accordingly, the higheſt mountains, even under the equator, are, during the whole year, covered with ſnow. Thus, M. Bouguer found the cold of Pinchinca, one of the Cordilleras, elevated 5760 feet above Quito, immediately under the line, to extend from ſeven to nine degrees under the freezing point every morning before ſun-riſe; and hence at a certain height, which varies in almoſt every latitude, it conſtantly freezes at night in every ſeaſon, though in the warm climates it thaws to ſome degree the next day. This height he calls the "lower term of congelation," which he places between the tropics at the height of 15,577 feet; but in lat. 28°, he thinks that it ſhould commence, in ſummer time, at the height of 13,440 feet from the level of the ſea. See CONGELATION.

Mountains ſometimes, turning a concave ſide towards the ſun, have the effect of a burning mirror on the ſubject plain; and the like effect is ſometimes had from the concave or convex parts of clouds, either by refraction or reflection. And ſome have even taken theſe to be ſufficient to kindle the exhalations lodged in the air.

As to ſoils; a ſtony, ſandy, or chalky earth, it is known, reflects moſt of the rays into the air again, and retains but few; by which means a conſiderable acceſſion of heat is derived to the air; as, on the contrary, black looſe ſoils abſorb moſt of the rays, and return few into the air, ſo that the ground is much the hotter.

This the peaſants, who inhabit the moraſs de Veenen, where turf is dug, are very ſenſible of: walking there but a little while, the feet grow extremely hot, but the face not at all; on the contrary, in a ſandy place, the feet are ſcarce warm, when the face is ſcorched by the great reflection.

It is certain, that heat communicated by the ſun to bodies on the earth, depends much upon other circumſtances beſides the direct force of its rays. Theſe muſt be modified by our atmoſphere, and variouſly reflected and combined by the action of the ſurface of the earth itſelf, to produce any remarkable effect of heat; ſo that if it were not for theſe additional circumſtances, it is much to be queſtioned whether the naked heat of the ſun would be very ſenſible. To this purpoſe, it is obſerved by Ulloa, in his Voyage to Peru, that on the weſtern ſhore of that kingdom, from Santa Maria de la Parilla to Lima, it is winter on the mountains from January or February to June, whilſt it is ſummer in the vallies; but from June to November or December, it is winter in the vallies, and ſummer in the mountains. See on this ſubject the article *Temperature of the* ATMOSPHERE.

The following table gives the heat to every tenth degree of latitude to the equinoctial and tropical ſun, by which an eſtimate may be made of the intermediate degrees:

Lat.	Sun in ♈ ♎	Sun in ♋	Sun in ♑
0	20000	18341	18341
10	19696	20290	15834
20	18794	21737	13166
30	17321	22651	10124
40	15321	23048	6944
50	12855	22991	3798
60	10000	22773	1075
70	6840	23543	000
80	3473	24673	000
90	0000	25055	000

For an account of the general principles and problem, by which this table is calculated, ſee Phil. Tranſ. abr. vol. ii. p. 167, &c.

From this table are deducible the following corollaries:

1. That the equinoctial heat, when the ſun becomes vertical, is as twice the ſquare of the radius; which may be propoſed as a ſtandard to be compared with, in all other caſes.

2. That under the equinoctial, the heat is as the ſine of the ſun's declination.

3. That in the frigid zones, when the ſun ſets not, the heat is as the circumference of a circle into the ſine of the altitude at 6. And conſequently, that in the ſame latitude theſe aggregates of warmth are as the ſines of the ſun's declination; and, at the ſame declination of the ſun, they are as the ſines of the latitudes, and generally they are as the ſines of the latitudes into the ſines of declination.

4. That the equinoctial day's heat is every where as the coſine of the latitude.

5. In all places where the ſun ſets, the difference between the ſummer and winter heats, when the declinations are contrary, is equal to a circle into the ſine of the altitude at 6, in the ſummer parallel; and, conſequently, thoſe differ-

ences are as the ſines of the altitude into, or multiplied by, the ſines of declination.

6. From the foregoing table it appears, that the tropical ſun, under the equinoctial, has of all others the leaſt force; under the pole it is greater than any day's heat whatever, being to that of the equinoctial as 5 to 4.

From the table, and theſe corollaries, a general idea may be conceived of the ſum of all the actions of the ſun in the whole year; and thus that part of heat which ariſeth ſimply from the preſence of the ſun may be brought to a geometrical certainty. The heat of the ſun, for any ſmall portion of time, is always as a rectangle, contained under the ſine of the angle of incidence of the ray producing heat at that time.

Many objections have been urged againſt the preceding theory of Dr. Halley: ſome have urged, that the effect of the ſun's heat is not in the ſimple ratio of the ſines of the angles of incidence, but in the duplicate ratio of theſe ſines; alleging, that this is the law of the impulſe of fluids. (See Force.) Dr. Halley himſelf was well appriſed, that many other circumſtances, beſides the direct force of the ſun's rays, contributed to augment or diminiſh the effect of this and the heat reſulting from it in different climates; and, therefore, no calculation, formed on the preceding theory, can be ſuppoſed to correſpond exactly with obſervation and experiment. It has alſo been objected, that, according to the preceding theory, the greateſt heat in the ſame place ſhould be at the ſummer ſolſtice, and the moſt extreme cold at the winter ſolſtice; which is contrary to experience. (See *Temperature of the* Atmosphere.) To this objection it may be partly replied, that heat is not produced in bodies by the ſun inſtantaneouſly, nor do the effects of his heat ceaſe immediately when his rays are withdrawn; and, therefore, thoſe parts which are once heated, retain the heat for ſome time, which, with the additional heat daily imparted, makes it continue to increaſe, though the ſun declines towards the ſouth: and this is the reaſon why July is hotter than June, although the ſun has withdrawn from the ſummer tropic; as we find it is generally hotter at three in the afternoon, when the ſun has declined towards the weſt, that at noon, when he is on the meridian. As long as the heating particles, which are conſtantly received, are more numerous than thoſe which fly away or loſe their force, the heat of bodies muſt continually increaſe. After the ſun has left the tropic, the number of particles, which heat our atmoſphere and earth, conſtantly increaſes, becauſe we receive more in the day than we loſe at night, and therefore our heat muſt alſo increaſe. *E. gr.* Let us ſuppoſe that there are 100 heating particles received in the day, whilſt the ſun is above our horizon, and that, as the night is much ſhorter, 50 of them fly off; the other 50 ſtill remaining to excite heat: the next day, the ſun acting with almoſt the ſame force, will impart 100 particles more, of which one half will eſcape in the night; ſo that, on the beginning of the third day, the number of particles exciting heat will be increaſed by 100: and thus while there are more particles that excite heat received in the day-time than thoſe that fly off in the night, the heat muſt increaſe. But as the days decreaſe, and the action of the ſun becomes weaker, more particles will fly off in the night time than thoſe we receive in the day, by which means the earth and air will gradually cool. Farther, thoſe places which are well cooled require time to be heated again; and, therefore, we find January for the moſt part colder than December, although the ſun has withdrawn from the winter tropic, and begins to emit his rays more perpendicularly upon us.

It is well known that the ſun is farther from the earth in ſummer than in winter, becauſe his apparent motion is ſlower, and his apparent diameter leſs in June than in December: but, as the eccentricity of the earth's orbit bears no greater proportion to the earth's mean diſtance from the ſun than 17 does to 1000, this ſmall difference of diſtance cannot occaſion any great difference of heat or cold. But the principal cauſe of the difference between the heat of ſummer and that of winter is, that in ſummer the rays fall more perpendicularly, and paſs through a leſs denſe part of the atmoſphere; and therefore, with greater force, and in greater number on the ſame place: and, beſides, by their long continuance, a much greater degree of heat is imparted by day than can fly off by night. The effect of rays, according to their various degrees of obliquity, has been already ſtated; and it will appear (by *Plate* XVI. *Aſtronomy*, *fig.* 138.) that a greater number of rays fall on the ſame place, when they come perpendicularly, than when they come obliquely upon it: for let A B repreſent a certain number of the ſun's rays falling on C D, *e. gr.* London, on the 21ſt of June; but on the 22d of December, the line C D, or London, has the oblique poſition C *d* to the ſame rays; and, therefore, ſcarcely a third part of them falls upon it, or only thoſe between A and *e*; all the reſt being expended on the ſpace *d* P, which is more than double the length of C D or C *d*.

Dr. Long, eſtimating the degree of heat by the ſines of the angles of incidence of the ſun's rays, computes the ſun's heat at noon at the ſummer ſolſtice to be in proportion to his heat at noon at the winter ſolſtice, in Cambridge, nearly as 100 to 28; for, the meridian height of the ſun, at the ſummer ſolſtice, being there 61° 19', and his height at the winter ſolſtice 14° 21', the ſines of theſe angles are 8772858 and 2478445 reſpectively.

Monſ. de Mairan, allowing for the principal cauſes of the ſummer heat, ſtates the proportion of ſummer heat to that of winter as 66 to 1. The method he purſues in forming his calculation is briefly as follows: he aſſigns the proportion of the ſines of the meridional heights of the ſun at the ſummer and winter ſolſtices to be as 3 to 1, and the ratio of the heat, which he ſuppoſes to be as the ſquares of the ſines, that of 9 to 1; and as the rays of the ſun proceed through a leſs ſpace of air in ſummer than in winter, he ſtates the increaſe of ſummer heat on this account to be in the proportion of 2 to 1, and that ariſing from the greater length of days as 4 to 1; and, therefore, the heat of ſummer is to that of winter as 72 to 1. But there are ſome other circumſtances, particularly the greater diſtance of the ſun in ſummer than in winter, which induce him to reduce this proportion of 72 to 1 to that of 66 to 1.

However, M. Amontons has, from obſervation, made the proportion of ſummer heat to that of winter as 60 to 51½; and M de Mairan, in order to reduce his calculation to fact, ſuppoſes that in the earth and air there is a conſtant fund of heat, equal to 393 degrees, to which 66 degrees muſt be added in ſummer, and 1 in winter, and thus he adjuſts his own proportion of 66 to 1 to that of M. Amontons, or 60 to 51½. Keill's Aſt. Lect. viii. Ferguſon's Aſt. chap. x. Long's Aſt. § 777. Mem. Acad. Science. 1719. But all calculations of this kind muſt be in a conſiderable degree fallacious, on account of collateral circumſtances, that contribute to increaſe or diminiſh the effect of the ſun's rays, as we have already ſhewn in this article, and more fully under *Temperature of the* Atmosphere.

With regard to the temperature or heat of our atmoſphere we may obſerve that the mercury ſeldom falls under 16 in Fahrenheit's thermometer; but we are apt to reckon it very cold at 24°, and it continues coldiſh to 40° and a little above.

However, ſuch colds have been often known as to bring it down to 0°, the beginning of the ſcale, or nearly the cold produced by a mixture of ſnow and ſalt. This, as Dr. Boerhaave ſeems to think, is the greateſt degree of cold which nature has ever been obſerved to produce on our earth; but the fallacy of this opinion has been evinced by a variety of obſervations in climates that may be reckoned ordinarily temperate. In Pennſylvania, in lat 40°, the cold brought the mercury to 5° in 1732; at Paris, in 1709 and 1710, the mercury ſunk to 8 ; at Leyden, in 1729, to 5°, and at Utrecht to 4 ; at London, in 1709 and 1710, the cold ſunk the ſpirits almoſt down to the artificial cold of an ice and ſalt mixture; and, in 1709, the mercury ſunk to 0° at Copenhagen, lat. 55° 43′. At Upſal, in 1732, the cold was ſo great as to be ſufficient to make the mercury fall one degree below 0°; and at Peterſburgh, lat. 59° 56′, much the ſame with that of Upſal, the cold was ſevere enough to depreſs the mercury to 28 below 0°.

We learn from Dr. King's Obſervations on the Climate of Ruſſia, that the cold at St. Peterſburgh, during the months of December, January, and February, is uſually from 8 to 15 or 20 degrees below 0°; and that commonly in the courſe of the winter, it is for a week or ten days ſome degrees lower. In this ſeaſon, the water iſſuing from the eyes hangs in little icicles on the eye-laſhes, and icicles appear ſuſpended to the beards of the peaſants in form of ſolid lumps of ice. But in ſtill more northern latitudes the cold is much more extreme. Maupertuis, who wintered at the north polar circle in 1736-7, found the degree of cold at Torneo, lat. 65° 51′, ſufficient to have made the mercury ſink to 33 diviſions below 0°. By Mr. Hutchins's obſervations at Albany Fort, lat. 52° 24′, the thermometer was at eight o'clock in the morning of the 19th of January, 1775, at 37° below 0°. And yet this degree of cold is inconſiderable, compared with that which may be produced by art. (See FREEZING.) The mean temperature of our atmoſphere is about 52°, which is, as it were, the medium of all the ſeaſons, coinciding nearly with the middle vernal and autumnal heat, as obſerved in England by ſir Iſaac Newton and Dr. Hales, and by Mr. Crucqius in Holland. The French make it ſomewhat higher, reckoning it equal to the heat of the cave of their royal obſervatory, or 53 . In cold countries the air will be found agreeable enough to the inhabitants while it is betwixt 40° and 50°. In our climate we are beſt pleaſed with the heat of the air from about 50° to 60°; while in the hot countries, the air is generally a little above or below 70 . With us the air is not reckoned warm till it arrives at about 64°, and it is very warm and ſultry at 80°: and Dr. Boerhaave thought, that in its natural ſtate it ſcarcely ever exceeded 80° or 90°, apprehending that ſuch hot air would ſoon be deſtructive of the life of animals; but in theſe temperate climates it has been found much hotter; and at Utrecht, Paris, Padua, &c. the mercury would have riſen in our thermometer to above 90 . In Pennſylvania, the ſummer heat in 1732 was once 96 or 97 ; and at Aſtracan, in July 1746, the heat was ſo great as to raiſe the mercury in M. de Liſle's thermometer in the ſhade to 89°, which correſponds to 103½ of Fahrenheit's; and during the whole month of July, and for ſeveral days in Auguſt, it was higher than 96°, which in Fahrenheit's denotes the natural heat of the blood. Mem. de l'Acad. de Berlin, 1746.

The preceding obſervations are applicable to the ſtate of the air, influenced by the ſun, but ſhaded from its immediate burning operation; for, in the open air, expoſed to its direct beams ſhining with great advantage, the heat is found much higher. Many have had occaſion to obſerve how much metals are heated in the ſun. Dr. Martine found dry earth heated to above 120 ; and Dr. Hales found a very hot ſunſhine heat in 1727 to be about 140 ; but Dr. Muſchenbroek once obſerved it ſo high as 150 ; and if we reckon from the freezing point at 32 , theſe ſtrong ſun-ſhine heats were much greater than one-third, or even the half of the heat of boiling water. At Montpelier the ſun was ſo very hot, on one day in the year 1705, as to raiſe the quickſilver in M. Amontons' thermometer to the mark of boiling water itſelf, which is our 212°. But the moſt common noontide heat of the ſun in our climate has been found to raiſe the mercury in the thermometer to about 60 or 70 diviſions above the freezing point at 32°; and the afternoon heat in the ſhade above the half of that; and therefore the ordinary ſummer ſun heat with us does nearly coincide with the heat of our body, and boiling water is between two and three times hotter than our common ſhaded warm air at Midſummer.

Sir Iſaac Newton informs us, that he found the heat of boiling water only about three times greater than the heat communicated to dry earth by the ſummer ſun, or about 92°, with which the obſervations of Muſchenbroek agree; and in Italy, Borelli and Malpighi found this heat at Midſummer equal to the heat of the viſcera of hot animals, or about 102°. In another place (*viz.* Princip. lib. iii. prop. 8. cor. 4) ſir Iſaac Newton eſtimates the heat of boiling water to be ſeven times greater than the heat of the ſummer ſun, which, in this reckoning, ſhould be only at $(32 + \frac{180}{7} =)$ 58 : by which, as Dr. Martine remarks, he muſt have meant ſolely the number of degrees above freezing water; and by ſummer ſun, the ordinary ſhaded air in ſummer, or the ſummer heat of the air. (Martine's Eſſ. Med. and Phil. 1740. Eſſ. vi.) It appears, from a regiſter of the thermometer kept at London, by Dr. Heberden, for nine years, *viz.* from the end of 1763 to the end of 1772, that the mean heat at eight in the morning was 47° 4′; and by another regiſter kept at Hawkhill, near Edinburgh, that the mean heat in that place, during the ſame period of time, was 46°. By regiſters kept in London and at Hawkhill, for the years 1772, 1773, 1774, it appears, that the mean heat of theſe three years in London, at eight in the morning, was 48°.5, and at two in the afternoon, 56°, and the mean heat of three years, both morning and afternoon, 52°.2; and the mean heat at Hawkhill for the ſame time, at eight in the morning, was 45°.4, and at two in the afternoon, 50°.1, and the mean heat of morning and afternoon, for the whole time, 47°.7. The mean heat of ſpring near Edinburgh ſeems to be 47 , and at London 51 . Phil. Tranſ. vol. lxv part ii. art. 44.

From the Meteorological Journals of the Royal Society publiſhed in the Philoſophical Tranſactions, it appears, that the mean heights of the thermometer, kept without and within the houſe, are as below:

	Therm. without.	Therm. without.
For 1775 - -	51.5	52.7
1776 - -	51 1	52.9
1777 - -	51.0	53.0
1778 - -	52.0	53.1

And, therefore, according to theſe obſervatiions, the mean heat of four years, eſtimated by the external thermometer, is 51°.4. The leaſt height during the period was on the 31ſt January, 1776, at eight in the morning, when it was 13 .5; and the greateſt, which was on the 13th and 14th of July, 1778, at two in the afternoon, was 86°.

HEAT, *Methods of eſtimating its effects on ſolids and fluids.* See PYROMETER and THERMOMETER.

HEAT, in *Agriculture* and *Vegetation*, the fluid matter which pervades different plants and ſubſtances, and promotes their increaſe:

increaſe and growth. It has been lately ſuggeſted by an intelligent writer, that ſenſible heat, when applied in a moderate degree, promotes vegetation in a variety of different ways; it excites the activity of plants; it increaſes the diſpoſition of ſome of their conſtituent parts, for new attraction and combination, to obtain ſuch ſubſtances as may be requiſite and proper for their growth; it likewiſe cauſes them to reject ſuch matters as would be hurtful to them, in retarding their growth, &c.; it haſtens the diſſolution or digeſtion, the formation and ſecretion of their different products. It ſupports the irritability of ſome of their parts, in diſpoſing them to acquire and to retain a due proportion of the principle which cauſes their irritability, namely, oxygen; and in preventing alſo the accumulation of this principle in plants, which may become hurtful to them. It renders their food and juices, &c. more fit for penetrating and paſſing their ſeveral conducting canals, and enables them to diſpoſe of their ſuperabundant portion of fluids, by promoting perſpiration and evaporation. It is ſtill further active in the production of electricity, which has alſo the power of promoting vegetation in a conſiderable degree.

It may likewiſe be obſerved, in addition to the above, that ſenſible heat becomes very uſeful to vegetation in another manner, after the plants have finiſhed the period of their life, or when purpoſely deprived of it; it then occaſions a diſſolution and new combination of their component parts, by fermentation, &c. according to the nature of the vegetable matter, and thereby promotes the preparation and formation of new food for living plants. And the ſame is the caſe with animal matters. By this means it is that manure is in a great meaſure formed. See MANURE.

It is principally in theſe ſeveral ways that heat produces a beneficial influence, in the proceſs of vegetation and the growth of plants.

It is, notwithſtanding, well known, that heat may become prejudicial or even fatal to the conſtitution of plants, when admitted in too great a degree, and for too great a length of time; as it may occaſion a too rapid digeſtion and perſpiration of their nouriſhment, and conſequently an exhauſtion. In caſes of this nature, plants are only capable of recovering by the gradual diminution of the application of ſenſible heat, either by occaſioning a ſlow evaporation of water upon their different parts, or by other means of a ſimilar deſcription. See PLANT and VEGETATION.

HEAT, in *Chemiſtry*. See FIRE.

HEAT *of Birds*. See *Anatomy of* BIRDS.

HEAT, in *Medicine*. This is a ſubject of great importance in the conſideration of the phyſician, whether it be viewed as a cauſe of certain diſeaſes, or as an effect; the regulation of which, in the latter caſe, conſtitutes a material part of the method of cure, and becomes the medium of controul over ſeveral functions of the ſyſtem. We ſhall firſt ſpeak of it as a cauſe of diſeaſe.

Great external heat has been obſerved to be the cauſe of ſevere and fatal diſeaſes, from the earlieſt periods of hiſtory: even in the time of Homer peſtilence was aſcribed to the anger of Apollo, as typical of the ſun: and in all ſouthern climates in our hemiſphere, the ſummer and the autumn are found to be the moſt unfavourable to health. (See EPIDEMIC and HEALTH.) The diſeaſes, too, which are prevalent in hot climates, differ materially in their nature and degree of violence, from thoſe which occur in the more temperate and in the cold ones.

The deleterious influence of heat, on the animal body, as we have already remarked in the article laſt referred to, is of a two-fold nature; ſome of its effects being the reſult of a *direct* operation on the body; but by much the greater number proceeding from its remote or *indirect* operation. We have there ſhewn, at great length, the connection of the moſt frequent and fatal epidemics of former times, with this indirect operation of heat, through the medium of the *miaſmata*, which it engendered in ſwampy countries, in filthy, ill-paved, and crowded towns, in camps, &c., eſpecially when combined with wet ſeaſons: and we have had the ſatisfaction of obſerving the gradual extermination of theſe dreadful maladies, in thoſe cities and countries of the temperate zone, in which improvements in the arts of life have in a great meaſure removed the ſources of miaſmata, upon which the heats of ſummer operated; and of witneſſing, therefore, a total change in the influence of the ſeaſons on the general health. Sir John Pringle long ago ſtated the ſame obſervation with reſpect to the indirect operation of heat. "Great heats," he ſays, "are never ſo much the immediate, as the remoter cauſe of a general ſickneſs:" and he illuſtrates the propoſition by ſhewing, that, in all the campaigns in which he ſerved, although the weather continued long hot, yet no epidemic ever appeared among the troops, until fogs or rains came on, or the army was encamped upon wet ground; as occurred after the battle of Dettingen, in 1743, and again in 1747. "And in the laſt campaign," he adds, "though the heats were great, yet they were the cauſe of little ſickneſs, till the troops were cantoned in the marſhes, where a conſiderable degree of putrefaction and moiſture being joined, the ardent, remitting, and intermitting fevers and fluxes were only the remoter effects of that heat." On Diſeaſes of the Army, part II. chap. 2.

Whether in conſequence of this indirect operation altogether, or partly by inducing ſome change in the animal economy, which prediſpoſes it to fever, it is certain that the yellow fever and the plague only commit their ravages under particular ſtates of heat. The following obſervations, therefore, are peculiarly ſatisfactory to the inhabitants of northern Europe. "In this view," ſays Dr. Blane, in a letter to the Pruſſian ambaſſador, baron Jacobi, "it is eſſential to remark, that this deſtructive (yellow) fever has never been known to appear, except either in tropical climates, or in thoſe ſeaſons in the more temperate climates, in which the atmoſpheric heat has for ſome length of time been equal to the tropical heat, that is, at or above 80 of Fahrenheit's', or 21 of Reaumur's thermometer. This is a fact incontrovertibly eſtabliſhed by obſervation; for there is no inſtance, either in North America or Europe, of the yellow fever appearing, except at theſe degrees of heat, nor of its ſurviving after the atmoſphere had fallen to a lower degree of temperature. This is leſs to be wondered at in North America, where the winters are extremely ſevere; but it holds equally true at Cadiz, Malaga, Gibraltar, and other parts of Spain, where the winters are warm, and where this diſeaſe ſpontaneouſly diſappeared, in degrees of heat equal to the uſual ſummer heats in the north of Europe.

"This is the fact," Dr. Blane proceeds, "which I am deſirous of communicating to the government of Pruſſia, in order to remove any groundleſs fears, with regard to the danger to be apprehended to the ſtates of his majeſty from this infectious diſorder. It is an obſervation which ſeems improbable *à priori*, and can only command belief from the truth of it being eſtabliſhed by a rigid induction of facts. In this reſpect it differs from the ſmall-pox, and other ſpecific contagions, but is *very analogous to the plague*; for it is perfectly aſcertained, that the prevalence of this latter epidemic is confined to a particular range of atmoſpheric heat, both in regard to climate and ſeaſon. We know hiſtorically, that it has never prevailed in England, but in one and the ſame ſeaſon of the year, and that it has entirely diſappeared, at leaſt as an epidemic, as the winter has come on. A high degree of heat is equally inimical to it; for it has never been known within the tropics, and it diſappears or declines in Egypt, as ſoon as the tropical heats come on at Midſummer. There are certain epidemics, therefore, which have their ſpecific and reſpective ranges of heat, on either ſide of which they cannot exiſt." See Edinburgh Med. and Surg. Journal, vol. iii. p. 385, et ſeq. where this letter is printed.

Exceſſive heat, however, is directly injurious to the human conſtitution, and produces ſome diſeaſes by a ſudden and violent operation, and others by a ſlower and more protracted influence. Of the former kind are the *ictus ſolis*, or *coup de ſoleil*, as the French term it, and acute ardent fevers; of the latter, are various diſorders of the liver and alimentary canal, connected with a ſuperabundant ſecretion of the bile; and ſome diſeaſes of the ſkin, ſuch as the "prickly heat," or *ſudamine*.

The *coup de ſoleil*, or inſolation, does not appear to ariſe from the heat of the atmoſphere alone, but occurs only when people are expoſed to the direct action of the rays of the ſun, eſpecially during any labour or active exertion. The intenſe heat of the ſun's rays, acting eſpecially on the head, increaſes the action of the blood-veſſels, and occaſions ſuch a congeſtion in the brain, as to bring on a ſort of apoplexy, which has been thus deſcribed by Chalmers (ſee his Account of the Weather and Diſeaſes of South Carolina, vol. i. p. 105.): "The ſigns which lead to this cataſtrophe are a full and high-fluſhed countenance; an univerſal languor with a drowſineſs; ſome are exceedingly ſick, and have retchings to vomit. The head alſo is ſo confuſed and giddy, that the perſon ſtaggers when he attempts to walk; and ſo vehement is the circulation in the veſſels within and without the *cranium*, that he compares the pulſations of the arteries to the noiſe of many hammers knocking on his ſkull. If, in this caſe, the affected perſon eſcapes convulſions or an apoplexy, ſuch a tightneſs will quickly be perceived about the breaſt as if that part was girded with cords. A profound ſleep ſoon enſues, during which inſpiration is performed in a long, and exſpiration in a quick manner, for a ſmall time; but afterward, the breathing being more hurried, is attended with a *ſtertor* or loud ſnorting, and inſpiration is exerted as it were in a redoubled manner. Preſently after, the reſpiration becomes very ſlow; and then he ſo quickly expires, that perhaps this whole ſcene paſſes in the ſpace of a quarter of an hour, from the time he began to be diſordered." The remedies, which were occaſionally ſucceſsful in removing this ſtate of diſeaſe, were, an immediate removal to a cool airy ſhade, the free uſe of the lancet according to the ſtrength of the patient, ſprinkling his bare head and breaſt from time to time with cold vinegar, and keeping him in a ſitting poſture. Theſe inſtances of fatal inſolation, however, are not very common (Moſeley on Tropical Diſeaſes, p. 41.); and obſervation and experiment have afforded abundant proofs that the human body is capable of ſuſtaining much higher degrees of heat in the atmoſphere than the hotteſt climate produces.

It might indeed ſeem improbable, *à priori*, that a heat ſo much above the temperature of the human body, as that which occurred in Charleſtown, in the ſummer of 1752, ſhould be borne with impunity; yet Dr. Chalmers aſſures us that the ſeaſon was unuſually healthy, ſo long as the weather continued ſteadily warm and fair. His thermometer, when expoſed to the ſun, roſe in 15 minutes to 120° (the extremity of its ſcale), and would have been broken if not ſpeedily removed; and, from trials made in cooler weather, Dr. Chalmers has no doubt that the heat of the ſun's direct rays was at that time equal to 140°. Suſpended in his kitchen, eight feet from the floor and fifteen from the fire, the windows and doors being all open on both ſides of the houſe, the thermometer ſtood at 115°. "Yet labourers and tradeſmen worked abroad as uſual; and blackſmiths, as well as cooks, did their buſineſs within doors." Several people indeed died ſuddenly both in town and country; but, on the whole, the ſeaſon was healthy.

Now, in conſequence of an obſervation, that a dog, accidentally ſhut up in a ſugar-baker's ſtove, in which the mercury roſe to 146 , ſuddenly died, and putreſied rapidly to an extreme degree, Boerhaave was led to deduce ſome erroneous inferences in reſpect to the effects of heat on living animals. (See his Elements of Chemiſtry, tom. i. p. 265.) The cauſe of death, in this caſe, was doubtleſs the mephitic air of the ſtove, and not the extreme heat; for ſubſequent experiments have proved that even the human body is capable of exiſting with impunity, for a conſiderable time, in a dry atmoſphere, heated ſeveral degrees *above the temperature of boiling water*. The experiments to which we allude were made by Dr. George Fordyce, ſir Charles Blagden, and other gentlemen, in the year 1774, and were repeated by theſe and other perſons both in London and in Liverpool, in the following year. (See an account of them in the Philoſophical Tranſactions, vol. lxv. pp. 114, 463, and 484. See alſo the particular detail of them under the article *Animal* HEAT.) In the firſt experiments, the heat of the rooms, in which they remained many minutes, was varied from 119° up to 211°, that is, within one degree of the heat of boiling water. Dr. Dobſon and his friends at Liverpool, who repeated the experiments, ventured on the temperature of 224°. But in the ſecond ſeries of trials in London, the air of the apartments was heated to the enormous temperature of 260°; and the experimenters had no doubt that they could have ſuſtained a higher degree of heat without material inconvenience. The pulſations of the arteries were increaſed to about 140 in a minute; but the heat of the body did not riſe more than from three to five degrees above the uſual ſtate, or 97° of Fahrenheit. Theſe high degrees of heat were much leſs diſagreeable when the body was enveloped in the uſual clothing, than when it was expoſed naked to the heated air. In the latter caſe a profuſe ſweat was produced; but the interpoſition of the clothes in the former caſe kept out the external heat in a conſiderable degree, upon the ſame principle as it prevents the eſcape of the internal heat in a cold atmoſphere, by being an imperfect conductor.

But although the human body is capable of ſuſtaining theſe extremely high degrees of temperature for a ſhort time with impunity, experience has ſhewn that a continued atmoſpheric heat, of a much lower degree, has a direct tendency to diſorder the animal economy, and eſpecially to augment and derange the ſecretion of the liver; inſomuch, that both in hot climates and in the hot ſeaſons of our own latitude, a number of diſeaſes conſtantly occur, dependent upon the morbid quantity or quality of the bile, and which are therefore denominated *bilious* diſeaſes. In this country the moſt common of theſe bilious diſeaſes are the affections of the alimentary canal, which the irritation of the redundant bile appears to occaſion. In this way the ſickneſs and bilious vomiting, the diarrhœa with bilious ſtools, or the combination of theſe two evacuations of bilious matter, conſtituting the cholera, are probably produced. Theſe diſeaſes occur principally in the months of Auguſt and September, and, during or after very hot ſummers, they have been obſerved to attack ſo many individuals as to be entitled to the epithet of epidemic. Such was the caſe in London in 1762, and again in 1789, 1790, and 1800. In many habits theſe bilious affections aſſume the form of dyſentery, probably from ſome degree of inflammation being excited in the internal coat of the inteſtines by the quantity and acrimony of the bile. In all hot countries theſe complaints are more common and more violent than with us. Indeed in thoſe climates the diſeaſes of the liver itſelf conſtitute the largeſt catalogue of derangements to which the human body, or at leaſt the European habit, is liable; and few individuals ſpend a large portion of their life in thoſe climates without ſuffering from them in ſome degree or other, if they do not bring home a conſtitution much deteriorated by ſuch attacks. Acute and chronic inflammations of the liver are among the moſt frequent diſorders which that organ ſuffers in tropical countries (ſee HEPATITIS); and the moſt violent and fatal fevers of thoſe countries have been emphatically called *yellow* fevers, from the colour imparted to the ſkin by the transfuſion of bile through the circulating ſyſtem.

The concurrence of the hot ſeaſon, in all climates, and the great frequency of theſe diſeaſes in the hotter regions, indicate a connection between the diſeaſes and the temperature of the atmoſphere; and many pleaſant theories have been deviſed, eſpecially upon the principles of chemiſtry, to account for the ſuperabundant ſecretion of the liver under the influence of great heat. But we do not deem it neceſſary to repeat theſe hypothetical ſpeculations, which, as yet, have failed to reduce the facts to any ſatisfactory general principle.

Practically, however, experience has taught, in reſpect to the prevention of theſe diſeaſes, what reaſoning would have ſuggeſted *à priori;* that the influence of the inordinate ſtimulus of heat is beſt counteracted by diminiſhing the other ſtimuli of the living body, which might concur in producing great excitement in the vaſcular and nervous ſyſtems, and in contributing to the unuſual diſtention of the veſſels; in other words, by *temperance.* "By keeping the body quiet, and cool within as well as without, the firſt object of ſeaſoning in hot climates will be attained; which is to moderate the action of the ſolids, and to diminiſh the volume and denſity of the fluids." (Moſeley on Tropical Diſeaſes, p. 49.) Hence the ſame author ſuggeſts, that, in a voyage to the Weſt Indies, "after the warm latitudes are reached, it becomes every perſon to prepare his body, by temperance, for the unavoidable change it muſt undergo; and to people of a groſs habit, and of a ſtrong and full conſtitution, a mild purge or two, or frequently diluting with a weak ſolution of cream of tartar in water, if not bleeding, is neceſſary. The neglect of theſe precautions occaſions violent perſpirations, troubleſome heats, and eruptions." On the arrival, every exceſs, more eſpecially in young perſons, is dangerous; and temperance in all things is neceſſary to be obſerved by men, women, and children. Great reſolution, however, appears to be requiſite in controlling the deſires in climates, where "the brilliancy of the ſkies, and the levity of the atmoſphere conſpire to influence the nerves againſt philoſophy and her frigid tenets, and forbid their practice among the children of the ſun." But theſe tendencies have been encouraged by the abſurd notions, that people muſt die of putrid diſeaſes in hot climates unleſs they embalm their bodies by the aſſiſtance of wine, ſtrong liquors, and good living, as it is called—notions which have cauſed the death of thouſands. Thoſe diſeaſes, improperly called putrid, occur moſt frequently in the young and ſtrong, bearing marks of an inflammatory diatheſis; and the ſymptoms, ſo called, ſeem to be the reſult of the previous high or inflammatory excitement. The avoiding of all ſpirituous liquors, taking little wine, and drinking principally water, ſeem to be the moſt effectual means of eſcaping the diſeaſes alluded to. "Whatever mode of living," ſays the author juſt quoted, "may be proper after people have lived long in hot climates, and when, perhaps, by having been frequently diſeaſed, the inflammatory diatheſis of the body is paſt—while it remains (as it will with ſome people for many years), thoſe who uſe water for their common drink will never be ſubject to troubleſome or dangerous diſeaſes." Again, he ſays, "I aver, from my own knowledge and cuſtom for ſeveral years, as well as from the cuſtom and obſervations of many other perſons, that thoſe who drink nothing but water are but little affected by the climate, and can undergo the greateſt fatigue without inconvenience." (Loc. cit. p. 57.)

Great heat is likewiſe injurious, and ſecondarily productive of much diſeaſe, by rendering the body ſuſceptible of the ſlighteſt impreſſions of cold. Many writers, indeed, conſider this circumſtance as the moſt pernicious effect of great heat: and Dr. Moſeley affirms, that, "however paradoxical it may appear, *cold* is the cauſe of almoſt all the diſeaſes in hot climates, to which climate alone is acceſſary." Although this aſſertion may be much too general, it cannot be doubted that the influence of cold is moſt deleterious after the body has been in ſome meaſure debilitated by the continued ſtimulus of heat, and more eſpecially when a free perſpiration has been flowing, as nature's expedient for reducing the increaſed temperature. Hence, in part, the origin of diſeaſes in armies, when they are expoſed to rains, or heavy dews, or lie on wet ground, at the cloſe of a hot day, or of a hot ſeaſon, as ſtated by ſir John Pringle: hence alſo the common occurrence of ſevere and fatal fevers after expoſure to the night air in the Weſt Indies: and hence, too, the well known effects of ſimilar expoſure, in this climate, after being confined for ſome hours to hot and crowded rooms and theatres. In the ſame way, the internal application of cold, by copious draughts of water, after violent exertion and during profuſe ſweating, has not only given riſe to violent diſeaſes, but even ſuddenly deſtroyed life.

Upon this ſubject facts are ſomewhat contradictory, on a ſuperficial view; and ſome miſtaken inferences have been deduced from them, and are ſtill popularly entertained. But the philoſophical inquiries of Dr. Currie of Liverpool, appear to have reconciled the apparent contradictions in the facts, and to have eſtabliſhed the true principle on which the danger or ſafety of the action of cold on the heated body depends. The principle is as follows. While the body continues under the influence of a ſteady heat, and while its power of evolving heat remains entire; that is, while nature's cooling proceſs, perſpiration, is not exceſſive, or the exertions of the body continue to excite the heat, or the external cauſe of heat remains, and while, on the other hand, no fatigue or exhauſtion of the powers of life has occurred, and the ability of re-action continues; then the application of cold is ſafe and ſalutary. And it is in the oppoſite circumſtances only that it is dangerous or prejudicial; namely, when a profuſe general ſweating is rapidly carrying off the heat, when the exertion, or the external heat which excited it have ceaſed, when the vigour of the ſyſtem is exhauſted by fatigue, and the power of evolving animal heat is thus diminiſhed. Hence, on the one hand, a perſon heated and exhauſted by violent exerciſe, may expire in conſequence of a copious draught of cold water; while, on the other, if he is heated by a quiet ſojourn in a hot or vapour-bath, as is the practice in Ruſſia, he may immediataly roll in the ſnow with impunity. Thus the experimenters in heated rooms, in which the animal heat was excited without exhauſtion of the vital powers, paſſed from the hot rooms immediately into the cold air, even naked, without the leaſt injury or inconvenience, and were very ſlightly ſenſible to the action of cold. Indeed, the circulation was ſo much excited, that it did not ſubſide for two hours; on which Dr. Fordyce remarks, "that the tranſition from very great heat to cold is not ſo hurtful as might be expected, becauſe the *external circulation is ſo excited, as not to be readily overcome by the cold.*" This is correctly true. Hence we have already deprecated that popular, but moſt erroneous practice, of waiting *to cool* before leaving a hot and crowded room; whereas, if we depart while "the external circulation is ſtill excited," while *we continue in a glow of warmth*, and, either by exerciſe in the air, or by a warm covering, *keep up that warmth*, and glow until we arrive at home, no ill conſequences can enſue. The ſenſe of chillineſs, in thoſe caſes, is the index of danger; and where that is prevented, we believe no hazard can be incurred. Dr. Currie has juſtly remarked, that cold is pernicious, not becauſe we *are hot*, but becauſe we are cooling, *after having been hot.* See COLD.

Of Morbid Heat.—By morbid heat, we mean that augmentation of the natural heat of the body, which is an effect, or one of the ſymptoms, of thoſe various and important diſeaſes which have been thence denominated *febrile* and *inflammatory*; the former term coming from *febris, ferveo, to be hot*,—the latter from *flamma, a flame.* (See FEVER.) The regulation of this febrile heat conſtitutes one of the moſt potent means of curing and alleviating thoſe diſeaſes; and the knowledge of the juſt principles upon which it may be conducted, forms one of the moſt valuable additions to medical ſcience that the laſt half century has produced. We are the more anxious to preſs this ſubject on the attention of our readers, becauſe, although the ſolidity of thoſe principles is eſtabliſhed upon a foundation as ſure as the operation of almoſt any remedy that is employed, ancient prejudices, founded on no better grounds than the old humoral pathology, continue to impede the progreſs of the practice among the people at large, and even to deter many *routiniſts* in the profeſſion from adopting it.

Without aſſuming any theory relative to the origin of animal heat, our knowledge of the nature of which is extremely imperfect, we muſt admit its connection with the circulation of the blood, and its reciprocal influence upon that function, as a matter of obſervation. Diſtention of the ſuperficial veſſels, with redneſs and increaſed pulſation, is invariably conjoined with increaſed heat;—collapſe and paleneſs of parts, with diminiſhed temperature. And, reciprocally, the application of external heat increaſes the action of the blood-veſſels, and the diſtention of vaſcular parts with blood; the abſtraction of heat (or what is commonly called the application of cold) diminiſhes the action of the veſſels, and occaſions a paleneſs and ſhrinking of the fleſhy parts. It muſt be obvious, then, that the regulation of the animal temperature, which is in our power, becomes an inſtrument of great efficacy in modifying other functions of the living body, which are connected with the ſtate of the circulation.

Now, in a ſtate of health, there is a pretty regular balance between the generation of heat, and its abſtraction from the body, ſo that it remains ſteadily about the ſame temperature of 97½° or 98 of Fahrenheit's thermometer. If the heat be augmented from exerciſe or other cauſes, the cooling proceſs of perſpiration and evaporation ſpeedily reduces it to the ſtandard degree. Febrile heat is alſo generally abated by ſweating, eſpecially when it is moderate: but when it is conſiderable, (and it often riſes to 102, ſometimes to 104° and 105°, or in ſcarlet fever even higher, if the obſervations of ſome writers be correct,) the ſecretion of perſpirable matter is prevented; juſt as the ſecretions of other organs are ſuppreſſed during a high inflammatory action of their veſſels. In ſuch a ſtate, then, the augmented heat contributes to keep up the inflammatory conſtriction of the veſſels; the two conditions mutually ſupport each other; and whatever aids the accumulation of heat, neceſſarily augments the inflammatory, or febrile action of the blood-veſſels, in other words, aggravates the febrile diſeaſe.

Let us compare, then, the practice of the humoral pathologiſts, the diſciples of Galen, who upheld his doctrines for thirteen centuries, with that of the modern ſyſtem, which experiment, and not hypotheſis, has eſtabliſhed. In common fever, when the heat of the patient is accumulated in and about him by every means; as by a load of bed-clothes, a cloſe unventilated room, cloſed curtains, and a fire; when nothing that is cold is allowed to enter his lips, in ſpite of his inſtinctive craving; and when the inflammatory action of the veſſels is farther hurried by wine, and bark, and aromatic cordials; when ſuch treatment is adopted, every ſymptom of the diſeaſe is aggravated. Congeſtion of blood in the head, and with it, increaſe of head-ach, delirium, reſtleſſneſs, or coma, enſue; the whole ſtate of ſenſation is diſtreſſing and irritating to the patient; the tongue is loaded, the ſtomach and alimentary canal are completely deranged, the thirſt moſt urgent; and, after a few days, exhauſted by this unceaſing irritation, the patient ſinks under all the ſymptoms of what is called putreſcency. When ſuch practice is purſued in ſmall-pox, or ſcarlet fever, theſe ſymptoms of putreſcency become ſtill more ſevere, and gangrenous appearances take place, ſoon to be followed by death. The ſmall-pox, indeed, afford a ſtriking proof of the pernicious operation of external heat in aggravating diſeaſes of this claſs: for, the eruptions on the ſkin may be multiplied at pleaſure, merely by exciting heat in the ſkin. Of this fact, ſome deſigning men are ſaid to have availed themſelves, in order to extend their reputation among the ignorant, and to have pretended to draw the diſeaſe to one ſpot, by covering the part with a warm plaſter, under which a large crop of puſtules never failed to appear.

On the other hand, when the regulation of the morbid heat is accompliſhed, according to the principles which have been eſtabliſhed by the experiments of Dr. Currie and others, febrile diſeaſes aſſume a much milder type, and many of the moſt diſtreſſing and dangerous ſymptoms are warded off. We have ſtood over a patient in ſcarlet fever, while the proceſs of reducing the heat by cold-waſhing was going on, and have had the ſatisfaction, in the courſe of a few minutes, of witneſſing the great amelioration of the ſymptoms thus produced. The extreme heat and dryneſs of the ſkin have been followed by a grateful coolneſs, and a gentle perſpiration; the tongue, before dry, has become moiſt, and the ſenſation of thirſt has been removed; the delirium has diſappeared, and the head-ache been greatly relieved; the dull, ſuffuſed, and anxious countenance has ſpeedily aſſumed the calm and clear expreſſion of agreeable feelings; and the general reſtleſſneſs been immediately followed by a diſpoſition to calm ſleep. When, in addition to this diminution of heat, the internal cordials are ſuperſeded by cool aqueous drinks, diluent and aperient medicines, and vegetable nutriment; and when the patient is ſurrounded by freſh cool air, the whole character of the fever is often changed; and if ſo treated from the beginning, it may paſs on ſafely and mildly to its termination, without exhibiting any of thoſe ſymptoms of malignancy and putreſcency which would have occurred under the oppoſite method of treatment. We know that the ſuperior ſucceſs of Sydenham's practice in the ſmall-pox, over that of his contemporaries, originated in the *cool* treatment which his ſagacity led him to introduce; and that the moſt ſucceſsful modern inoculators of that malady have adopted a ſimilar ſyſtem. We know, too, that the ſcarlet fever prevailed, like a plague, in its moſt fatal forms, in many parts of Europe, under the method of treatment formerly purſued. (See Willan, on Cutaneous Diſeaſes, p. 3.) It is unneceſſary to add, that in acute local inflammation, in general, the abſtraction of heat is, next to the removal of the diſtention of the veſſels by blood-letting, one of the moſt effectual means of reducing the inflammatory action. See INFLAMMATION.

It remains for us to ſay a few words in reſpect to the circumſtances under which the great abſtraction of morbid heat may be unſafe: for although the abſurdity of the humoral theories may be conſpicuous, and the danger of repelling the *materies morbi* from the ſurface to the internal parts may be gratuitous and viſionary in a great degree; yet there are varieties of diſeaſe and ſtates of the conſtitution in which danger may be incurred, and caution is requiſite. The principle already ſtated, when ſpeaking of the influence of cold on the body heated during health, is applicable in the caſe of this morbid heat. The great and ſudden abſtraction of it in febrile diſeaſes is only unſafe, when the heat is not preternaturally great; when it is not ſteady, but fluctuating, or alternating with chills; when it is only partial; when it is accompanied by general or profuſe perſpiration; and even when the heat, as meaſured by the thermometer, is preternaturally great, if the patient be acutely ſenſible to impreſſions of cold on the ſurface, the application of cold will be unſalutary. In a word, whenever the faculty of cooling heat is not ſteady, or is eaſily interrupted; when the arterial action is not powerful, although quick; and the *vires vitæ*, or energies of the ſyſtem, have been enfeebled by the continuance of diſeaſe, much ſweating, or other cauſes; under theſe circumſtances, and theſe only, is the ſudden application of cold hazardous. When there is any local inflammatory diſeaſe in any internal organ, its operation is leſs ſalutary, but there is reaſon to believe not dangerous.

The preceding obſervations apply principally to the ſudden abſtraction of heat in febrile diſeaſes, by means of cold water *affuſed* on the body, or uſed in the way of *ablution*: but the neceſſity of avoiding the accumulation of the morbid heat by *coolneſs* in the air of the ſick-room, in the bed, and in the general regimen of the patient, is requiſite in the early ſtages (after the heat is eſtabliſhed, and the chills have entirely ſubſided) of all fevers, and is ſalutary, we believe, through the whole courſe of the majority of them. (See COLD *as a Remedy*; and *the Cure of* FEVER.) Thoſe who wiſh for more ample information on this important ſubject, may conſult Dr. Currie's Medical Reports on the Effects of Water, &c. Dr. Stock's Medical Collections on the Effects of Cold, 1805. Dr. Irvine's Obſ. on the Diſeaſes of Sicily, 1810. Dr. Ruſh's Medical Inquiries. Dr. Kinglake's Treatiſe on Gout, &c.

HEAT, *Prickly*, an eruption of *papulæ* or pimples, almoſt univerſally affecting Europeans on their firſt ſettlement in tropical climates.

The "prickly heat" is placed by Dr. Willan as a variety of Lichen, the ſecond genus of the Order of *Papulæ*, and denominated Lichen *tropicus*. It appears without any fever or preceding diſorder of the conſtitution, and conſiſts of numerous pimples, about the ſize of a ſmall pin's head, and elevated ſo as to produce a conſiderable roughneſs of the ſkin. The papulæ are of a vivid red colour, and often exhibit an irregular form, two or three of them being in many places united together: but no redneſs or inflammation appears on the ſkin in the interſtices of the papulæ. The eruption ſpreads over thoſe parts which are uſually covered with the clothes, as the neck, breaſt, arms, legs, and inſide of the thighs. It does not appear on the face, except on the upper part of the forehead contiguous to the hair; nor is it ever found in the palms of the hands, ſoles of the feet, or on the hairy ſcalp. When perſpiration is very copious, ſmall pearly veſicles, containing a limpid humour, are often intermixed with the *prickly heat,* more eſpecially on the breaſt and about the wriſts: but they terminate in ſcales, having no diſpoſition to ulcerate, though violently ſcratched. Some authors have likewiſe mentioned an appearance of ſmall white tubercles, or wheals, interſperſed with this eruption.

An intolerable itching attends the *prickly heat*, together with a frequent ſenſation of pricking, as if a number of needles were piercing the ſkin; whence the diſorder has derived its name. This often takes place ſuddenly, Dr. Winterbottom remarks, after drinking a diſh of tea or any warm liquor, ſo as to cauſe the perſon affected to ſtart from his ſeat. The eruption is generally ſtationary, but is always increaſed by increaſe of heat. Thus wearing flannel or other clothes, too thick and warm for the climate, greatly aggravates it; and in the hotteſt months, it occurs more or leſs to many people every year, to natives as well as ſtrangers, according to Dr. Hillary. It generally goes off in a few weeks, leaving the cuticle ſcurfy, which afterwards falls off in ſmall white ſcales. Perſons of a fair complexion, with red hair and a ſoft ſkin, are moſt liable to this eruption, and have the greateſt quantity of it: thoſe who are of a dark complexion either remain wholly free from it, or are affected very ſlightly. In general the complaint becomes leſs frequent and troubleſome as ſettlers become habituated to the climate, and at length entirely diſappears.

Dr. Winterbottom remarks, that "the prickly heat is, in general, conſidered as a ſalutary eruption, whence we are cautioned not to repel it from the ſkin by cold or other external applications. Such a repulſion cannot, however, be eaſily effected: it is certainly not produced by bathing, which has been hitherto thought highly prejudicial. A vivid eruption of the prickly heat is a proof that the perſon affected with it is in a good ſtate of health, although its abſence does not always indicate the contrary. The ſudden diſappearance of it, which frequently happens, is rather an effect than a cauſe of internal diſorder, as of fever, or any ſlight complaint of the ſtomach: in the latter caſe, a temporary ſtimulus applied to the ſtomach, as by ſpirits, tea, or other warm liquids, has the power of reſtoring the eruption. Its appearance on the ſkin of perſons in a ſtate of convaleſcence from fevers, &c. is always a favourable ſign, indicating the return of health and vigour. Various means," Dr. Winterbottom adds, "have been employed to alleviate the itching and tingling of the prickly heat: the favourite remedy at Sierra Leone is the juice of limes rubbed on the ſkin, which, however, has no conſiderable effect. I have found it of moſt advantage to uſe a light, cool dreſs, and to avoid the drinking of warm liquors."

The earlier writers on tropical diſeaſes agree in recommending a cool regimen and temperance, eſpecially in the uſe of ſpirituous or vinous liquors; but they all harp upon the old humoral ſtring, and ſpeak much of the danger of repelling the eruption, and the advantage of "*encouraging* the eruption by taking ſmall warm liquids and nouriſhments, as gruel, tea, coffee, wine, whey, broth, and plain meats." (Hillary.) In this ſtyle they formerly treated of ſmall-pox and ſcarlet fever: but unbiaſſed obſervation has exploded theſe opinions; and we doubt not that the remarks of Dr. Winterbottom are correct.

Dr. Cleghorn has deſcribed a ſimilar eruption, which is called the Raſh, or Summer Raſh, or prickly heat, in the iſland of Minorca; but its ſymptoms are by no means ſo violent and diſtreſſing as thoſe of the Lichen tropicus. Dr. Cleghorn conſiders this diſeaſe as the *ſudamina* of the Romans, and the ἱδρωα, *hidroa*, of Hippocrates. Dr. Willan, however, obſerves that "the term Hidroa is uſually applied by the Greek phyſicians to an eruption of miliary puſtules:" and thinks that the more appropriate terms uſed by them are lichen, eczema, or eczeſma. The eſſera of the Arabians comprizes the nettle-raſh, prurigo, and ſome other eruptions, beſides the prickly heat. See Hillary on the Diſ. of Barbadoes. —Moſeley on Tropical Diſeaſes.—Cleghorn on the Diſ. of Minorca.—See alſo Dr. Willan's learned work on Cutaneous Diſeaſes, which contains a deſcription of the diſeaſe by Dr. Winterbottom, &c.

Heat *of Mines*, in *Geology*. Among early writers, great ſtreſs was laid on the temperature of deep mines as a geological phenomenon; and accordingly Dr. Woodward gave this ſubject particularly in charge to the travelling obſervers whom he employed, "Method of Foſſils," p. 103. Repeated obſervations have however ſhewn, that the preſence of different minerals, at ſimilar depths, do not ſenſibly affect the temperature of excavations therein. M. Werner, in the tranſlation of his "New Theory of Veins," p. 171, ſays, "I have likewiſe found that what has been ſaid of the great heat obſervable in mines of pyrites, is totally void of foundation."

Heat, in *Smithery*, &c. See Iron.

Heat is alſo uſed, in reſpect of race-horſes, for the exerciſes to be given them by the way of preparation, &c. Two heats in a week are reckoned a juſt meaſure for any horſe, of what ſtate or conſtitution ſoever. The jockeys lay it down as a rule, that one of the heats be given on the ſame day of the week whereon the horſe is to run his match; and this is to be the ſharpeſt heat.

Heat *of Vegetables*, in *Vegetable Phyſiology*, is evinced by the more ſpeedy melting of ſnow when in contact with their leaves or ſtems, compared with what is lodged on dead ſubſtances, provided the preceding froſt has been ſufficient to cool thoſe ſubſtances thoroughly. Mr. Hunter appears to have detected this heat by a thermometer applied in froſty weather to the internal parts of vegetables newly opened, but ſuch an experiment may be liable to ſome fallacy.—That a certain portion of heat is neceſſary to the life and vegetation of every plant, is evident to the ſlighteſt obſervation. It is not only a neceſſary ſtimulus to its conſtitution, for the purpoſes of vegetation, but its total deprivation is fatal to the vital principle. A determinate portion of heat is eſſential to the health and well-being of every plant, but this degree is remarkably different with reſpect to the plants of different climates. The vegetable productions of the tropics are as effectually killed by a freezing degree of cold as all plants are by a boiling heat, and exhibit nearly the ſame appearance. The vegetables natural to cold climates, on the contrary, are able to ſupport a much greater degree of cold without injury, at leaſt while in a torpid ſtate. When their vital principle is rouſed, and their buds begin to expand, they become vaſtly more ſenſible. This may be ſeen every ſpring, more or leſs, in trees whoſe buds are formed to ſuſtain the ſevereſt froſt, even of a Lapland climate, but ſome of which, even in our own, are liable to ſuffer from a comparatively ſlight recurrence of cold after their buds have once begun to burſt. Hence the difficulty of naturalizing many trees and ſhrubs, of America for inſtance, in climates apparently much milder than their native ones.

The growth of moſt plants may be accelerated by artificial heat, (ſee the article Forcing,) and Mr. Knight has ſhewn that plants acquire habits with regard to heat which are a deciſive proof of their vitality. A peach-tree that has been forced, if expoſed to the open air in the following ſeaſon, expands its buds prematurely to inevitable deſtruction. In general, however, plants which have been forced require a ſtronger degree of heat than is natural to them, in order to continue in health. The effect of heat upon them is in proportion to the degree of cold to which they have been accuſtomed. See Circulation *of Sap*.

If it be ſo difficult to account for the ſpontaneous production of heat in animal bodies, as all phyſiologiſts have found, it muſt be much more ſo to account for the generation of vegetable heat, yet one cannot but ſuſpect that the cauſes of each may be ſimilar. Light and the atmoſpheric air at leaſt are known to be eſſential to the vital functions of both. The moſt remarkable inſtance of heat in plants upon record, is what is related of the *Arum maculatum*. Lamarck ſays, in his *Flore Francaiſe*, v. 3. 538, "that when the flowers are in a certain ſtate of perfection, the ſpadix is ſo hot as to ſeem burning, and not at all of the ſame temperature as the ſurrounding bodies. This heat remains but for a few hours." This ſame author obſerved this phenomenon in the white-veined variety of the plant in queſtion, which is certainly very little different from our common *Arum*. Mr. Senebier noticed that this heat began when the ſheath was about to open, and the ſpadix juſt peeping forth, and that it was perceptible from three or four o'clock in the afternoon till midnight. Its greateſt degree was 7° of Reaumur's ſcale above the heat of the atmoſphere, which at the time of his obſervation was about 14 or 15 of that thermometer.

HEATH, in *Botany*. See Erica.

Heath, *Berry-bearing*. See Empetrum.

Heath, *Mountain*. See Saxifraga.

Heath, *Low-pine*. See Coris.

Heath-*cock*, in *Ornithology*. See Grous and Tetrao.

Heath-*peaſe*, in *Botany*. See Orobus.

Heath, in *Agriculture*, a well-known plant, frequently met with on extenſive tracts of poor common and moor land. It is conſtantly found growing on ſuch deſcriptions of land as have an indifferent quality. A tilly ſoil, according to the Survey of the County of Invernefs, is that in which it moſt delights; ſand being too weak to carry a plant that demands ſuch a quantity of ſupport; while deep moſs is too much ſurcharged with moiſture to render its growth vigorous. There is, however, a ſtratum of moſs on the ſuperficial parts of grounds, where it is met with in abundance, but the layer in theſe caſes is thin; being formed by the leaves and other deciduous parts of the plant itſelf, in the courſe of time, and has invariably a ſubſtratum of till, which is more or leſs barren in its nature, placed below it. It has been further ſuggeſted in the above work, that "the region peculiar to heath and the altitude at which it grows, is not great, conſidering the frequency of its appearance in northern latitudes. While the warm valley on the one hand, which enjoys the fertilizing influence of a placid ſtream, and of a powerful ſun, is too rich a ſoil for this plant; the higher ſummit of the mountain is, on the other hand, too cold, too barren, and too much expoſed, to be the favourite ſoil or climate of heath. Fungous moſs, the moſt barren of all plants, and the leaſt capable of affording nouriſhment to cattle, occupies theſe ſummits. The heath grows midway up the hill, while the ſkirts and the vallies below are deſtined for graſs and corn. Thus, the very covering given to the mountains, demonſtrates the benignity of Providence: what is neareſt to the habitation of man, is beſt adapted to his ſupport; what is neareſt and moſt acceſſible to his cattle, affords them moſt nouriſhment; and the leaſt productive part of his ground is removed to the greateſt diſtance."

It is ſtated in addition, that "in ſome low plains of till, or gravel, or ſand, where the ſurface is too flat or too diſtant from the higher ground to admit of brooks, the ſurface is covered with a ſhort ſtunted heath. If till be the ſubſoil, the heath is mixed with ſome piles of coarſe graſs, by means of the rains and dews, which do not haſtily loſe their effect; but if the gravel or ſand be pure, having little or no mixture of earth, the rain filters through before it has had time to produce any effect on the ſurface; and the dews are too feeble and tranſient a refreſhment, to counteract the ſterility of the ſoil. In theſe ſituations, nothing is to be ſeen but one continued field of heath; becauſe the ſoil is the moſt barren of all, and moſt difficult to be rendered productive. Even Scotch firs, it is remarked, which grow almoſt in any ſoil, will not thrive in it, of which inſtances might be given in different counties."

It is an extremely intereſting conſideration, whether taken in a national or individual point of view, that the progreſs of agriculture, and the ſtrenuous exertions of man, are ſpeedily leſſening the domination of this barren plant in numerous diſtricts of the kingdom. It is now well known, however, that ſuch ſoils as are prone to the production of this vegetable, though brought into a ſtate of cultivation with the utmoſt care, are conſtantly diſpoſed, under any ſort of neglect, to throw up the ſame ſort of plants by which they were previouſly coated. On this account it is, that neither cattle, ſheep, nor any other ſort of live ſtock, are capable of keeping down the heath, where the exertions of man are not carried on in combination with them.

It is found that ſheep, in many ſituations, are fond of cropping this plant, and that, in the county of Norfolk, they are occaſionally obſerved to ſucceed better, as well as to be more free from diſeaſe, when kept in ſituations where it prevails than in other caſes. And in a paper contained in the firſt volume of the Farmer's Magazine, a plan is propoſed for converting it into winter fodder, in ſituations where green crops are not capable of being raiſed in that intention, to any conſiderable degree; as from long experience, it is well known to compriſe a wholeſome and palatable ſort of food when conſumed in the green ſtate, there can be little doubt of its being equally ſo, when cut and dried at a proper ſeaſon, and duly preſerved. Beſides, it is aſſerted that the practice has long prevailed in Sweden, the heath harveſt in ſome parts of that country being as regular, and as much regarded, as the corn harveſt in the moſt fertile provinces of the ſtate. Long experience has convinced the natives of its value, and furniſhed an example that ought not to be loſt ſight of by other nations, which are ſimilarly ſituated in regard to ſoil and climate. It affords in that kingdom, a bulk and eſſential article of winter fodder, in various places where no other ſort can be procured. While kept properly down and in the young ſtate of growth, it may with facility be cut over or mown with a ſcythe for the purpoſe; but under the contrary circumſtances it will require a much ſtronger tool. It is adviſed to be mown or cut over at the period when the flowers are fully expanded, as it will then be in the moſt nutritious ſtate. And the work ſhould be performed as much as poſſible in dry weather, being immediately put into a ſort of cocks or heaps, where it may continue for a week or ten days, being then placed in large ricks, and permitted to remain until it may be found convenient to have it conveyed to the places where it may be wanted as a winter food. In this way it may be found of great utility to ſheep farmers in particular ſituations.

It has alſo been found uſeful in other points of view, as in thatching different ſorts of farm buildings, conſtructing brooms, and various other purpoſes.

HEATH-*plough*, is an implement contrived for the breaking up of lands covered by heath. In the Repoſitory of the Society of Arts in the Adelphi, there are preſerved, for public inſpection, models of two heath-ploughs, *viz.* by Mr. Ringroſe, Claſs I. N 4, deſcribed in volume 1. of the Society's Tranſactions, p. 303, and in Bailey's Machines, vol. i. p. 26: and another with a curved coulter, by Mr. Matthew Peters, Claſs I. N° 39, vol. i. p. 312, Bailey's Machines, vol. ii. p. 11, and Doſſie's Memoirs, vol. iii. p. 266. At the Woburn ſheep-ſhearing 1810, Mr. Robert Salmon produced a plough for preparing heath land for planting, which was tried in preſence of a committee, and rewarded by the noble duke's premium for implements.

HEATH, BENJAMIN, in *Biography*, an eminent claſſical ſcholar, was by profeſſion a lawyer, and held the poſt of town clerk of Exeter. He publiſhed, in 1740, "An Eſſay towards a demonſtrative Proof of the Divine Exiſtence, Unity, and Attributes," which was eſteemed one of the beſt defences of Dr. Clarke's hypotheſis. In 1762, he publiſhed, as the reſult of twelve years labour, "Notæ ſive Lectiones, ad Tragicorum Græcorum veterum, Æſchyli, Sophoclis, Euripidis, quæ ſuperſunt Dramata, deperditorumque reliquias." This was printed at the Clarendon preſs, and probably, on account of it, he received a diploma from the univerſity of Oxford, creating him doctor of laws. In 1763, he wrote a pamphlet, on the exciſe duty on cyder and perry, which was ſuppoſed to have had great influence in procuring the repeal of that tax; and in 1765, he gave the public "A reviſal of Shakſpeare's text, wherein the alterations introduced into it by the more modern editors and critics, are particularly conſidered." Gen. Biog.

HEATH *Point*, in *Geography*, a cape on the S.E. extremity of the iſland of Anticoſti, in the gulf of St. Laurence. N. lat. 49° 6'. W. long. 62°.

HEATHEN. See GENTILE and PAGAN.

HEATHER, or HEYTHER, WILLIAM, in *Biography*, was born at Harmſworth in Middleſex, and having been received as a choriſter in Weſtminſter abbey, when his voice broke, he purſued the ſtudy of muſic as a profeſſion; but though he became one of the gentlemen of the chapel royal, he ſeems to have diſtinguiſhed himſelf neither by his vocal nor inſtrumental performance, or by his muſical compoſitions; but has had his name recorded as the friend and agent of our learned and excellent antiquary Camden, who having formed the deſign, a few years before his deceaſe, of founding a hiſtory-lecture or *profeſſorſhip*, in the univerſity of Oxford, diſpatched his friend Heather on a miſſion thither, with the deed of endowment properly executed, and addreſſed to the vice-chancellor Dr. Piers. It was in conſequence of this embaſſy that Heyther obtained his degree of doctor in muſic, with little expence and trouble; and perhaps it was in gratitude for the kindneſs he received from the univerſity upon this occaſion, as well as in imitation of his learned friend Camden, that he endowed the profeſſorſhip, which is both theoretical and practical. At the time of this endowment, in order to promote the practice of the art, "he gave to the muſic-ſchool an harpſicon, a cheſt of viols, and divers muſic-books, both printed and manuſcript."

It is the more likely that Heyther was inſtigated by Camden to found this profeſſorſhip, who had himſelf been a choriſter at Magdalen college, Oxford, and may be ſuppoſed to have ſtill retained a love for muſic; and that Camden had a great aſcendency over him, may be inferred from the intimate friendſhip which had long ſubſiſted between them. Their ſeveral employments reciprocally obliged them to reſide in Weſtminſter: for Camden was maſter of Weſtminſter-ſchool, and Heyther a gentleman of the king's chapel. In town they reſided under the ſame roof; and, in 1609, when a peſtilential diſeaſe had reached the houſe next to that of Camden and himſelf, by which Camden was afterwards infected, he retired to the reſidence of his friend Heyther at Chiſlehurſt, and by the aſſiſtance of Dr. Giffard, his phyſician, was cured. But of his friendly regard for Dr. Heyther, he gave ample teſtimony at his deceaſe, by appointing him his executor, and bequeathing to him and his heirs an eſtate of 400*l.* a year, for the term of ninety-nine years, he and they paying to the hiſtory-profeſſor 140*l.* per annum; at the expiration of which term, the eſtate was to veſt in the univerſity.

It is more than inſinuated by Ant. Wood, that Heather was not ſufficiently ſkilled in counterpoint, to have compoſed the anthem which was performed as an exerciſe for his degree. But as this ſtory probably originated from envy, and has been ſince propagated without ſufficient proof, it now only merits notice, in order to put readers who may meet with it elſewhere, on their guard, in giving it credence. Who knows now what the anthem was which Heather had performed for his degree? The ſtory ſeems not to have been circulated till after the deceaſe of Orlando Gibbon, who could alone have confirmed or confuted it: as it is poſitively ſaid that a MS. copy of Heather's exerciſe has been found with the name of Orlando Gibbon prefixed to it, without acquainting us how it was known to have been performed as Dr. Heyther's exerciſe, who being brought up in one of our beſt choirs, and qualified for admiſſion as a gentleman of the king's chapel, could not be ignorant of muſic, and who by the muſical profeſſorſhip which he founded, manifeſted his zeal for the honour and progreſs of the art.

Heyther had been ſworn a gentleman of the chapel royal in 1615. And according to Ant. Wood, he and Orlando Gibbon were ſuffered to accumulate the degrees both of bachelor and doctor in muſic; and on the 18th of May, 1622, were both created doctors together.

Orlando Gibbon died of the ſmall-pox at Canterbury 1625, where he was attending the ſolemniſation of the marriage of Charles I. with Henrietta of France, for which occaſion he had compoſed the muſic, and Dr. Heyther died in 1627, and was buried in the broad or ſouth aiſle, joining to the choir of Weſtminſter abbey.

There is now in the muſic-ſchool at Oxford, a picture of Dr. Heyther in his gown and cap, and he well merits a place there, not only as a graduate, but a benefactor to that univerſity.

Heather, in *Rural Economy*, a name commonly applied to heath in moſt of the more northern parts of the kingdom, and particularly in Scotland. See Heath.

Heather-*roof*, that kind of roof employed in building, which is thatched over or covered with heather or heath, inſtead of ſome other material. It is recommended, as well adapted to buildings of the farm deſcription, by the writer of the Survey of the County of Argyle, in Scotland, on the principle that it does well with timber of the ordinary ſort, is capable of being procured for a trifle, laſts nearly as long as ſlates, and affords leſs trouble in the repairs. It is aſſerted that a roof of this material, when well put on, will laſt one hundred years, provided the timber continues good that length of time. And it is ſtated, that formerly moſt of the churches in the above county were covered with this ſort of roof; likewiſe, that heather-roofs are frequently met with in the diſtrict of Cowal, and that there are a few of them in Kintyre.

It is ſuggeſted, that in the "great rage for deſtroying heath it would be wiſe to ſave, at leaſt, as much of the proper kind as might be needed for thatching." The writer indeed conſiders it "aſtoniſhing, that, in a country where heather abounds, thoſe roofs are not more common. They are," he aſſerts, "indeed heavier than ſtraw roofs; but by making them a little ſteeper, and placing the couples a little nearer, than in our ordinary roofs, the moſt of the weight will be thrown on the walls; which, if made, as they ought to be, of ſtone and lime, will not feel the burden."

This ſort of material may certainly be employed with advantage as a covering for ſmall houſes and other buildings, where other kinds of ſubſtances cannot be procured, except at great expence; but at the ſame time it is very inferior to ſlate and other ſimilar matters in forming the coverings of ſuch erections. See Farm *Buildings*.

HEATHY Land, that deſcription of waſte moory ground which is principally covered with the heath plant. There are vaſt tracts of this kind of land in theſe kingdoms, which, in their preſent ſtate, are merely appropriated to the ſupport of a few ſheep, but which, under proper cultivation, would afford uſeful crops of ſeveral different ſorts, and of courſe become of much greater utility and advantage.

Lands of this nature are, notwithſtanding, found to vary greatly in the qualities of the ſoil, as well as the abundance of the heathy material by which they are covered. They muſt of conſequence differ much in the means of cultivation which are neceſſary to be employed according as theſe different circumſtances are more or leſs predominant. Where ſuch lands are thickly ſtudded with this ſort of plant, it has been adviſed on the ground of experience, as the beſt mode of proceeding in the intention of getting ſpeedily quit of it, to have recourſe to the proceſs of paring off and burning the ſurface, as under this management the land is at once reduced into a proper ſtate for the reception of crops; while, under other modes of treatment, much time is not only requiſite for the complete decay of the heath, but the ſoil is preſerved in far too open and light a condition for the growth of moſt ſorts of crops, during the whole period. Immenſe diſtricts of land of this quality have, within theſe late years, been brought into cultivation in this manner with the moſt perfect ſucceſs and benefit. In moſt caſes, however, it is eſſential that the paring ſhould be executed in as thin a manner as poſſible, ſo as effectually to remove the heath, and that a proper ameliorating ſyſtem of cropping ſhould afterwards be purſued. And in a great number of inſtances it will be the moſt adviſable plan to reſtore ſuch lands as ſpeedily as the nature of the undertaking will permit to the condition of graſs in the view that they may be fed with ſheep, or ſome other light ſort of live ſtock.

Mr. Wedge, on poor heathy land, alſo found that ſuch parts as were pared and burned, were far ſuperior in the crops to thoſe which had not the benefit of that proceſs. Many other farmers are, likewiſe, decidedly of opinion that the moſt advantageous ſyſtem of practice, in many caſes, is that of having the heathy material at firſt properly reduced by fire.

In ſome inſtances, notwithſtanding, ground of this deſcription, where the heath is not too ſtrong or thick in its growth, may be brought into a ſtate of culture without undergoing the operations of paring and burning; which is often tedious, as well as attended with conſiderable expence.

There is ſcarcely any point of this intereſting ſubject that demands more regard than that of the proper modes of cropping after they have been broken up at firſt. On poor gravelly heath, Mr. Wright of Rutlandſhire has ſtrongly recommended the mode detailed below: "firſt year pare and burn, and ſow with turnips; ſecond year, barley; then immediately after the barley crop, on once ploughing, harrow in winter tares, to be mown for ſoiling ſtock of all kinds upon the ſame ground; the fence to be kept ſhifting back as the piece gets cleared. It may be begun moſt probably about the third week in May, and continued till the ſeed in the pod is nearly full, perhaps in the beginning of July; what is then unconſumed ſhould be mown and made into hay, which is excellent; then directly on one ploughing ſow with turnips without manure, though it would certainly be a valuable addition, if attainable; after turnips, barley laid down with ſeeds, either for one year or permanently." It is obvious that, in this method of proceeding, there are five valuable crops, and the land laid down with ſeeds in three years and about two months; and each crop may be expected to be a good one either with fallow or manure.

It is conceived, that under this plan the land can neither get foul, ſtale, or exhauſted. Tares are by many thought an inconſiderable crop, but they are ſuch perſons as have not been in the habit of cultivating them. All things conſidered, it is ſuppoſed a matter of doubt whether a farmer can cultivate a more beneficial crop from the ameliorating quality of ſmothering. Corn thrives remarkably after them. Some may, it is conjectured, object to corn crops coming ſo ſeldom; to this it is anſwered, that the moſt corn ſown, is not always the moſt reaped, but the very reverſe; for theſe two corn crops will, at a certainty, produce more grain than if every crop had been of that deſcription, while the ground is left in an improved condition inſtead of being left wholly deteriorated.

Upon a poor heath, on a chalky bottom, Mr. Wedge found the mode of cropping detailed below to be highly advantageous:

1ſt year burnt wheat,
2d —— turnips,
3d —— barley,
4th —— ſeeds,
5th —— half-ſeeds, half-peas,
6th —— wheat after ſeeds and peas,
7th —— turnips manured for,
8th —— barley,
9th —— ſeeds,
10th —— half-peas, half-ſeeds.

In this manner of proceeding it is remarked, that half of the ſecond year's ſeeds will be ſown with peas or tares alternately, the wheat crops will conſtantly take the fold, and the turnip ground the dung, which, in general, will ſecure on white land a fair crop of turnips; it is contended that the fold will not afford the ſame effect. The writer conceives that it requires but little to prove the vaſt benefit of burning this kind of land. The ſeventh year after that operation is the firſt period at which dung is at all requiſite, as the land is in no part of this proceſs in a deteriorated condition. In light heathy ſoils, the advantage of the uſe of clay and marle is very conſiderable, when applied in tolerably large quantities, as from fifty to ſixty loads or more to the acre. Without ſome application of this nature, that ſort of firmneſs which is neceſſary for the growth of turnips and ſome other crops can ſcarcely ever be attained. See *Waſte* Land.

It has been ſuggeſted, in conſidering the cultivation of waſte lands of the heath kind, where the tenants have leaſes, and are not able or diſpoſed to the improvement of them, that, as the principal charge is the expence of lime, the proprietor ſhould advance the amount to the tenant free of intereſt for three years; the former to be reimburſed at the termination of that period; the tenant being in return bound, not only to improve the land on a plan to be laid down by the landlord, but alſo to be ſubjected to a certain method of cropping, when the improvement has been effected. By adopting this ſort of arrangement, a great extent of heathy land might ſpeedily be brought into a highly productive ſtate of cultivation.

HEATOTOTL, in *Ornithology*, the name of an American bird, deſcribed by Nieremberg, and called alſo *avis venti*. It is remarkable for a very large and round creſt of whitiſh feathers on its head. Its breaſt is of a browniſh grey; its belly white, and its feet yellow; its tail is round when expanded, and is variegated with black and white; its back and wings are black.

HEAVE, at *Sea*, ſignifies to throw away or fling any thing over-board.

When a ſhip, being at anchor, riſes and falls by the force of the waves, ſhe is alſo ſaid to *heave and ſet*.

To Heave *a peek*. See Peek.

To Heave *at the capſtan*, ſignifies to turn it about. See Capstan.

To Heave *down*. See Careening.

To Heave *a flag aboard*, is to hang it out. See Flag, and Signal.

To Heave *a-head*, is to make the ſhip advance by heaving in the cable, or other rope, which is faſtened to an anchor at ſome diſtance before her. *To heave a-ſtern*, is to draw the ſhip backwards by the ſame operation.

To Heave *the lead*. See Sounding.

To Heave *out*, is to unfurl and throw looſe a ſail from the place where it had been rolled and faſtened. The phraſe is more particularly applied to the ſtay-ſails: as, *looſe the top-ſails*, and *heave out the ſtay-ſails*, which is done, in order to ſet or dry them.

To Heave *ſhort*, is to draw ſo much of the cable into the ſhip, by means of the capſtan or windlaſs, as that by advancing ſhe will be almoſt perpendicularly above the anchor, and in a proper ſituation to ſet ſail: and to *heave taught*, is to turn about the capſtan, till the rope applied to it becomes ſtraight, and ready for action.

Heave-*offerings*, under the *Jewiſh Law*, were things offered up to God, by lifting them up on high.

Heave, in *Mining*, ſignifies a *fault* or derangement of the ſtrata, ſee that article. Mr. Farey, from obſerving the worn ſtate of the edges of faults, as well of thoſe which do not derange the ſtrata vertically, or very little, as of thoſe which do ſo in the greateſt degree, infers, that the ſurface of the earth has, for a long time, been ſubjected to a progreſſive *heaving*, like the waves of a high ſea. See Philoſophical Magazine, vol. xxviii. p. 120. and other places in that work.

HEAVED is applied, in Cornwall, to the lateral derangement, with reſpect to the ſurface, which the loads or mineral veins have ſuffered by the croſs flookans or faults.

HEAVEN, Cœlum, an azure, tranſparent orb inveſting our earth; wherein the celeſtial bodies perform their motions.

The popular notion of heaven, it muſt be obſerved, has various ideas, in the language of philoſophers, divines, and aſtronomers: agreeable to which we may lay down divers heavens; as the *higheſt*, or *empyrean* heaven; the *ætherial*, or *ſtarry* heaven; the *planetary* heaven, &c.

Heaven, among *Divines*, called alſo the *empyrean* heaven, is the abode of God, and bleſſed ſpirits; as angels, and the ſouls of the righteous deceaſed.

In this ſenſe, *heaven* ſtands oppoſite to *hell*.

This is alſo frequently called in Scripture, the *kingdom of heaven*, the *heaven of heavens*, and by St. Paul the *third heaven*: ſometimes *Paradiſe*, the *New Jeruſalem*, &c.

This heaven is conceived as a place in ſome part of infinite ſpace, wherein the Deity is pleaſed to afford a nearer and more immediate view of himſelf, and a more ſenſible manifeſtation of his glory; and a more adequate perception of his attributes, than in the other parts of the univerſe, where he is likewiſe preſent.

This makes what the divines alſo call the *beatific viſion*. Authors are much divided as to the reality of ſuch *local* heaven.

The inſpired writers give us very magnificent deſcriptions of heaven, the ſtructure, apparatus, and attendance thereof; particularly Iſaiah, and St. John the Divine. Plato, in his Dial. de Anim. ſpeaks of heaven in terms that bear ſo near a reſemblance to thoſe of Scripture, that Euſebius charges him with borrowing his account thence. (De Præpar. Evangel. lib. xi. can. 37.) A late writer, whoſe imagination ſeems to have miſled his judgment, conceiving that the heat produced by the rays of the ſun is not in the rays themſelves, but in another diſtinct fluid, upon which they act, and which may be called the elementary fluid of heat, and, moreover, that this fluid is capable of being reduced to a fixed and ſolid ſtate, proceeds to conjecture, that the ſun is not a maſs of fire, according to the vulgar notion, but a glorious manſion, whoſe ſurface is covered with a vaſt variety of ſplendid objects, of different colours, ſhining and becoming viſible by their own emitted light; thence it may ſeem reaſonable to conclude, that the ſun is an habitation of happy beings, and becauſe of its connection with the earth, that it is "our heaven." This conjecture the author applies to the explication of many paſſages of ſcripture, and particularly of the Lord's prayer, in which he ſays there is a manifeſt diſtinction between "the heavens" and "heaven." The former, in which God is ſaid to reſide, (Our father, which art in "the heavens,") includes the numerous worlds in which he manifeſts his glory; the latter (thy will be done on earth as it is in "heaven,") denotes one peculiar heaven, the ſun. Thoſe who wiſh for more conjectures and criticiſms of this kind, may conſult a work, publiſhed in 1788, 4to, by Edward King, eſq., and entitled "Morſels of Criticiſm, &c." Some of the ancients alſo imagined that the habitation of good men, after the reſurrection, would be the ſun, grounding this fanciful opinion on a miſtaken interpretation of Pſ. xix. 4., which they rendered, with the LXX and Vulgate, "He has ſet his tabernacle in the ſun." Others again have thought it to be beyond the ſtarry firmament, a notion no leſs unphiloſophical and improbable than the former. Mr. Whiſton (Boyle's Lect. Append.) ſuppoſes the air to be the manſion of the bleſſed, at leaſt for the preſent; and he imagines, that Chriſt is at the top of the atmoſphere, and other ſpirits nearer to, or more remote from him, according to the degree of their moral purity, to which he conceives the ſpecific gravity of their inſeparable vehicles to be proportionable. Mr. Hallet, a writer of ſounder judgment, has endeavoured to prove, that they will dwell upon earth, when it ſhall be reſtored to its paradiſaical ſtate. (See Hallet on Script. vol. i. p. 191—240. vol. ii. p. 167—174.) The paſſages of ſcripture, however, on which he grounds his hypotheſis, are capable of another and very different interpretation. After all, we may obſerve, that the place of the bleſſed is a queſtion of comparatively little importance; and if we believe the deſcription of their happineſs, expreſſed often in highly figurative terms, we may cheerfully expect and purſue it, though we cannot anſwer a multitude of curious queſtions, relating to various circumſtances that pertain to it. We have reaſon to believe that heaven will be a ſocial ſtate, and that its happineſs will, in ſome meaſure, ariſe from mutual communion and converſe, and the expreſſions and exerciſes of mutual benevolence. (See Heb. xii. 22. 1 Theſſ. ii. 19, 20.)

The ancient Romans had a kind of heaven in their ſyſtem of theology, which they called *elyſium*, or the *elyſian fields*.

The Mahometan heaven, or *paradiſe*, is very groſs, agreeable to the genius of their religion.

Heaven, among *Aſtronomers*, called alſo the *ætherial* and *ſtarry heaven*, is that immenſe region wherein the ſtars, planets, and comets are diſpoſed.

This is what Moſes calls the *firmament*, ſpeaking of it as the work of the ſecond day's creation; at leaſt it is thus the word רקיע is uſually rendered by his interpreters; though ſomewhat abuſively, to countenance their own notion of the heavens being firm, or ſolid. (See Firmament.) The word, it is certain, properly ſignifies no more than *expanſe*, or *extenſion*; a term very well adapted by the prophet to the impreſſion which the heavens make on our ſenſes; whence, in other parts of ſcripture, the heaven is compared to a curtain, or a tent ſtretched out to dwell in. The LXX firſt added to this idea of expanſion, that of *firm* or *ſolid*; rendering it by ϛερεωμα, according to the philoſophy of thoſe times; in which they have been followed by the modern tranſlators.

The later philoſophers, as Des Cartes, Kircher, &c. have eaſily demonſtrated this heaven not to be ſolid, but fluid; but they ſtill ſuppoſe it full, or perfectly denſe, without any vacuity, and cantoned out into many vortices.

But others carry the thing much farther, and overturn not only the ſolidity, but the ſuppoſed plenitude, of the heavens. Sir Iſaac Newton has abundantly ſhewn the heavens void of almoſt all reſiſtance, and, conſequently, of almoſt all matter: this he proves from the phenomena of the celeſtial bodies; from the planets perſiſting in their motions without any ſenſible diminution of their velocity; and the comets freely paſſing in all directions towards all parts of the heavens.

Heaven, taken in this general ſenſe, for the whole expanſe between our earth and the remoteſt regions of the fixed ſtars, may be divided into two very unequal parts, according to the matter found therein; *viz.* the atmoſphere, or *aerial heaven*, poſſeſſed by air; and the *ætherial heaven*, poſſeſſed by a thin, unreſiſting medium, called *æther*.

Heaven is more particularly uſed, in *Aſtronomy*, for an orb, or circular region, of the ætherial heaven.

The ancient aſtronomers aſſumed as many different heavens as they obſerved different motions in them. Theſe they ſuppoſed all to be ſolid, as thinking they could not otherwiſe ſuſtain the bodies fixed in them; and ſpherical, that being the moſt proper form for motion.

Thus we had ſeven heavens for the ſeven planets; *viz.* the heavens of the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn. The eighth was for the fixed ſtars, which they particularly called the *firmament*; which ſee.

Ptolemy adds a ninth heaven, which he called the *primum mobile*.

After him two cryſtalline heavens were added, by king Alphonſus, &c. to account for ſome irregularities in the motions of the other heavens: and laſtly, an *empyrean* heaven was drawn over the whole, for the reſidence of the Deity; which made the number twelve.

But others admitted many more heavens, according as their different views and hypotheſes required. Eudoxus ſuppoſed twenty-three, Calippus thirty, Regiomontanus thirty-three, Ariſtotle forty-ſeven, and Fracaſtor no leſs than ſeventy.

We may add, that the aſtronomers did not much concern themſelves whether the heavens, they thus allow of, were real or not, provided they ſerved a purpoſe in accounting for any of the celeſtial motions, and agreed with the phenomena.

Among the other reveries of the rabbins, contained in the Talmud, we find it aſſerted, that there is a place where the heavens and the earth join together; that rabbi Barchana, going thither, laid his hat on the window of heaven; and that, going to take it again immediately after, it was gone, the heavens having carried it off; ſo that he muſt wait for a revolution of the orbs to bring it to its place again.

The indefatigable labours of Dr. Herſchel, in the ſervice of aſtronomy, are known to every lover of the ſcience. None of his numerous diſcoveries are worthy of greater attention than thoſe which relate to the conſtruction of the heavens. The ſubject, both theoretically and practically, has engaged his attention for many years; and a ſlight ſketch of his theory, as far as relates to the conſtruction of the milky-way, has already been given under GALAXY. We have now to inform our readers, in what manner Dr. H. applies his valuable and immenſe ſeries of obſervations to the conſtruction of the whole ſidereal ſyſtem of the heavens. Firſt, taking a theoretical view of the ſubject, he ſuppoſes numberleſs ſtars of various ſizes ſcattered over an indefinite portion of ſpace, in ſuch a manner as to be almoſt equally diſtributed throughout the whole. The laws of attraction, extending to the remoteſt regions of the fixed ſtars, will then, he conceives, very probably produce the following remarkable effects:

Formation of Nebulæ.

Form 1.—In the firſt place, ſince the ſtars are ſuppoſed to be of various ſizes, it will frequently happen, that a ſtar, being conſiderably larger than its neighbouring ones, will atttract them more than they will be attracted by others that are immediately round them; by which means they will be in time, as it were, condenſed about a centre; or, in other words, form themſelves into a cluſter of ſtars of almoſt a globular figure, more or leſs regularly ſo according to the ſize, and original diſtance of the ſurrounding ſtars.

Form 2.—The next caſe, which will alſo happen almoſt as frequently as the former, is where a few ſtars, though not ſuperior in ſize to the reſt, may happen to be rather nearer each other than the ſurrounding ones; for here alſo will be formed a prevailing attraction in the combined centre of gravity of them all, which will occaſion the neighbouring ſtars to draw together; not indeed ſo as to form a regular or globular figure, but, however, ſo as to be condenſed towards the common centre of gravity of the whole irregular cluſter. And this conſtruction admits of the utmoſt variety of ſhapes, according to the number and ſituation of the ſtars, which firſt gave riſe to the condenſation of the reſt.

Form 3.—From the compoſition and repeated conjunction of both the foregoing forms, a third may be derived, when many large ſtars, or combined ſmall ones, are ſituated in long extended, regular, or crooked rows, hooks, or branches; for they will alſo draw the ſurrounding ones, ſo as to produce figures of condenſed ſtars coarſely ſimilar to the former, which gave riſe to theſe condenſations.

Form 4.—We may likewiſe admit of ſtill more extenſive combinations, when at the ſame time that a cluſter is forming in one part of the ſpace, there may be another collecting in a different, but, perhaps, not far diſtant quarter, which may occaſion a mutual approach towards their common centre of gravity.

Form 5.—In the laſt place, as a natural conſequence of the former caſes, there will be formed great cavities or vacancies, by the retreat of the ſtars towards the various centres which attract them; ſo that upon the whole there is evidently a field of the greateſt variety for the heavenly bodies to exert themſelves in.

From this theoretical view of the heavens, which has been taken from a point not leſs diſtant in time than in ſpace, let us now retreat to our own ſtation, in one of the planets attending a ſtar in its great combination with numberleſs others; and in order to inveſtigate what will be the appearances from this contracted ſituation, let us begin with the naked eye.

The ſtars of the firſt magnitude being, in all probability, the neareſt, will furniſh us with a ſtep to begin our ſcale; ſetting out, therefore, with the diſtance of Sirius or Arcturus, for inſtance, as unity, let it be ſuppoſed, that thoſe of the ſecond magnitude are at double, and thoſe of the third at treble the diſtance, and ſo forth. It is not neceſſary critically to examine what quantity of light, or magnitude of a ſtar, entitles it to be eſtimated at ſuch or ſuch a proportional diſtance, as the common coarſe eſtimation will anſwer our preſent purpoſe as well: taking it then for granted, that a ſtar of the ſeventh magnitude is about ſeven times as far diſtant as one of the firſt, it follows, that an obſerver who is encloſed in a globular cluſter of ſtars, and not far from the centre, will never be able with the naked eye to ſee the end of it; for ſince, according to the above eſtimations, he can only extend his view to about ſeven times the diſtance of Sirius, it cannot be expected that his eyes ſhould reach the borders of a cluſter, which has, perhaps, not leſs than fifty ſtars in depth every where round him. The whole univerſe, therefore, will, to him, be compriſed in a ſet of conſtellations, richly ornamented with ſcattered ſtars of all ſizes. Or if the united brightneſs of a neighbouring cluſter of ſtars ſhould, in a remarkably clear night, reach his ſight, it will put on the appearance of a ſmall faint whitiſh nebulous cloud, not to be perceived without the greateſt attention.

Without conſidering other ſituations, let him be placed in a much extended ſtratum, or branching cluſter of millions of ſtars, ſuch as may fall under the third form of nebulæ, conſidered in a foregoing paragraph. Here alſo the heavens will not only be richly ſcattered over with brilliant conſtellations, but a ſhining zone, or milky way, will be perceived to ſurround the whole zone of the heavens, owing to the combined light of thoſe ſtars which are too ſmall, that is, too remote, to be ſeen.

The obſerver's ſight will be ſo confined, that he will imagine this ſingle collection of ſtars, of which he does not perceive even the thouſandth part, to be the whole contents of the heavens. Allowing him now the uſe of a common teleſcope, he begins to ſuſpect, that all the milkineſs of the bright path that ſurrounds the ſphere may be owing to ſtars. He perceives a few cluſters of them in various parts of the heavens, and finds alſo, that there is a kind of nebulous patches; but ſtill his views are not extended ſo far as to reach to the end of the ſtratum in which he is ſituated, ſo that he looks upon theſe patches as belonging to that ſyſtem which to him ſeems to comprehend every celeſtial object. He now increaſes his power of viſion, and applying himſelf to a cloſe obſervation, finds that the milky-way is indeed no other than a collection of very ſmall ſtars. He perceives that thoſe objects, which had been called nebulæ, are evidently nothing but cluſters of ſtars. He finds their number increaſe

creaſe upon him, and when he reſolves one nebula into ſtars he diſcovers ten others, which he cannot reſolve. He then forms the idea of immenſe ſtrata of fixed ſtars, of cluſters of ſtars, and of nebulæ; till going on with ſuch intereſting obſervations he perceives that all theſe appearances muſt naturally ariſe from the confined ſituation in which we are placed.

Confined indeed it may be called, though in no leſs a ſpace than what before appeared to be the whole region of the fixed ſtars; but which now has aſſumed the ſhape of a crookedly branched nebula; not indeed one of the leaſt, but perhaps, very far from being the moſt conſiderable of thoſe numberleſs cluſters that enter into the conſtruction of the heavens.

Dr. H. then gives a number of obſervations, which he calls gages, and arrives at this concluſion, "That we inhabit the planet of a ſtar belonging to a compound nebula of the third form;" the particular form and dimenſions of which have been deſcribed under the article Galaxy.

Dr. Herſchel, after giving a very detailed deſcription of our nebula, proceeds to give an account of the origin of nebulous ſtrata, and obſerves, that if it were poſſible to diſtinguiſh between the parts of an indefinitely extended whole, the nebula we inhabit might be ſaid to be one that has fewer marks of profound antiquity upon it than the reſt. He obſerves, that to explain this idea more clearly, it ſhould be recollected that the condenſation of cluſters of ſtars has been aſcribed to a gradual approach, and that whoever reflects on the number of ages that muſt have paſſed before ſome of the cluſters, that are to be found in his catalogue of them, could be ſo far condenſed as they are found at preſent to be, will not wonder that he ſhould aſcribe a certain air of youth and vigour to many very regularly ſcattered regions of our ſidereal ſtratum. There are, moreover, many places in it where there is the greateſt reaſon to believe, that the ſtars, if we may judge from appearances, are now drawing towards various ſecondary centres, and will, in time, ſeparate into different cluſters, ſo as to cauſe many ſubdiviſions. Hence we may ſurmiſe, that when a nebulous ſtratum conſiſts chiefly of nebulæ of the firſt and ſecond form, it probably owes its origin to what may be called the decay of a great compound nebula of the third form; and that the ſubdiviſions, which happened to it in length of time, occaſioned all the ſmall nebulæ which ſprung from it to be in a certain range, according as they were detached from the primary one. In like manner, our ſyſtem, after numbers of ages, may very poſſibly become divided, ſo as to give riſe to a ſtratum of two or three hundred nebulæ, for it would not be difficult to point out ſo many beginning or gathering cluſters in it. Dr. Herſchel remarks, that this view of the preſent ſubject throws a conſiderable light upon the appearance of that remarkable collection of many hundreds of nebulæ, which are to be ſeen in what he has called the nebulous ſtratum of Coma Berenices. It appears, from the extended and branching figure of our nebula, that there is room for the decompoſed ſmall nebulæ of a large reduced former great one, to approach nearer to us in the ſides than in other parts. Nay, poſſibly there might originally be another very large joining branch, which in time becomes ſeparated by the condenſation of the ſtars; and this may be the reaſon, he obſerves, of the little remaining breadth of our ſyſtem in that very place; for the nebulæ of the ſtratum of the Coma are the brighteſt and moſt crowded juſt oppoſite our ſituation, or in the pole of our ſyſtem.

As ſoon as this idea was ſuggeſted, Dr. Herſchel tried alſo the oppoſite pole, where accordingly he met with a great number of nebulæ, though under a much more ſcattered form.

Dr. Herſchel ſuſpects, that parts of our ſyſtem have already ſuſtained greater ravages of time than others, if this expreſſion may be allowed; for inſtance, he found, in the body of the Scorpion an opening or hole, which he thinks is probably owing to this cauſe. This opening is at leaſt four degrees broad, but its height is not yet aſcertained. It is remarkable that the 80 *nebuleuſe ſans etoiles* of the *Connoiſſance des temps*, which is one of the richeſt and moſt compreſſed cluſters of ſmall ſtars, is ſituated juſt on the weſtern border of it, and would almoſt authorize a ſuſpicion, that the ſtars of which it is compoſed were collected from that place, and had left the vacancy. What adds not a little to the probability of this ſurmiſe is, that the ſame phenomenon is once more repeated with the fourth cluſter of ſtars of the *Connoiſſance des temps*; which is alſo on the weſtern border of another vacancy, and has moreover a ſmall, miniature cluſter, or eaſily reſolvable nebula, of about 2½ minutes in diameter, north following it at no very great diſtance.

Dr. Herſchel obſerves, that there is a remarkable purity or clearneſs in the heavens when we look out of our ſtratum at the ſides; that is, towards Leo, Virgo, and Coma Berenices one one ſide, and towards Cetus on the other; whereas the ground of the heavens becomes troubled as we approach towards the length or height of it. He ſays, it was a good while before he could trace the cauſe of theſe phenomena; but that ſince he has been acquainted with the ſhape of our ſyſtem, he thinks it plain that theſe troubled appearances, when we approach the ſides, are eaſily to be explained, by aſcribing them to ſome of the diſtant ſtraggling ſtars that yield hardly light enough to be diſtinguiſhed. And this, he ſays, he has often experienced to be actually the cauſe, by examining theſe troubled ſpots for a long while together, when at laſt he generally perceived the ſtars which occaſioned them. But in looking towards the poles of our ſyſtem, where the viſual ray does not graze along the ſides, the ſtraggling ſtars will of courſe be very few in number, and therefore the ground of the heavens will aſſume that purity which is always obſerved to take place in thoſe regions.

We are uſed to call the appearance of the heavens, where it is ſurrounded with a bright zone, the milky-way; there are other remarkable nebulæ which cannot well be leſs, but are probably much larger than our own ſyſtem, and being alſo extended, the inhabitants of the planets that attend the ſtars which compoſe them, muſt likewiſe perceive the ſame phenomenon; for which reaſon they may alſo be called milky-ways by way of diſtinction.

Dr. Herſchel's opinion of their age is grounded on the following obſervations. There are many round nebulæ of the firſt form, of about five or ſix minutes in diameter, the ſtars of which he can ſee very diſtinctly, and on comparing them with the viſual ray, calculated from ſome of his long gages, he ſuppoſes by the appearance of the ſmall ſtars in thoſe gages, that the centres of theſe round nebulæ may be 600 times the diſtance of Sirius from us.

In eſtimating the diſtance of ſuch cluſters, Dr. Herſchel conſulted rather the comparatively apparent ſize of the ſtars, than their mutual diſtance; for the condenſation in theſe cluſters, being probably much greater than in our own ſyſtem, if we were to overlook this circumſtance and calculate by their apparent compreſſion, where in about ſix minutes diameter there are perhaps ten or more ſtars in the line of meaſures, we ſhould find that on the ſuppoſition of an equal ſcattering of the ſtars throughout all nebulæ, the diſtance of the centre of ſuch a cluſter from us could not be leſs than 6000 times the diſtance of Sirius. And perhaps in putting it at 600 only, it is conſiderably under-rated. Dr. Herſchel thinks, that if this ſhould be the caſe, it will ſtrengthen his opinion. But to proceed,

Some of theſe round nebulæ have others near them, perfectly ſimilar in form, colour, and the diſtribution of ſtars, but of only half the diameter; and the ſtars in them ſeem to be doubly crowded, and at only about half the diſtance from each other; they are, indeed, ſo ſmall as not to be viſible without the utmoſt attention. Theſe miniature nebulæ are ſuppoſed to be at double the diſtance of the firſt. An inſtance equally remarkable and inſtructive, is a caſe where, in the neighbourhood of two ſuch nebulæ as have been mentioned, a third is met with, ſimilar, reſolvable, but much ſmaller and fainter. The ſtars of it are no longer to be perceived, but a reſemblance of colour with the former two, and its diminiſhed ſize and light, may well permit us to place it at full twice the diſtance of the ſecond, or about four or five times that of the firſt. And yet, the nebuloſity is not of the milky kind, nor is it difficult to reſolve if colourleſs. Now in a few of the extended nebulæ, the light changes gradually, ſo as from the reſolvable to approach to the milky kind; which appears to be an indication that the milky light of the nebulæ is owing to their much greater diſtance. A nebula, therefore, whoſe light is perfectly milky, cannot well be ſuppoſed to be at leſs than ſix or eight thouſand times the diſtance of Sirius, and though the numbers here aſſumed are not to be taken otherwiſe than as very coarſe, yet an extended nebula, which in a very oblique direction, where it is probably ſhortened by one half, two-thirds or three-fourths of its length, ſubtends a degree or more in diameter, cannot be otherwiſe than of a wonderful magnitude, and may well exceed our milky-way in grandeur.

Dr. Herſchel enumerates ſeveral of this kind of nebulæ, an account of which, as well as a table of nebulæ, will be given under the article NEBULÆ.

From about the year 1784, when the firſt communications were made on this ſubject to the Royal Society, Dr. Herſchel has continually added to our ſtock of information on this intereſting ſubject. In the year 1802, he gave a more minute claſſification of the celeſtial bodies, which compoſe the ſidereal ſyſtem; of which the following abridged account is given by Dr. Young, in the appendix to his lectures on Natural Philoſophy.

Dr. Herſchel takes a very enlarged view of the ſidereal bodies compoſing the univerſe, as far as he can conjecture from their nature, and enumerates a great diverſity of parts that enter into the conſtruction of the heavens, reſerving a more complete diſcuſſion of each to a future time.

The firſt ſpecies are inſulated ſtars; as ſuch, the author conſiders our ſun, and all the brighter ſtars which he ſuppoſes nearly out of the reach of mutual gravitation; for ſtating the annual parallax of Sirius at 1″, he calculates that Sirius and the ſun, if left alone, would be 38 millions of years in falling together, and that the action of the ſtars of the milky-way, as well as others, would tend to protract this time much more.

Dr. Herſchel conjectures that the inſulated ſtars alone are ſurrounded by planets. The next are binary ſidereal ſyſtems, or double ſtars; from the great number of theſe which are viſible, in different parts of the heavens, and the frequent apparent equality of the two ſtars, Dr. Herſchel calculates the very great improbability that they ſhould be at diſtances from each other at all comparable to thoſe of the inſulated ſtars. Hence he infers that they muſt be ſubjected to mutual gravitation, and can only preſerve their relative diſtances by a periodical revolution round a common centre. In confirmation of this inference he promiſes ſoon to communicate a ſeries of obſervations made on double ſtars, ſhewing that many of them have actually changed their ſituation in a progreſſive courſe, the motion of ſome being direct, and of others retrograde. The proper motion of our ſun does not appear to be of this kind, but rather to be the effect of ſome perturbations in the neighbouring ſyſtems.

The ſame theory is next applied to triple, quadruple, and multiple ſyſtems of ſtars, and particular hypothetical caſes are explained by diagrams. Some ſuch caſes, Dr. Herſchel is fully perſuaded, have a real exiſtence in nature. The fourth ſpecies conſiſts of cluſtering ſtars and of the milky way. The ſtars thus diſpoſed conſtitute maſſes which appear brighter in the middle, and fainter towards the extremities, being perhaps collected in a ſpherical form. Groups of ſtars the author diſtinguiſhes from theſe by a want of apparent condenſation about a centre of attraction; and cluſters of ſtars by a much more complete compreſſion near ſuch a centre, ſo as to exhibit a mottled luſtre almoſt reſembling a nucleus. The eighth ſpecies conſiſts of nebulæ, which probably differ from the three laſt ſpecies only in being more remote; ſome of them, Dr. Herſchel calculated, are at ſo great a diſtance, that the rays of light muſt have been nearly two millions of years in travelling from them to our ſyſtem. The ſtellar nebulæ, or ſtars with burs, form a diſtinct ſpecies. A milky nebuloſity is next mentioned, which may, in ſome caſes, reſemble other nebulæ, but, in others, appears to be diffuſed almoſt like a fluid. The author is not inclined to conſider it as either reſembling the light of the ſun, or of a phoſphoreſcent nature. The tenth ſpecies is denominated nebulous ſtars. Theſe are ſtars ſurrounded with a nebuloſity like an atmoſphere, of which the magnitude muſt be amazingly great; for the apparent diameter of one of them deſcribed in the catalogue was 3′. The planetary nebulæ are diſtinguiſhed by their equable brightneſs and circular form, while their light is ſtill too faint to be produced by a ſingle luminary of great dimenſions. When they have bright central points, Dr. Herſchel conſiders them as forming a twelfth ſpecies, and ſuppoſes them to be allied to the nebulous ſtars, which might approach to their nature if their luminous atmoſpheres were very much condenſed round the nucleus. For a more minute account of theſe various bodies, ſee DOUBLE STAR, NEBULA, &c. &c.

HEAVER, in *Sea Language*, is a name given by ſeamen to a wooden ſtaff, which they employ as a lever on many occaſions; particularly in ſetting up the top-maſt ſhrouds, frapping the top maſts, ſtropping the larger blocks, ſeizing the ſtanding rigging, &c.

HEAVINESS. See GRAVITY.

For the laws of the deſcent of heavy bodies, ſee DESCENT.

Heavy bodies do not tend preciſely to the very centre of the earth, except at the poles, and the equator, on account of the ſpheroidal figure of the earth. Their direction is every where perpendicular to the ſurface of the ſpheroid.

HEAULME, or HEAUME, in *Heraldry*, a helmet, or head-piece.

HEAVY, in the *Manege*. A horſe is ſaid to reſt heavy upon the hand, who, through the ſoftneſs of his neck, the weakneſs of his back, the weight of his fore-quarters, or through wearineſs, throws himſelf upon the bridle; but without making any reſiſtance, or any effort to force the horſeman's hand. This fault is remedied, and the horſe made light upon the hand, by ſtopping, and making him go back frequently, if it proceeds only from lazineſs and ſtiffneſs; but if cauſed by any defect in the back, there is no remedy for it.

HEB, or Ebb, in *Mining*, ſignifies ſhallow, as a heb pit means a ſhallow pit.

HEBBING-Wears, in our *Statutes*, is uſed for weirs or engines made or laid at ebbing water, 23 Hen. VIII. cap. 5.

HEBDEN, John, in *Biography*, a native of Yorkſhire, well known in London, in the middle of the laſt century, as a performer on the baſſoon and violoncello of the ſecond claſs. He was more a uſeful than an ornamental player on both theſe inſtruments. At Vauxhall he was ſecond on the baſſoon, where Miller was the firſt; and at Drury Lane, where Cervetto was firſt violoncello, Hebden was ſecond; yet he often played concertos on the baſſoon at benefit concerts with conſiderable applauſe.

He was totally ignorant of compoſition; and, getting young and obſcure ſtudents in counterpoint, to ſtring together a cento of muſical phraſes, from different authors, in the ſame key and meaſure for each movement, no individual had a right to claim the whole piece, in its totality.

HEBDOMADARY, Hebdomadarius, or Hebdomadius, a member of a chapter or convent, whoſe week it is to officiate in the choir, to rehearſe the anthems and prayers, and to perform the uſual functions which the ſuperiors perform at ſolemn feaſts, and other extraordinary occaſions.

The word is formed of the Greek ἑβδομας, which ſignifies the number *ſeven*; of ἑπτα, *ſeven*.

The hebdomadary generally collates to the benefices which become vacant during his week; though it is uſually looked on as an abuſe.

In cathedrals the hebdomadary was a canon or prebendary who had the peculiar care of the choir, and the inſpection of the officers of his week.

In monaſteries the hebdomadary is he who waits at table for a week, or other ſtated period; directs and aſſiſts the cook, &c.

In church-antiquity we meet with accounts of nine different ſorts of hebdomadaries, *viz.* the *hebdomadarius cantor*, or hebdomadary cantor; *hebdomadarius chori*, hebdomadary of the choir; which two were really the ſame, *viz.* he who led or conducted the public ſervice; hebdomadary of the kitchen, *hebdomadarius coquinæ*; hebdomadary of the defunct, or the dead, *hebdomadarius defunctorum*, he who took care of the office and ſervice of the dead; *hebdomadarius invitatorii*, he who ſung the invitatory; *hebdomadarius lector ad menſam*, he who read at meal time; *hebdomadarius majoris miſſæ*, he who read maſs; *hebdomadarius pſalterii*, who probably was the ſame with the *hebdomadarius chori*; and *hebdomadarius ſacri altaris*, who might be the ſame with the hebdomadary of the high maſs.

HEBDOME, Ἑβδομη, among the Athenians, a feſtival or holy day kept always on the ſeventh day of the moon in honour of Apollo; that being ſuppoſed to have been his birth-day.

HEBE, in *Ancient Mythology*, a goddeſs, the daughter of Jupiter and Juno, the idea of whom, among the Romans, ſeems to have been much the ſame with that of eternal youth, or an immortality of bliſs; agreeably to which, ſhe is repreſented on a gem, in the great duke's collection at Florence, with a young airy look, and drinking out of a little bowl; or, according to Milton's expreſſion, "Quaffing immortality and joy." Hebe is ſaid to have been married to Hercules after his deification.

Hebe, in *Botany*, a name given by Commerſon, and adopted by Juſſieu, to the *Veronica decuſſata* of Aiton's Hortus Kewenſis, ed. 2. v. 1. 31. Curt. Mag. t. 242, which, with ſome other ſpecies that have ovate capſules and are rather of a ſhrubby habit, have been ſuſpected to conſtitute a diſtinct genus, but, we believe, without ſufficient grounds. Such are, *V. parviflora*, *macrocarpa*, *ſalicifolia*, and *cataractæ* of Vahl's Enumeratio Plantarum, v. 1. 66, 67.

HEBENSTREIT, John Ernest, in *Biography*, profeſſor of medicine in the univerſity of Leipſic, was born at Neuſtadt, in Germany, in the year 1703, or, as we learn from other accounts, in the preceding year (Dryander. Bibl. Banks. v. 5. 272.)—During the earlier part of his life it appears that he purſued his ſtudies at Jena, from whence he removed to Leipſic; and at this latter place he took, ſucceſſively, the degrees of maſter of arts and doctor of phyſic. Before he attained the age of 30, at the command of Frederic Auguſtus II. king of Poland and elector of Saxony, he undertook a voyage to Africa, being accompanied by Ludwig, and ſome other philoſophical friends, to aſſiſt in his reſearches, for the purpoſe of inveſtigating the natural hiſtory of that part of the world; but a complete account of this expedition has never been publiſhed. Dr. Aikin, in his General Biography, on the authority of Hirſching, informs us, that "Hebenſtreit, having explored the neighbourhood of Tripoli and Tunis, travelled through part of the deſart between theſe two towns, and examined the ruins of Carthage, but was obliged, on account of the king's death, to return rather ſuddenly in the year 1733." He brought home with him, however, many valuable curioſities of nature, which were partly preſented to the menagerie at Dreſden, and partly lodged in the king's private muſeum. Auguſtus III. following the ſteps of his father, continued to patronize the ſubject of theſe memoirs, and cauſed him to be appointed public profeſſor of medicine at Leipſic ſoon after his return from Africa. In this profeſſorſhip he remained till his death, which was occaſioned by a malignant fever that prevailed immediately after the battle of Roſbach, in the year 1757. "Hebenſtreit poſſeſſed an extenſive knowledge of philoſophy, medicine, both ancient and modern, natural hiſtory, botany, and anatomy. He had a ready talent for Latin poetry, and was well verſed in the Greek language. He was deeply ſkilled in the ſtudy of nature, and to him Leipſic is in part indebted for a valuable collection of curioſities." He zealouſly defended the ſyſtem of botany which was founded by Rivinus upon the corolla, againſt the various objections to it which were urged by Ray, Schelhammer, Rudbeck, and Dillenius. The following is a liſt of his works.

Muſeum *Richterianum*, continens foſſilia, animalia, vegetabilia marina, illuſtrata iconibus et commentariis. *Lipſiæ*, 1743, folio.

Programmata:

De organis piſcium externis. 1733.

De methodo plantarum ex fructu optimâ. 1740.

De vermibus anatomicorum adminiſtris. 1741.

De inſectorum natalibus. 1743.

Hiſtoriæ naturalis inſectorum inſtitutiones proponens. 1745.

De fœtu vegetabili. 1747.

De ordinibus gemmarum, verbis C. Plinii, ex ejus naturalis hiſtoriæ libris 37. 1747.

The following diſſertations were written and defended by graduates under the preſidency of Hebenſtreit.

De ordinibus Conchyliorum methodicâ ratione inſtituendis. Reſp. Joh. Gezaur. 1728.

De ſenſu externo facultatum in plantis judice. Reſp. Chr. Gottlieb Ludwig. 1730.

Definitiones plantarum. Reſp. Chr. Aug. Eberſbach. 1731.

Hiſtoriæ naturalis foſſilium caput de terris. Reſp. Jo. Ge. Lutherus. 1745.

All the above tracts were publiſhed at Leipſic, and in quarto. Haller's Bibl. Bot. Aikin's General Biography.

HEBENSTREITIA, in *Botany*, was ſo named by Linnæus in honour of profeſſor John Erneſt Hebenſtreit (ſee laſt article). Linn. Gen. 318. Schreb. 416. Willd. Sp. Pl. v. 3. 330. Mart. Mill. Dict. v. 2. Ait Hort. Kew. v. 2. 356. Juſſ. 110. Lamarck Dict. v. 3. 77. Illuſtr. t. 521. Gærtn. t. 51. Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Aggregatæ*, Linn. (rather *Perſonatæ*.) *Viticibus affine*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, tubular, membranaceous, emarginate, opening longitudinally underneath. *Cor.* of one petal and one lip; tube cylindrical, longer than the calyx, gaping on the lower ſide half way; limb aſcending, flattiſh, four-cleft, clefts nearly equal. *Stam.* Filaments four, the upper pair inſerted into the margin of the corolla, prominent; the lower anterior pair are included and bent back to the ſides; anthers creſcent-ſhaped, compreſſed, truncated outwards. *Piſt.* Germen ſuperior, very ſmall; ſtyle thread-ſhaped, wavy, bent back through the fiſſure of the corolla; ſtigma ſimple. *Peric.* Capſule oblong, of one cell and two valves. *Seeds* two, oblong, convex, and three-furrowed on one ſide, plain on the other.

Eſſ. Ch. Calyx doubly emarginate, cloven underneath. Corolla of one, aſcending, four-cleft lip. Capſule containing two ſeeds. Stamens ſtanding in the margin of the limb of the corolla.

All the ſpecies of this curious genus are natives of the Cape of Good Hope. The two beſt known in our gardens are *Hebenſtreitia dentata*, and *aurea*, which are deſcribed below. Willdenow enumerates five others, H. *ciliata*, *integrifolia*, *erinoides*, *fruticoſa*, and *cordata*.

1. H. *dentata*. Toothed Hebenſtreitia. Linn. Sp. Pl. 878. Curt. Mag. t. 483.—"Leaves linear, acute, flat, ſlightly toothed, ſometimes entire; ſpikes of flowers ſmooth."—Not unfrequent in green-houſes, and capable of being propagated by cuttings, though with ſome difficulty; flowering from February to November. *Stem* erect, about a foot high. *Branches* ſimple, aſcending. *Leaves* alternately ſcattered, linear, ſomewhat hiſpid and dentate, ſpreading or recurved, furniſhed with little axillary tufts. *Spike* terminal, barren on the lower part, bracteas ſmooth, awl-ſhaped, imbricated, ſingle-flowered. *Corolla* white, with a yellow and red ſtripe, having the ſtamens curiouſly placed on the edge of its fiſſure. *Seeds* of a pale yellow.—Linnæus remarks that "its flowers in the morning are without ſcent; at noon they are nauſeouſly fœtid; in the evening highly fragrant, like the oriental hyacinth."

2. H. *aurea*. Golden-flowered Hebenſtreitia. Andr. Bot. Repoſ. t. 252.—"Leaves ſomewhat cylindrical, obtuſe, entire; ſpikes of flowers ſmooth."—Introduced in 1796 by Meſſrs. Lee and Kennedy. It may be increaſed by cuttings, and if theſe are taken off in May, they will become flowering plants in September. *Stems* ſmooth and branched. *Leaves* linear, entire, ſomewhat whorled. *Spike* formed of beautiful golden-coloured flowers, variegated with deep orange.—The flowers become extremely fragrant in an evening.

HEBER, or Eber, in *Scripture Biography*, the father of Peleg and the ſon of Salah, who was the grandſon of Shem, one of Noah's ſons, was born A. M. 1723, B.C. 2281. From him ſome have ſuppoſed that Abraham and his deſcendants derived the appellation of Hebrews. But others have ſuggeſted, with greater probability, that Abraham and his family were thus called, becauſe they came from the other ſide of the Euphrates into Canaan; Heber (עבר) ſignifying in the Hebrew language "one that paſſes," or a "paſſage," *i. e.* of the river Euphrates. Heber is not particularly extolled in ſcripture, ſo that a whole nation ſhould be diſtinguiſhed by his name. Upon the whole, the moſt probable opinion concerning the origin of the appellation Hebrew, applied to Abraham and his poſterity, is that already ſtated: that it is derived from the prepoſition עבר, *trans*; from whence thoſe that lived *beyond*, or to the eaſt of the river Euphrates, were called by the Canaanites and others who lived in the weſt, עברים, *Enebhrim*. Le Clerc takes ב י עבר, *beni gnebher*, (Gen. x. 21) to be a Hebraiſm, denoting the inhabitants of the country beyond the Euphrates. Hence the ſenſe of the text is, that all this eaſtern part of the world was peopled by Shem's poſterity. Thus the LXX, as we have already ſaid, underſtood this word. Thus, alſo, among the ancients, Theodoret and Jerom, as well as ſome others; and among the moderns, Grotius and Le Clerc underſtand the word "Hebrew." According to this opinion, Hebrew ſignifies much the ſame as foreigner among us, or one that comes from beyond ſea. Such were Abraham and his family among the Canaanites; and his poſterity, learning and uſing the language of the country, ſtill retained the appellation originally given them, even when they became poſſeſſors and ſettled inhabitants. Beſides, Abraham was the ſeventh in lineal generation from Heber (Gen. xi. 10, &c.); and it ſeems to be more likely that Abraham ſhould take a name that was to deſcend to his family after him from a circumſtance that applied more generally to the deſcendants of Shem, of whom it is ſaid (Gen. x. 21.) that he was "the father of all the children of Heber," *i. e.* of thoſe on the other ſide of the Euphrates. Abraham was not called an Hebrew till ten years after his arrival in the land of Canaan, on occaſion of the war with Chedorlaomer. The LXX and Aquila tranſlate "Heberi" *Perates* or *Peraites*, which ſignifies a paſſenger, or one who came from beyond the river. (Gen. xiv. 13.) העברי אברהם, LXX. Ἄβραμ τῷ Περάτῃ Aquila, τῷ περαίτῃ. See Walton's Prolegomena.

The rabbins, indeed, pretend, that he was a man of ſingular piety, and that the primitive religion and language were preſerved by him and his family; to which they add, that Abraham and his poſterity are called Hebrews, becauſe they ſpoke the ſame language, and profeſſed and practiſed the ſame religion with that of Heber. But theſe facts are deſtitute of ſatisfactory evidence. It is not certain that Heber uſed the Hebrew language; and as to his preſerving the true religion in his family, this by no means agrees with Joſhua's ſaying, that the anceſtors of the Iſraelites, who, in old time, dwelt "on the other ſide of the flood," even Terah, "the father of Abraham, ſerved other gods." Joſh. xxiv. 2.

HEBERDEN, William, in *Biography*, an amiable and learned phyſician, was born in London in the year 1710. Having received his early education in his native city, he was entered of St. John's college, Cambridge, in 1724; and, after a reſidence of ſix years, he was elected fellow of that ſociety. From this time he devoted himſelf to the ſtudy of medicine, partly at Cambridge, and partly in the metropolis. After he had taken the degree of M.D., he ſettled at Cambridge, where he practiſed his profeſſion during ten years, and gave lectures on the materia medica annually to the ſtudents in the univerſity. While he reſided here, we believe, he printed a little tract, entitled "Ἀντιθηριακα; An Eſſay on Mithridatium and Theriaca:" 1745; the place of publication is not mentioned in the title-page. This tract contained a hiſtory of theſe medicaments, and an expoſure of the abſurdity of employing ſuch a medley of diſcordant ſimples. Dr. Heberden removed to London in 1748, to the general regret of the univerſity and town of Cambridge, where his profeſſional ſkill and ſuavity of manners had obtained for him a high eſteem. He had already been elected a fellow of the College of Phyſicians, and was ſhortly after admitted into the Royal Society. He ſoon roſe to a conſiderable profeſſional reputation, and enjoyed a large ſhare of medical practice in the metropolis, which he conducted with great honour and liberality, and with a conſtant attention to the improvement of the art, at once adorning and extending the uſefulneſs of his profeſſion. To Dr. Heberden's ſuggeſtion the public is indebted for the publication of the "Medical Tranſactions of the College of Phyſicians," the firſt volume of which appeared in 1768, and two others ſubſequently in 1772 and 1785. Among the uſeful communications contained in theſe volumes, the papers of Dr. Heberden himſelf are moſt prominent in number and value. His account of a fatal diſorder of the cheſt, which he denominated *Angina pectoris*, firſt called the attention of phyſicians to it, as an idiopathic diſeaſe: and the numerous caſes of it, which have ſince been promulgated, evince its frequency and importance. In this work, alſo, Dr. Heberden firſt gave an accurate deſcription of the chicken-pox, pointing out its diagnoſtic ſymptoms with preciſion, chiefly with a view to prevent the very eaſy miſtake of confounding it with a mild ſmall-pox. Dr. Heberden communicated ſome other papers to the Royal Society, which were printed in its Tranſactions.

During a period of thirty years Dr. Heberden continued to enjoy the confidence of the public, and to reap conſiderable emolument from the exerciſe of his profeſſion. As his years advanced, he began to relax from the fatigues of practice in the ſummer ſeaſon, and paſſed a few months in a country retreat at Windſor. In the year 1782 he terminated his profeſſional ſervices, by compiling the records of his long experience into a volume of Commentaries. He had ever accuſtomed himſelf to take notes in the ſick chamber of all the peculiarities of diſeaſe; and, at the end of each month, arranged theſe deſultory obſervations under their proper heads;—a practice not leſs calculated to form the mind to accuracy of obſervation, than to lay up a ſtore of practical knowledge. From theſe arranged collections, when he had reached his ſeventy-ſecond year, he compoſed his volume, which was written in elegant Latin, and laid up in manuſcript, not to be given to the public till after his death;—an injunction probably proceeding from an averſion to being involved in any controverſial diſcuſſions. For ſeveral years afterwards, he enjoyed the rewards of a virtuous and temperate life in a deſirable old age, cheered by domeſtic enjoyments, and ſcientific and literary purſuits. He ſunk calmly under the load of years in 1801, after completing the ninetieth year of his age, and was buried in the pariſh church of Windſor.

In the year 1802, the work above alluded to was publiſhed by his ſon, Dr. William Heberden, junior, under the title of "Gulielmi Heberden Commentarii de Morborum Hiſtoria et Curatione," in octavo; an Engliſh copy of it, from the author's own MS., appeared at the ſame time. Theſe faithful records of experience are related with perfect candour, and without any admixture of hypotheſis; and if the powers of medicine are eſtimated moderately, and the ſtock of facts but little augmented, the experienced practitioner will not deem them the more diſtant from truth, or conſider the various comparative reſults of different modes of treatment, ſo well eſtabliſhed in many inſtances, as leſs valuable to the profeſſion.

Few men have maintained a more uniformly eſtimable character through life than Dr. Heberden. Mild, candid, and modeſt in his diſpoſition, his conduct was marked by the ſtricteſt integrity, and by a ſuperiority to all unworthy acts of advancement. He was a munificent patron of letters and ſcience, without diſtinction of ſect or party. His converſation was diſtinguiſhed by cheerfulneſs, liberality, and good ſenſe; and his company was made up of the moſt learned men of the age in which he lived. See the life prefixed to his Commentaries. Gen. Biog.

HEBERMAN, in *Ancient Law Books*, a poacher, or a fiſherman below London bridge; thus called, becauſe he commonly fiſhes at ebb-water.

HEBERTHEFT, in *Ancient Cuſtoms*, a privilege of having the goods of a thief, and the trial of him, within a particular diſtrict.

HEBRAICA Concha, in *Natural Hiſtory*, a name given by authors to a very beautiful ſea-ſhell of the voluta kind, from a number of black marks, which ſeem to reſemble the Hebrew characters. See Conchology.

HEBRAISM, an idiotiſm, or manner of ſpeaking peculiar to the Hebrew tongue. For the probable origin of the appellation, ſee Heber.

There is no underſtanding even the verſions of the Old Teſtament, without ſome acquaintance with the Hebrew; they are ſo full of Hebraiſms.

We have abundance of Hebraiſms borrowed from ſcripture, and naturalized in our own language: as *Son of perdition; to ſleep in the Lord*, &c.

Maſclef has given an ample collection of the Hebraiſms that occur in the Sacred Writings, in the firſt volume of his excellent Hebrew Grammar; which the biblical critic will find it not only uſeful, but abſolutely neceſſary to conſult, in order to underſtand the phraſeology both of the Old and New Teſtaments. Theſe Hebraiſms conſiſt partly of ſingle words, which are of three ſorts, ſuch as are properly of Hebrew extract, as Meſſias, Satanas, &c. with a Greek termination, and σαβαωθ, Αβαδδων, &c. which retain the Hebrew termination; ſuch as are of a Greek extract, but uſed in a different ſenſe from that which they have in other authors, and in a manner conformable to the Hebrew, as βιβλος for a catalogue, like ספר, *ſapher*, (Matt. i. 1.): ϱημα, which in Greek ſignifies a word, but in the New Teſtament ſometimes a thing, like דבר, *dabbar*, (Luke, i. 37.); and ſome words that are newly coined, by which Hebrew words are tranſlated, as αναθεματιζω for חרם, *charam*, (Mark, xiv. 71.) Again, Hebraiſms are found in phraſes; either ſuch as have not been uſed by other Greek authors, as ſeeing of life and death for living and dying (Heb. xi. 5.); or ſuch as have not been uſed by other Greek writers in the ſame ſenſe as in the New Teſtament, as to hear the voice of a perſon ſignifies to obey (John, xviii. 37.), parallel with Gen. iii. 17. There are alſo pleonaſms in the New Teſtament, ſuch as do not occur in the Greek authors, as John, vi. 5. compared with Gen. xxii. 4., Acts, iv. 24. compared with Judg. ix. 7., &c. There are alſo conſtructions in the New Teſtament, which are ſaid to be Hebraiſms; as the feminine gender for the neuter, Matt. xxi. 42, Pſalm cxviii. 23;—a noun repeated twice, to expreſs a diſtribution into ſeveral parts, Mark, vi. 39, 40. compared with Gen. xxxii. 16., Mark, vi. 7. compared with Gen. vii. 2;—the ſuperlative degree expreſſed by the addition of Θεος, Acts, vii. 20. compared with Jonah, iii. 3.—Some verbs are ſaid to be uſed with different conſtructions from what they are in other Greek authors, as προσκυνεω, with a dative caſe, Matt. viii. 2., John, ix. 38.; ειναι εις τι for ειναι τι is alſo ſaid to be an Hebraiſm, Matt.

xix. 5.—Hebrew figures occur in the New Teſtament; as enallage of the caſe, perſon, number, and gender, Rev. ii. 26., iii. 12; Luke, i. 55, &c. Matt. xxiii. 37., Matt. xii. 1. Col. ii. 19.—Pleonaſms are ſaid to be borrowed from the Hebrew, Acts, xv. 17. compared with Joſh. i. 3.—Ellipſis is a common figure in the New Teſtament, after the manner of the Hebrew, Matt. xxiii. 34. compared with 2 Kings x. 23. For other inſtances, ſee Jennings's Jewiſh Antiq. vol. i. The beſt treatiſe, ſays the learned Marſh, in his Notes to the Tranſlation of Michaelis's Introduction on the Hebraiſms of the New Teſtament, is Johannis Vorſtii de Hebraiſmis, Novi Teſt. Commentarius ad Fiſcher, Lipſiæ, 1778. See *Language of the New* TESTAMENT.

HEBREW *of the* HEBREWS, an appellation which the apoſtle Paul applies to himſelf (Phil. iii. 5.), concerning the meaning of which there has been ſome difference of opinion. Godwin, in his "Moſes and Aaron," underſtands by this expreſſion, an Hebrew both by father's and mother's ſide. But if it meant no more than this, there was little occaſion for the apoſtle's uſing it, immediately after having declared, that he was "of the ſtock of Iſrael, and the tribe of Benjamin," which, on Godwin's ſuppoſition, is the ſame as an Hebrew of the Hebrews; for the Jews were not allowed to marry out of their own nation. Beſides, it is not likely that St. Paul would have mentioned it as a diſtinguiſhing privilege and honour, that his parents were not proſelytes. It is more probable that a Hebrew of the Hebrews ſignifies a Hebrew both by nation and language, which many of Abraham's poſterity, in thoſe days, were not; or one of the Hebrew Jews who performed their public worſhip in the Hebrew tongue; for ſuch were reckoned more honourable than the Helleniſtic Jews. See HELLENISTS.

HEBREW, ſomething relating to the people of the Jews, *i. e.* the twelve tribes, deſcending from the twelve patriarchs, ſons of Jacob. See JEWS.

HEBREW *Accents* are very numerous, ſome reckoning 40 and others reducing them to 30, and even a leſs number. Of theſe there are ſeveral, whoſe uſe is not well aſcertained, notwithſtanding all the inquiries of the learned in reference to this ſubject. In general three things are known concerning them, that they ſerve to diſtinguiſh the ſentences, and the number of ſentences, like the points and commas, &c. in the Engliſh; 2. To determine the quantity of the ſyllables; and, 3. To mark the tone with which they are to be ſpoken or ſung. It is no wonder then, that there ſhould be more accents in Hebrew than in other languages; as they perform three diſtinct offices, which, in other languages, are called by different names. See ACCENT.

HEBREW *Bible*. See BIBLE.

HEBREW *Character*. There are two kinds of Hebrew characters: the *ancient*, called alſo the *ſquare*; and the *modern*, or *rabbinical* characters. The *ſquare* Hebrew take its denomination from the figure of its characters, which ſtand more ſquare, and have their angles more exact and preciſe than the other.

This character is uſed in the text of holy ſcripture, and the other principal and moſt important writings. When both this and the rabbinical character are uſed in the ſame work, the former is for the text, or the fundamental part; and the latter for the acceſſory part; as the gloſs, notes, commentaries, &c.

The beſt and moſt beautiful characters of this kind, are thoſe copied from the characters of the Spaniſh manuſcripts; next, thoſe from the Italian manuſcripts; then thoſe from the French; and laſtly, thoſe of the Germans, whoſe characters are much the ſame, with reſpect to the other genuine *ſquare* Hebrew characters, that the Gothic, or Dutch characters are, with reſpect to the Roman.

Several authors contend, that the *ſquare* character is not the real ancient Hebrew character, written from the beginning of the language to the time of the Babyloniſh captivity; but that it is the Aſſyrian, or Chaldee character, which the Jews aſſumed, and accuſtomed themſelves to, during the captivity, and retained afterwards. They ſay that the Jews, during the captivity, had quite diſuſed their ancient character; ſo that Ezra found it neceſſary to have the ſacred books tranſcribed into the Chaldean ſquare character. Theſe authors add, that what we call the *Samaritan* character, is the genuine ancient Hebrew.

Of this opinion are Scaliger, Bochart, Caſaubon, Voſſius, Grotius, Walton, Capellus, &c. and among the ancients, Jerom and Euſebius. Joſeph Scaliger, in his notes upon Euſebius's "Chronicon," thinks it ſo evident, that the ſacred books were originally written in the Samaritan character, at leaſt thoſe of them that were written before the captivity, that it is "luce clarius," and with a politeneſs not very decorous, though too common, in ſuch a great critic, he calls thoſe of a contrary opinion, "ſemi-docti, ſemi-theologi, ſemi-homines, and aſini." This critic, and others of the ſame opinion, allege, that the Samaritan was the ancient Phœnician character, and conſtantly uſed by the Jews till the Babylonian captivity; when, learning the Chaldee character from the Babylonians, they preferred it to their own on account of its far ſuperior beauty. So that by the time they returned from the captivity they had, in a manner, quite diſuſed their ancient characters; for which reaſon, Ezra found it requiſite to have the ſacred books tranſcribed into the Chaldean ſquare character, and from that time the old character hath been retained only by the Samaritans. On this ſide it is urged, that the preſent characters are called Aſſyrian by the ancient Jewiſh writers of the Talmud, and, therefore, muſt have been brought from Aſſyria; but to this argument it is replied, that there were two ſorts of characters anciently in uſe, *viz.* the ſacred, or preſent ſquare character, and the profane or civil, which we call Samaritan; and that the ſacred is called Aſſyrian, becauſe it firſt began in Aſſyria to come into common uſe. It is farther alleged, that the Chaldee letters, which the Jews now uſe, were unknown to the ancient Jews before the captivity, from Dan. i. 4. Moreover, it is inferred from 2 Kings, xvii. 28. whence we learn that a Jewiſh prieſt was ſent to teach the Samaritans the worſhip of Jehovah; on which occaſion he muſt have taught them the law; and yet no mention occurs of his teaching them the language or character; that the law was then written in the character which the Samaritans uſed. Beſides, it is argued in favour of the Samaritan character from the authority of Jerom, who obſerves, on occaſion of the prophet Ezekiel's being ordered "to ſet a mark," in the Hebrew ת, *tau*, "upon the forehead of the men that ſigh and cry for the abomination done in the midſt of Jeruſalem," (Ezek. ix. 4.); that this mark was the ſign of the croſs, there being a reſemblance of that figure in the *tau* of the ancient alphabet; which, ſays he, is what the Samaritans now uſe. If ſo, the form of this letter muſt have been, as ſome aſſert it was, different in his time from what it is at preſent, in which the reſemblance is very ſmall. But the chief argument is taken from ſome ancient Jewiſh ſhekels, with a legend on one ſide. "The ſhekel of Iſrael;" and on the other "Jeruſalem the holy," both in Samaritan characters. Theſe ſhekels, it is ſaid, muſt have been coined before the diviſion of the two kingdoms of Judah and Iſrael, or, at leaſt before the Aſſyrian captivity, becauſe the Samaritans never afterwards reckoned Jeruſalem holy. This argument ſeems, indeed, to be demonſtrative. Nevertheleſs, conſidering the many notorious impoſitions with reſpect to coins and medals, we ſhould be well aſſured of the genuineneſs of theſe ſhekels, before we are abſolutely determined by them. On the other ſide, or for the primitive antiquity of the ſquare character, are the two Buxtorfs, Leuſden, Calovius, Hottinger, Spanheim, Lightfoot, &c. They urge, from Matthew, v. 18. that *jod* is really the leaſt of the conſonants in the preſent Hebrew, whereas it is one of the largeſt characters in the Samaritan alphabet. Schickard calls this "argumentum palmarium;" but Walton replies, that if our Saviour here ſpeaks of the leaſt letter of the alphabet, which, however, he does not admit, we can only infer that the preſent Chaldee character was uſed in our Saviour's time, which is not denied by thoſe who maintain the Samaritan to be the original. The advocates in favour of the Samaritan character alſo allege the following paſſage of Iſaiah, "of the increaſe, לםרבה, *lemarbeh*, of his government and peace, there ſhall be no end, &c." (Iſa. ix. 7.), where the word לםרבה, *lemarbeh*, hath a mem clauſum in the middle of it, of which there are only two inſtances. This, it is imagined, contains a myſtery, and ſignifies that Chriſt ſhould come "ex utero clauſo." But this cannot be expreſſed in the Samaritan character, becauſe it has no mem clauſum. The prophecy of Iſaiah, therefore, it is ſaid, was originally written in the preſent character. It is anſwered by Walton, &c. that it is only gratis dictum, there is any myſtery in this letter; and the eaſieſt way of accounting for it is to attribute it to the careleſſneſs of ſome tranſcriber. They alſo allege, that the Jews were too obſtinate and ſuperſtitious to allow their ſacred character to be altered; but if this was done under the direction and authority of Ezra, the argument will be much invalidated. Farther they ſay, that Ezra could not alter the ancient character, becauſe it was impoſſible to make the alterations in all their copies. This argument, however, is contradicted by fact; ſince the old Engliſh black letter is actually changed for the Roman. They ſay, likewiſe, that Ezra was not diſpoſed to profane the ſacred writings with a heathen character; but this ſuppoſes that Ezra was ſo ſuperſtitious as to imagine, that there was ſome peculiar ſanctity in the ſhape of the letters. Moreover, the advocates for this opinion appeal to ancient coins found in Judea, with a legend in the Chaldee or Aſſyrian character. But the genuineneſs of theſe coins is much ſuſpected.

The learned Jeſuit Souciet maintains, with great addreſs, that the ancient Hebrew character is that found on the medals of Simon, and others, commonly called *Samaritan medals*; but which, he aſſerts, were really Hebrew medals, ſtruck by the Jews, and not the Samaritans.

Buxtorf endeavours to reconcile theſe two opinions, by producing a variety of paſſages from the rabbies to prove, that both theſe characters were anciently uſed; the preſent ſquare character being that in which the tables of the law, and the copy depoſited in the ark were written; and the other character being uſed in the copies of the law, which were written for private and common uſe, and in civil affairs in general; and that after the captivity, Ezra enjoined the former to be uſed by the Jews on all occaſions, leaving the latter to the Samaritans and apoſtates. But it can hardly be allowed by any who conſider the difference between the Chaldee and Samaritan characters, with reſpect to convenience and beauty, that they were ever uſed at the ſame time. After all, it is of no great moment which of theſe, or whether either of them, were the original characters; ſince it appears, that no change of the words has ariſen from the manner of writing them, becauſe the Samaritan and Jewiſh Pentateuch almoſt always agree after ſo many ages. It is moſt probable that the form of theſe characters has varied in different periods; this appears from the teſtimony of Montfaucon, in his Hexapla Origenis, vol. i. p. 22. &c. and is implied in Dr. Kennicott's making the characters, in which manuſcripts are written, one teſt of their age. See Jenning's Ant. vol. ii. p. 336, and the authors there cited. Kennicott's Diſſ. on the Hebrew Text, vols. i. and ii.

HEBREW *Character*, *modern*, or *rabbinical*, is a good neat character, formed of the ſquare Hebrew, by rounding it, and retrenching moſt of the angles or corners of the letters, to make it the more eaſy and flowing. The letters uſed by the Germans are very different from the rabbinical character uſed every where elſe, though all formed alike from the ſquare character; but the German in a more ſlovenly manner than the reſt.

The rabbins frequently make uſe either of their own, or the ſquare Hebrew character, to write the modern languages in. There are even books in the vulgar tongues, printed in Hebrew characters; inſtances whereof are ſeen in the French king's library.

HEBREW *Language*, called alſo abſolutely Hebrew, is the language ſpoke by the HEBREWS, (which ſee,) who were ſo called, as ſome have ſaid, from Heber, the ſon of Shem, wherein all the books of the Old Teſtament are written; whence it is alſo called the *holy* or *ſacred language*. It is ſaid to have been preſerved in the midſt of the confuſion at Babel, in the family of Heber, or Eber, who, as it is alleged, was not concerned in the building of Babel, and, conſequently, did not ſhare in the puniſhment inflicted on the actual aggreſſors. The Jews, in general, have been of opinion, that the Hebrew was the language of Heber's family, from whom Abraham ſprung. On the other hand, it has been maintained, that Heber's family, in the fourth generation after the diſperſion, lived in Chaldea, where Abraham was born (Gen. xi. 27, 28.), and that there is no reaſon to think they uſed a different language from their neighbours around them. It appears, moreover, that the Chaldee, and not the Hebrew, was the language of Abraham's country, and of his kindred (Gen. xxiv. 4. Gen. xxxi. 46, 47.); and it is probable, that Abraham's native language was Chaldee, and that the Hebrew was the language of the Canaanites, which Abraham and his poſterity learnt by travelling among them. For proof of this point we refer to Le Clerc's Prolegomena, 1. in Pentateuch de Ling. Heb. J. Scalig. Epiſt. 242 & 363. Walt. Proleg. ii. § 13—19. Selden, c. 2. Proleg. de Diis Syris.

There is no piece in all antiquity, written in pure Hebrew, beſide the books of the Old Teſtament; and even ſome parts of thoſe are in *Chaldee*; which ſee.

The Hebrew, then, appears to be the moſt ancient of all the languages in the world; at leaſt it is ſo with regard to us, who know of no older. Dr. Sharpe adopts the opinion, that the Hebrew was the original language; not indeed that the Hebrew is the unvaried language of our firſt parents, but that it was the general language of men at the diſperſion; and however it might have been improved and altered from the firſt ſpeech of our firſt parents, it was the original of all the languages, or almoſt all the languages, or rather dialects, that have ſince ariſen in the world. Origin, &c. of Languages, p. 22, &c.

Other arguments have been deduced from the nature and genius of the Hebrew language, in order to prove that it was the original language, neither improved nor debaſed by foreign idioms. The words of which it is compoſed are ſhort, and admit of very little flexion. The names of places are deſcriptive of their nature, ſituation, accidental circumſtances, &c. The compounds are few, and inartificially conjoined; and it is leſs burdened with thoſe artificial affixes, which diſtinguiſh other cognate dialects, ſuch as the Chaldean, Syrian, Arabian, Phœnician, &c. From the age of Moſes to the era of the Babyloniſh captivity, when the Hebrew language declined, and even during the age of David and Solomon, which has been reckoned its golden period, it does not ſeem to have undergone any material improvement; nor were the Jews, either from their diſpoſition or circumſtances, likely to have improved it. Like other unimproved languages, it abounds in figurative expreſſions borrowed from ſenſible objects. If we compare the Hebrew with other languages, ſuch as the Chaldæan, Syrian, Arabian, &c. which have contended with it for originality, we find theſe to have been ſo varied by ſucceſſive improvements, that on this account, independently of every other conſideration, they are not likely to have been the original language, as the moſt ancient language is, *cæteris paribus*, that which is leaſt improved. This has been particularly the caſe with reſpect to the Chaldæan, ſo that although this and the Hebrew might originally have been the ſame, the former appears now to be different in conſequence of its having been more improved. Camden, indeed, many of the fathers, and ſeveral learned writers, have aſcribed priority to the Chaldee; but, as we conceive, without ſufficient reaſon. Erpenius, indeed, in his oration for the Hebrew tongue, having conſidered the arguments for and againſt the alleged claims of theſe two languages, heſitated in deciding the queſtion.

The generality of eaſtern writers allow the preference in this reſpect to the Syriac, except the Jews, who with great ardour contend for the antiquity of the Hebrew; and with them ſeveral Chriſtian writers agree; particularly Chryſoſtom, Auſtin, Origen, and Jerom among the ancients, and among the moderns Bochart, Heidegger, Selden, and Buxtorf. The chief argument, alleged by many of them to prove the Hebrew to have been the original language, is taken from the names of perſons mentioned before the confuſion of Babel, which, they ſay, are plainly of the Hebrew derivation; as אדם, Adam, from אדמה, Adamah, the ground; הוה, Eve or Havah, from היה, hajah, vixit, becauſe ſhe was the mother of all living; פלג, peleg, from פלג, peleg, diviſit; and ſeveral others. Theſe, they maintain, are plainly Hebrew names, and therefore prove the Hebrew language to have been in uſe when they were given. Beſides, it is alleged, that the names of ſome nations are derived from Hebrew names, as Ιωνια, Ionia, from יון, Javan, the ſon of Japhet, and thoſe alſo of ſome heathen gods, as Vulcan, which ſeems to be a corruption of Tubal-cain, and Apollo of Jubal. Grotius, however, and others, will not allow this argument to be concluſive, becauſe there are more patriarchal names for which we can find no ſuch Hebrew derivation, than there are of thoſe which have ſuch derivations; that names occurring in the Moſaic hiſtory were not original names, but probably tranſlated by Moſes into the language in which he wrote; and becauſe ſeveral of theſe names are more particularly derived from ſome other of the oriental tongues than from the Hebrew. But reſuming the conſideration of changes which a language has undergone, the Hebrew, in which fewer of theſe occur than in other languages, claims priority. In order to give this argument its full force, we muſt ſeparate from its original character, for reaſons which ſhall be given under a future article, all Maſoretic additions (ſee POINTS); we muſt alſo exclude all thoſe prefixes and affixes, which have been ſucceſſively introduced, in order to give it compaſs and preciſion. We muſt reſtrict our attention to the indeclinable radix or root, ſeparate from the various voices, moods, tenſes, numbers and perſons of verbs, and alſo adjectives, and numbers and regimen of nouns, which have been improvements ſubſequent to its original formation; and further recollect that the Hebrew verbs conſiſted originally of three letters, and that they were probably pronounced at firſt as monoſyllables. Thus ſimplifying the language and reſtoring it to a few names of things, perſons, and actions, we ſhall proceed far in vindicating its claim to originality. After all, the moſt probable opinion ſeems to be, that neither the Hebrew, nor Syriac, nor Chaldee, nor any other language now extant, was the true original tongue in ſuch a ſenſe, that all other languages were derived from it as their ſource and matrix; but that this, and the other oriental tongues, were either coeval and perhaps one and the ſame, or that they all ſprung from or are ſo many different dialects of that firſt language, which is itſelf now loſt among them: juſt as the Italian, French, and Spaniſh are none of them the languages of the ancient Romans, but all derived from it. See LANGUAGE.

The Hebrew language has been highly extolled by its partial advocates, and it is unqueſtionably entitled, on account of its ſimplicity, purity, energy, and other qualities, to commendation. This language is ſaid to abound in the apteſt etymologies and roots of the names both of men and things. The names of brutes expreſs their nature and properties more ſignificantly and more accurately than in any other known language in the world. Its words are conciſe, yet expreſſive, derived from a ſmall number of roots, (its radical words being now no more than about 500, and rarely conſiſting of more than three letters, or two ſyllables, frequently one, and expreſſed by two ſounds,) yet without the ſtudied and artificial compoſitions of the Greek and Roman languages. Its words follow each other without intricacy or tranſpoſition. Above all, notwithſtanding its ſimplicity and conciſeneſs, and purity of original radicals, it has the happieſt and richeſt fecundity in its verbs of any known tongue, either ancient or modern, which is owing to the variety and ſufficiency of its conjugations; by means of which, as Bellarmine obſerves, in his Hebrew grammar, all the variety of ſignifications, into which it is poſſible for a verb to be branched out, are expreſſed with a very ſmall variation of a letter or two, which, in any other language, cannot be done without circumlocution. Properly ſpeaking, it has but one ſimple conjugation, but this is varied in each verb ſeven or eight different ways, which has the effect of ſo many different conjugations, and affords a great number of expreſſions, by which to repreſent, under one ſingle word, all the different modifications of a verb, and ſeveral ideas at once; which in the modern, and moſt of the ancient and learned languages, are expreſſible only by phraſes. It derives alſo great advantage, with reſpect to brevity and variety of expreſſion, from its few prefixes and affixes, which annexed to the radix or root, vary its ſignification almoſt at pleaſure, and when the radix is a verb, exhibit the gender of the object introduced. Its nouns have no flexion beſides that which is neceſſary to indicate the difference of gender and number. Its caſes are diſtinguiſhed by articles, conſiſting of ſingle letters at the beginning of a word; its pronouns are ſingle letters affixed, and the prepoſitions are prefixed to words. Some learned men, ſays Dr. Sharpe (ubi ſupra), will have it to be the language ſpoken by Adam in paradiſe, and that the ſaints will ſpeak it in heaven; alleging, that it is ſo conciſe, and yet ſo ſignificant, ſo pathetic, and yet ſo free from levity or bombaſt, as, of all languages, to approach neareſt to that of ſpirits, who need no words for conveying their ideas to each other.

It has been ſuppoſed by many very learned men, that the Hebrew characters or letters were often uſed hieroglyphically, and that each had its ſeveral diſtinct ſenſe underſtood as a hieroglyphic. Newmann, who ſeems to have taken infinite pains to find out this ſecret meaning of theſe letters, gives the following explication: א, *aleph*, he ſays, is a character denoting motion, readineſs, and activity; ב, *beth*, ſignifies, 1, matter, body, ſubſtance, thing; 2. Place, ſpace or capacity; and 3. In, within or contained; ג, *gimel*, ſtands for flexion, bending, or obliquity of any kind; ד, *daleth*, ſignifies any protruſion made from without, or any promotion of any kind; ה, *he*, ſtands for preſence, or demonſtrative eſſence of any thing; ו, *vau*, ſtands for copulation or growing together of things; ז, *dſain*, expreſſes vehement protruſion and violent compreſſion, ſuch as is occaſioned by at once violently diſcharging and conſtringing a thing together; it alſo ſignifies, ſometimes, the ſtraightening of any figure into a narrow point at the end; ח, *cheth*, expreſſes aſſociation, ſociety, or a kind of compoſition, or combination of things together; ט, *teth*, ſtands for the withdrawing, drawing back, or receſs of any thing; י, *jod*, ſignifies extenſion and length, whether in matter or in time; כ, *caph*, expreſſes a turning, curvedneſs or concavity; ל, *lamed*, ſtands for an addition, acceſs, impulſe, or adverſation, and ſometimes for preſſure; מ, *mem*, expreſſes amplitude, or the amplifying any thing in whatever ſenſe; in regard to continuous qualities it ſignifies, the adding length, breadth, and circumference; and in disjunct qualities it ſignifies multitude; נ, *nun*, ſignifies the propagation of one thing from another, or of the ſame thing from one perſon to another; ס, *ſamech*, expreſſes cincture and coarctation; ע, *ain*, ſtands for obſervation, objection, or obviation; פ, *pe*, ſtands for a crookedneſs or an angle of any figure; צ, *tſade*, expreſſes contiguity and cloſe ſucceſſion; ק, *koph*, expreſſes a circuit or ambit; ר, *reſh*, expreſſes the egreſs of any thing, as alſo the exterior part of a thing, and the extremity or end of any thing; ש, *ſhin*, ſignifies the number three or the third degree, or the utmoſt perfection of any thing; ת, *tau*, expreſſes a ſequel, continuation, or ſucceſſion of any thing.

According to this explication, as the ſeveral particular letters of the Hebrew alphabet ſeparately ſignify the ideas of motion, matter, ſpace, and the ſeveral modifications of matter, ſpace, and motion, it follows, that a language, the words of which are compoſed of ſuch expreſſive characters, muſt neceſſarily be of all languages the moſt perfect and expreſſive; as the words formed of ſuch letters, according to their determinate ſeparate ſignifications, muſt convey the idea of all the matters contained in the ſenſe of the ſeveral characters, and be at once a name and a definition, or ſuccinct deſcription of the ſubject, and all things material as well as ſpiritual, all objects in the natural and moral world, muſt be known as ſoon as their names are known, and their ſeparate letters conſidered. Whether the Hebrew language merits theſe high encomiums in preference to all others or not, yet its well authenticated antiquity, and the venerable tone of its writings, ſurpaſs any thing left upon record in any other dialect now extant in the world. By this language God has thought fit to convey a great part of his revelations to mankind, and the ſcriptures of the Old Teſtament penned in this language are ſo nearly connected with thoſe of the New, that the ſtudy of it may be recommended to the ſcholar, and particularly to the divine.

In the Hebrew language, which is written from the right to the left hand, there are 22 letters, which are divided by grammarians into *guttural*, *palatal*, *dental*, *labial*, and *lingual*; which diviſion is taken from the ſeveral organs of ſpeech, ſome of which contribute more than others to the pronunciation of certain letters. The letters, with their names, figures, and ſounds, are exhibited in the following table.

Name.	*Figure.*	*Sound.*
Aleph	א	*a*, as in call.
Beth	ב	*b*, never *v*.
Gimel	ג	*g*, hard, as gone.
Daleth	ד	*d*.
He	ה	*h*, or *e*, a gentle aſpiration, as in holy, at the beginning of a word, and â in the end of a word, or ê only.
Vau	ו	*u*, always a vowel.
Zain	ז	*z*, ſoft, like Gr. *zeta*, as in roſe.
Hheth	ח	*hh*, a ſtrong guttural, as χ, or *é*, like the Greek *eta*.
Teth	ט	*t*, like the Greek *tau*.
Jod	י	*i*, always a vowel.
Caph	כ	*k*, or *c* hard.
Lamed	ל	*l*.
Mem	מ	*m*.
Nun	נ	*n*.
Samech	ס	*s*.
Ain	ע	*gn*, *ng*, *o* or *á*.
Phe	פ	*p*, *ph*, like Greek φ.
Tſade	צ	*tſ*, or *tz*.
Koph	ק	*k* or *q*, Greek κ.
Reſh	ר	*r*.
Schin or ſhin	ש	*ſh*, or *s*.
Thau	ת	*th*, or *t*, Greek θ or τ.

N. B. The following five letters, *viz.* כמנפצ, are at the end of a word written thus, ךםןףץ. The two letters א and ל are ſometimes made to coaleſce, thus ﭏ.

Of the above 22 letters 16 are conſonants, and according to the diſtribution of Maſclef, the following ſix are vowels, *viz.* אהוחיע; four of which, *viz.* אהוי are ſimple and ſhort, and two, *viz.* ח and ע, double and long, becauſe they are more ſtrongly aſpirated. Of theſe vowels three are evidently of this character, *viz.* א, ו, and י, *a*, *u*, and *i*; and they have been called "Matres lectionis," or the parents of reading, to which number ſome have added ה, comprifing them all in the technical word אהוי, *ehevi*. According to this arrangement, the vowels in the Hebrew alphabet are,

א	*a*.
ה	*e* ſhort, or Greek ε.
ח	*é* long, or Greek η.
י	*i* or *y*.
ע	*o*.
ו	*u*.

When theſe vowels occur, it will not be difficult to pronounce Hebrew words; but words and ſyllables often occur, that conſiſt merely of conſonants, and in which none of theſe original vowels are found. If we reject the Maſoretic punctuation, we are aſked how are ſuch ſyllables and words to be enunciated? We may obſerve, in general, that in words of this kind, they are chiefly, if not altogether, the *ſhort* vowels that are wanting: and as no conſonant could be articulated without a ſhort vowel, the Hebrew writers thought it ſufficient, in words deſtitute of long vowels, to note down the conſonants only; concluding, as they might naturally do, that in this abbreviated form the meaning of ſuch words could not be miſtaken by the reader. They, therefore, employed their vowel-characters for the purpoſe of expreſſing the *long* vowels, when theſe conſtituted a radical part of the word. For the ſhort vowels they had no characters, deeming them unneceſſary. Accordingly ſome have propoſed to inſert a ſhort *a* or *e*, in any combination of conſonants, to facilitate their pronunciation. This method is exceedingly ſimple; whereas the Maſoretic pointing is complex and difficult, and very diſcouraging to a beginner. Maſclef propoſes to ſupply the vowel that is wanted between two conſonants by the auxiliary vowel of the preceding one; that is, by the vowel which immediately follows the firſt conſonant in its artificial denomination. The artificial denomination of ב is *beth*, of ג is *ghimel*, of ד is *daleth*; and of courſe the vowel which follows ב is *e*, and *e* is its auxiliary vowel, and ſo of the reſt. Suppoſe the word דבר occurs, it would be read *daber*: ſo in פלשת having no vowel, פ is followed by *e*, ל by *a*, ש by *i*, and it would be read *phelaſſith*. Many bibles being, however, ſtill printed on the Maſoretic plan, we ſhall here give a brief account of the Maſoretic points, referring to the article Points the diſcuſſion of the time of their introduction and their authority. The vowel-points amount in number to 15, and the accents to about 30. The points may be divided into ſigns of long, ſhort, and very ſhort vowels, as below:

Long vowels.

בָ bâ, kametz.
בֵ bê, tzere, *n.*
בִי bi, chirek-longum.
בוֹ bo, cholem.
בוּ bu, ſhurek, *u.*

Short vowels.

בַ ba, patach.
בֶ be, ſægol.
בִ bi, chirek-breve.
בֳ or בָ bo, kametz-chateph.
בֻ bu, kibbutz, *v.*

Very ſhort vowels.

אֲ ă, chateph-patach.
אֱ ĕ, chateph-ſægol.
אֳ ŏ, chateph-kametz.

N.B. Two dots placed one above the other : are called *ſheva*, which repreſents a very ſhort *e*. It is pronounced only under the firſt letter of a word, under a doubled or dagheſhed letter, after another ſheva, or after a long vowel. In other caſes it is quieſcent. The term *chateph* ſignifies ſhort. The letter ש has ſometimes a point above its right branch, and ſometimes above its left; thus שׁ, ſhin, and שׂ, ſin. If the preceding letter wants a point, the right hand point of ſhin is cholem, or ō long. When the letter immediately following has no point, ſhin is furniſhed with two points, thus שׁׂ, the left one cholem, if there be no point below ש; the right cholem, if the preceding letter is unpointed. A dot or point in the middle of a letter is called dagheſh; and the letter is ſometimes doubled by it, in which caſe it is called dagheſh forte; ſometimes it only removes the aſpiration from the letters בגדכפת, and it then is called dagheſh lene. A ſimilar point placed in the boſom of ו and ה imports that they are to be ſounded, when otherwiſe they would be ſilent. This point is called mappik. When (-) patach is below the laſt letter of a word, being a guttural, it is to be pronounced before, and not after ſuch letter; it is then called patach furtivum. ו repreſents two vowels and a conſonant; with a point above, it is a cholem; with a point in its boſom, it is ſchurek, but if it has a point below, it becomes the conſonant *v*. For an account of the Hebrew accents, ſee Accents.

We have already obſerved, as an excellence of the Hebrew language, and as a circumſtance that conduces to its ſimplicity and conciſeneſs, that the relations of nouns are diſtinguiſhed by particles or prepoſitions prefixed; and the perſons, modes, or tenſes of verbs are marked by means of letters of a particular order, which ſometimes appear in the middle, ſometimes in the beginning, and ſometimes at the cloſe of the original word. With this view, all the letters of the alphabet are divided into two claſſes, denominated *radical* and *ſervile*, the former conſtituting primitive words, called *roots*, and the latter derivatives, which are employed in all the various flexions of words. The roots, as we have already obſerved, are generally verbs, conſiſting commonly of three letters. All the letters may be radical, but the appellation is appropriated to 11, becauſe they can never be ſervile. The other 11 letters are denominated ſerviles, and by theſe the whole buſineſs of flexion, derivation, numbers, genders, perſons, and tenſes, is accompliſhed.

Pure radicals.	Serviles.
ג	א
ד	ב
ז	ה
ח	ו
ט	י
ס	כ
ע	ל
פ	מ
צ	נ
ק	ש
ר	ת

The caſes of nouns are diſtinguiſhed, not by their terminations, but by letters or prepoſitions prefixed; as in the following example.

Nom.	מלך	rex,
Gen.	המלך	regis,
Dat.	למלך	regi,
Accuſ.	אתמלך	regem,
Voc.	המלך	o rex,
Ablat.	ממלך	á rege.

Maſculine nouns form their plural by יִם added to the ſingular, and feminines by adding ות to the ſingular. All the ſervile letters uſed as prefixes to nouns are comprehended in this technical memorial משה וכלב. Adjectives and participles are often uſed as ſubſtantives; in which caſe the definite article ה is often prefixed to them. Theſe are frequently placed after the ſubſtantive; and a ſingular or plural adjective is ſometimes joined with a plural or ſingular ſubſtantive. Sometimes the termination of the adjective is feminine when the ſubſtantive is maſculine. Degrees of compariſon are commonly expreſſed by adverbs or prepoſitions. The ſuperlative degree is expreſſed by a repetition of the poſitive, or ſubjoining the name of God to words *in ſtatū regiminis*. Nouns ſtanding alone, or independent of other words, are ſaid to be *in ſtatu abſoluto*; but when they are placed before ſubſtantives, differing in ſignification, they are ſaid to be *in ſtatu regiminis* or *conſtructo*. The word *in regimine* ſometimes undergoes no change, and its regimen is only known by juxtapoſition. Words in this ſtate admit of a change of ים in maſculine plurals into י, or by expunging ם; and ה the mark of the feminine ſingular is changed into ת. Of *Affixes* and *ſuffixes*, ſee theſe terms.

Verbs, as we have before ſaid, have, ſtrictly ſpeaking, only one conjugation, or are indeclinable. The radical word remains unvaried, and the inflexion is carried on by ſervile letters. The conjugations in the Hebrew language are denoted by the technical terms of kal, niphal, hiphil and hophal, and hithpahel; which names are derived from the old theme פעל, *operatus eſt*, which was the model of verbs, the middle letter ע being pronounced as a ſtrong guttural. Kal, *i. e.* lævis, denotes the pure root, unburdened with ſervile letters, and repreſents the active voice. *Niphal* is the paſſive of kal, and is formed by fixing נ to the radical letters. *Hiphil*, in the active voice, is formed by prefixing ה to the firſt radical, and inſerting י betwixt the ſecond and third. It ſignifies to cauſe or command another to perform the action of the verb; and its paſſive is *hophal*. *Hithpahel* bears a near reſemblance to the middle voice of the Greeks; it is formed by prefixing הת to the radical letters, and commonly ſignifies to perform the action of the verb to one's ſelf, or frequently to repeat the action. The letters prefixed to the radical letters or inſerted between them are called the "characteriſtics" of the conjugations. Hebrew verbs have only three moods; *viz.* the indicative, imperative and infinitive. The future is often uſed for the imperative, and the ſubjunctive or optative mood is expreſſed by conjunctions placed before the indicative. All verbs are declined by fragments of the perſonal pronouns, prefixed or ſubjoined to the radical letters. Hebrew verbs are *perfect* or *defective*, perfect when they retain all their radical letters through every mood and form; and defective when they reject one or more radical letters in ſome of their parts.

Nouns are formed from verbs, 1. By abſtraction of radical letters; 2. By commutation of radical letters; 3. By prefixion of ſerviles; 4. By inſertion of the ſame; and 5. By addition of the ſame. Nouns formed by the prefixion or addition of ſerviles are denominated *heëmantic*, becauſe the letters which compoſe the word האמנתי, *credidi*, are employed in their formation; and to the number may be added the letter ו. For the letters expreſſing numbers in the Hebrew language, ſee CHARACTER. For the *keri* and *chetib*; ſee theſe articles. For the Hebrew ſyntax, ſee SYNTAX. The following directions will ſerve for finding the root and reſtoring the radical letters. 1. Reject the ſerviles, and if three pure radicals remain, theſe conſtitute the root. 2. If two remain, as is commonly the caſe, in abbreviated roots, prefix to theſe either נ or י, or inſert ו betwixt them, or poſtpone ה, or double the ſecond. On the ſubject of the Hebrew language, ſee Maſclef's Grammatica Hebræa, 1743, tom. i. Wilſon's Elements of Hebrew Grammar, ed. 2. 1788. Robertſon's Editio Secunda Grammaticæ Hebrææ, &c. Edinb. 1783. See MASORA and POINTS.

HEBREW, *Rabbinical*, or *Modern Hebrew*, is the language uſed by the rabbins, in the writings they have compoſed. The baſe, or body hereof, is the Hebrew and Chaldee, with divers alterations in the words of theſe two languages, the meanings whereof they have conſiderably enlarged and extended. Abundance of things they have borrowed from the Arabic: the reſt is chiefly compoſed of words and expreſſions, chiefly from the Greek; ſome from the Latin; and others from the other modern tongues; particularly that ſpoken in the place where each rabbin lived or wrote.

The rabbinical Hebrew muſt be allowed a very copious language. Mr. Simon, in his "Hiſt. Crit. du. Vieux Teſtam." liv. iii. chap. 27, obſerves that there is ſcarce any art or ſcience; but the rabbins have treated thereof in it. They have tranſlated moſt of the ancient philoſophers, mathematicians, aſtronomers, and phyſicians; and have wrote themſelves on moſt ſubjects: they do not want even orators and poets. Add, that this language, notwithſtanding it is ſo crowded with foreign words, has its beauties viſible enough in the works of thoſe who have written well in it.

M. Simon ſays, it is impoſſible to reduce it into an art, or ſyſtem of rules; but ſeveral learned men are of another ſentiment; and it not only appears poſſible, but has actually been performed. Genebrard firſt attempted it in his "Iſagoge Rabbinica," which yet goes no farther than the learning to read it. Buxtorf ſeconded him, at the end of his Hebrew Grammar; where we have an additional piece, under the title "Lectionis Hebreæo-Germanicæ Uſus & Exercitatio." Others have gone yet farther: Maius has given us a rabbinical grammar, at Gieſſen, under the title of "Johannis Maii Grammatica Rabbinica;" and before him Sennert had done the ſame; "Rabbiniſmus: i. e. Præcepta Targumico-Talmudico-Rabbinica." Wirtemb. an. 1666.

HEBREW *Muſic*. Notwithſtanding the unremitting labours of the firſt fathers of the church, and the learning and diligence of innumerable tranſlators and commentators, but few materials of great importance can be acquired for this article in the muſical department, except what the Bible itſelf contains; as the firſt periods of the hiſtory of the ancient Hebrews, from its high antiquity, can receive no illuſtration from cotemporary hiſtorians, or from human teſtimony.

The chief part, therefore, of what we have to do, is to collect the principal paſſages relative to thoſe early ages of the world, the tranſactions of which are recorded in the ſacred writings with true and genuine ſimplicity, and to arrange them in chronological order; a taſk which, however trivial and eaſy it may ſeem, will not be without its uſe in a General Hiſtory of Muſic; as it will at leaſt ſhew, that this art has always had admiſſion into the religious ceremonies, public feſtivals, and ſocial amuſements of mankind.

The conſtruction and uſe of muſical inſtruments have a very early place among the inventions attributed to the firſt inhabitants of the globe, by Moſes: for, Geneſis, chap. iv. ver. 21, Jubal, the ſixth deſcendant from Cain, is called "the father of all ſuch as handle the harp and organ."

But though this circumſtance is mentioned ſo ſoon in the Pentateuch, yet it could have happened but a ſhort time befor the deluge, A. M. 1656; conſequently the world muſt have been peopled many centuries before the invention took place. And with reſpect to the inſtrument called an *organ*, in the Engliſh verſion of this paſſage, it muſt not be imagined that ſuch a noble and complicated machine is there implied, as the preſent inſtrument of that name. In the Hebrew it is called *huggab*, which, ſay the commentators, was a kind of ſyrinx, or fiſtula. The Septuagint, inſtead of harp and organ, has ψαλτηϱιον και κιθαϱον, *pſaltry* and *cithara*; the Syriac, *citharam* et *fides*; Chaldæan paraphraſe, *ipſe fuit magiſter omnium canentium in nablio, ſcientium cantium citharæ et organi*. *Nablion* is the Hebrew word for harp. The Arabic has *tympanum et citharam*; and the French has *le violon et les orgues*.

Hence it appears, that the tranſlators, ancient and modern, of all parts of the world, not knowing what were the real forms and properties of the Hebrew inſtruments, have given to them the names of ſuch as were of the moſt common uſe in their own countries.

No mention, however, is made in the ſcriptures of the practice of muſic, till more than ſix hundred years after the deluge. But in Geneſis xxxi. and 26th and 27th verſes, about 1739 years before Chriſt, according to the Hebrew chronology, both vocal and inſtrumental muſic are ſpoken of as things in common uſe.

"And Laban ſaid to Jacob, what haſt thou done, that thou haſt ſtolen away unawares to me, and carried away my daughters, as captives taken with the ſword?"

"Wherefore didſt thou flee away ſecretly, and ſteal away from me? and didſt not tell me, that I might have ſent thee away with mirth and with ſongs, with tabret, and with harp?"

Laban was a Syrian, and brother to Rebecca, Iſaac's wife; ſo that the tabret and the harp ſhould be ranked among Aſſyrian inſtruments.

After this time the ſacred text furniſhes no muſical incident, till the year 1491 before Chriſt, when we have the firſt hymn, or pſalm, to the Supreme Being, upon record. It contains the pious effuſions of Moſes, after the paſſage of the Red ſea, at the head of the whole people of Iſrael, juſt eſcaped from bondage.

"Then ſang Moſes and the children of Iſrael this ſong unto the Lord, and ſpake, ſaying, I will ſing unto the Lord, for he hath triumphed gloriouſly," &c. Exod. xv.

Moſes is ſeconded on this occaſion by Miriam, the propheteſs, and ſiſter of Aaron, who "took a timbrel in her hand, ver. 20; and all the women went out after her with timbrels and with dances."

"And Miriam anſwered them, ſing ye to the Lord," &c.

Here is an early inſtance of women being permitted to bear a part in the performance of religious rites, as well as of vocal muſic being accompanied by inſtrumental, and by dancing.

St. Stephen tells us (Acts, vii. ver. 21, 22.) that Moſes, having been educated by Pharaoh's daughter "as her own ſon, was learned in all the wiſdom of the Egyptians." And Clemens Alexandrinus particularizes his acquirements; by affirming that "he was inſtructed in his maturer age by the Egyptians in all liberal ſciences, as arithmetic, geometry, rhythm, harmony, but, above all, medicine and muſic."

However, in the infancy of a ſtate, a nation has but little leiſure for cultivating muſic any otherwiſe than as it is connected with religious rites and the military art. Accordingly we find no other muſical inſtrument mentioned during the adminiſtration of the great Hebrew legiſlator, than trumpets, except the timbrel, uſed by Miriam. Numb. chap. x. 2. he is ordered by divine command to make two trumpets of ſilver of a whole piece, "for aſſembling together the people, and for journeying the camps." And in the eight following verſes all the ſignals to be ſounded by one and by two trumpets are regulated. But theſe inſtruments ſeem to differ from that of the jubilee, in nothing but the materials of which they were made: as the Hebrew text, and the ſeveral verſions, agree in calling all by one name.

The feaſt of trumpets inſtituted by Moſes, Numb. xxix. 1. in the month of September, is imagined to have been the celebration of harveſt home. "And in the ſeventh month, on the firſt day of the month, ye ſhall have a holy convocation; ye ſhall do no ſervile work; it is a day of blowing the trumpets unto you." The rigid obſervance of the Sabbath upon every ſeventh day, rendered ſeven a ſacred number among the Hebrews. Hence, not only the ſeventh day, but the ſeventh week, the ſeventh month, the ſeventh year, and ſeven times ſeventh year, were kept holy: "and on the fiftieth year thou ſhall cauſe the trumpet of the jubilee to ſound throughout the land." Levit. xxv. 9.

The trumpets of rams horns uſed at the ſiege of Jericho, ſeem to have been leſs muſical inſtruments, than military ſignals for the aſſailant to march and ſhout by, in order, by their noiſe, to terrify and diſmay the enemy.

Upon this occaſion all the powers of the number ſeven were put in practice. "Seven prieſts ſhall bear before them ſeven trumpets, and the ſeventh day ye ſhall compaſs the city ſeven times, and the prieſts ſhall blow with the trumpets." Joſh. vi. 4.

No further mention is made of muſic, till the ſong of Deborah and Barak, Judges v. which ſeems to have been ſung in dialogue, and wholly without inſtruments. It was about fifty years after this period, and eleven hundred and forty-three years before Chriſt, that the unfortunate daughter of Jephtha, upon hearing of her father's victory over the Ammonites, went out to meet him with timbrels and with dances: Judges ii. 34. From this time till Saul was choſen king, 1095, B. C. the ſacred text is wholly ſilent about every ſpecies of muſic, except that of the trumpet in military expeditions.

But here an incident occurs, which ſeems to merit particular attention. It appears from many paſſages in ſcripture, that muſic was as nearly allied to prophecy as to poetry.

When Samuel, after ſecretly anointing Saul king, inſtructs the new monarch in the meaſures he is to purſue for eſtabliſhing himſelf on the throne, he ſays, "And it ſhall come to paſs, when thou art come to the city (Bethel,) that thou ſhalt meet a company of prophets coming down from the high place, with a pſaltery and tabret, and a pipe, and a harp before them, and they ſhall propheſy. And the ſpirit of the Lord will come upon thee, and thou ſhalt propheſy with them."

Who is ignorant, ſays Quintilian, that muſic in ancient times was ſo much cultivated, and held in ſuch veneration, that muſicians were called by the names of *prophets* and *ſages*?

Vates, in Latin, is a common term for *prophet*, *poet*, and *muſician*. Clemens Alexandrinus, deſcribing the different kinds of Egyptian prieſts, and their functions, ſays, that the principal of them were called *prophets*. The oracles of the ancients were delivered in ſong; and the Pythian prieſts, who compoſed into hexameter verſe the looſe and disjointed expreſſions of the agonizing Pythia, were ſtyled *prophets*, προφηται. Theſe, according to Plutarch, "were ſeated round the ſanctuary, in order to receive the words of the Pythia, and incloſe them immediately into a certain number of verſes, as liquors are incloſed in bottles."

The improviſatori of Italy are ſtill accompanied by an inſtrument, like the prophets of old; and Italian poets, who write down verſes, ſing at the time of compoſing them.

The examples in ſcripture of this union of muſic and prophecy are numerous. "Moreover, David, and the captains of the hoſt, ſeparated to the ſervice of the ſons of Aſaph, and of Heman, and of Jeduthun, who ſhould propheſy with harps, with pſalters, and with cymbals.—Of the ſons of Aſaph, four, who propheſied according to the order of the king:—Of Jeduthun, ſix, who propheſied with a harp, to give thanks and to praiſe the Lord. And of the ſons of Heman, the king's ſeer, in the words of God, fourteen, to lift up the horn."

But the moſt ſtriking example of the cuſtom practiſed by the prophets, of tranquillizing their minds, and exciting in themſelves divine inſpiration, by means of muſic, is in the ſecond book of Kings.

The three ſovereigns of Iſrael, Judah, and Edom, marching with their armies through a wilderneſs, were all upon the point of being deſtroyed by thirſt, as there was no water to be found in their paſſage, either for man or beaſt.

“ And the king of Iſrael ſaid, alas! that the Lord hath called theſe three kings together, to deliver them into the hand of Moab. But Jehoſhaphat ſaid, is there not here a prophet of the Lord, that we may enquire of the Lord by him? And one of the king of Iſrael's ſervants anſwered and ſaid, here is Eliſha, the ſon of Shaphat. So the king of Iſrael and Jehoſhaphat, and the king of Edom, went down to him.—And Eliſha ſaid, bring me a minſtrel. And it came to paſs when the minſtrel played, that the hand of the Lord came upon him, and he ſaid, “ Thus ſaith the Lord, make this valley full of ditches,” &c.

David, by having cultivated muſic ſo early in youth, ſeems to have been intended by his family for the *profeſſion* of a prophet. St. Ambroſe ſays, that he had always the gift of prophecy, and was choſen by God himſelf, in preference to all other prophets, to compoſe pſalms. (Præf. in Pſal. i.) See DAVID.

It has ever been the cuſtom of legiſlators and founders of religion, in compliance with the prejudices of mankind, to retain part of the former laws and religious inſtitutions. The Egyptians divided the inhabitants of their country into caſts, or tribes, confining each profeſſion to one family. And as muſic was many ages confined by them to the prieſthood, and to religious purpoſes, the Hebrews, who had their arts and ſciences from the Egyptians, and who adopted many of their religious rites, as the primitive Chriſtians did afterwards thoſe of the Pagans, in order to conciliate parties, and facilitate the eſtabliſhment of a new worſhip, made both prieſts and muſicians hereditary in the tribe of Levi. “ And the ſons of Aaron the prieſts ſhall blow with the trumpets, and they ſhall be to you for an ordinance for ever, throughout your generations.” Accordingly, during the life of Moſes, none but the prieſts blew the trumpets, whether in peace or war: as, afterwards, in Joſhua's adminiſtration, both at the ſiege of Jericho, and upon all other occaſions, we find the office of blowing the trumpets was ſtill confined to the prieſthood: and, when David firſt regulated the muſical eſtabliſhments, for the ſervice of religion, it appears, that not only the ſelect band of ſinging men and ſinging women, but all the four thouſand performers upon inſtruments, were choſen from the families of prieſts and Levites.

Of the muſical inſtruments of the Hebrews, ſo often mentioned in the Pſalms, ſo diſcordant are the commentators on the ſubject, that no preciſe or ſatisfactory idea can be ſuggeſted on the ſubject. If, indeed, the leaſt ray of hope remain, that a true idea of Jewiſh inſtruments can ever be acquired, it muſt be from the arch of Titus at Rome, where it is ſuppoſed that the ſpoils brought by that emperor from Jeruſalem have been exactly repreſented in ſculpture. Among theſe are ſeveral muſical inſtruments, particularly the ſilver trumpets, called by the Hebrews *chatzotzeroth*; and horns, ſuppoſed to reſemble the ſhawms, mentioned ſo often in ſcripture, called in Hebrew *keranim*, or *ſacerdotal trumpets*.

But the arch upon which theſe inſtruments are ſculptured, though, according to Venuti, of excellent workmanſhip, was not erected till after the death of Titus; and, to ſay the truth, the inſtruments are of no uncommon form. The trumpets are long ſtraight tubes, as modern trumpets would be, if not folded up, for the convenience of the player; and the horns are ſuch as frequently occur in ancient ſculpture. Examples of both may be ſeen in Blanchini, Bartholinus, Montfaucon, Padre Martini, and all the writers upon ancient muſic.

The reign of Solomon, ſo long, ſo pacific, and ſo glorious to the Hebrews, may be regarded as the Auguſtan age of that people; whoſe proſperity, during this period, not only enabled them to cultivate arts and ſciences among themſelves, but ſtimulated foreigners to viſit and aſſiſt them. And as we find that the Romans, during the time of Auguſtus, and his ſucceſſors, were indebted to the Greeks for a great part of their knowledge in the polite arts, ſo the Hebrews, under Solomon's government, had aſſiſtance from Egypt and from Tyre. Riches and renown never fail to attract talents into a country from neighbouring kingdoms. As to muſic and poetry, which were put upon ſo reſpectable a footing in the former reign, they ſeem to have had their ſhare of attention in this; particularly in the ſervice of the temple, at the dedication of which, if we may credit Joſephus, “ Solomon made two hundred thouſand trumpets, according to the ordinance of Moſes: (Moſes was ordered to make two trumpets of ſilver only. Numb. x. 2.) and forty thouſand inſtruments of muſic (as if trumpets were not inſtruments of muſic) to record and praiſe God with, as the pſaltery and harp of electrum,” a mixed metal, of which, according to Pliny, four parts were gold, and the fifth part was ſilver. Joſephus has often been accuſed of inaccuracy in other things; and with reſpect to muſic, his accounts neither bear the marks of judgment nor fidelity; but we have information from much better authority, “ That Solomon appointed, according to the order of David his father, the courſes of the prieſts to their ſervice, and the Levites to their charges, to praiſe and miniſter before the prieſts, as the duty of every day required.”

It is the opinion of many expounders and commentators of the ſacred writings, that Solomon was author of ſome of the Pſalms that are attributed to David. Of this we are certain, that he was no leſs fond of poetry than his father. In the firſt of Kings, iv. and xxv. we are told that “ he ſpake three thouſand proverbs: and his ſongs were a thouſand and five.” But whether, like the royal Pſalmiſt, he was a practical muſician, does not appear in the records of his reign. However, in Eccleſiaſtes, ii. 8. we find muſic mentioned by this voluptuous prince among the vain luxuries and vexations of ſpirit, with which he found himſelf ſatiated: “ I gat me men-ſingers and women-ſingers, and the delights of the ſons of men, as muſical inſtruments, and that of all ſorts:” which is all that can be gathered on the ſubject of muſic during this ſplendid reign.

A century paſſed from the dedication of the temple, without the mention of any thing remarkable in ſcripture concerning the muſic of the Hebrews, except the paſſage already cited, where Eliſha calls for a minſtrel to awaken inſpiration, previous to his propheſying.

In the year 896, B. C. the ſingers are ſaid to have contributed greatly towards obtaining a ſingular advantage in favour of Jehoſhaphat, over the Ammonites and Moabites; the muſicians following the camp in the ſame order as they ſerved in the temple, marched as a vanguard in the field with their inſtruments: “ And the Levites of the children of the Kohathites, and the children of the Korahites, ſtood up to praiſe the Lord God of Iſrael with a loud voice on high.—And when Jehoſhaphat had conſulted with the people, he appointed ſingers unto the Lord, and that ſhould praiſe the beauty of holineſs as they went out before the army, and to ſay, praiſe the Lord, for his mercy endureth for ever. And when they began to ſing and to praiſe, the Lord ſet ambuſhments againſt the children of Ammon, Moab, and Mount Seir, which were come againſt Judah, and they were ſmitten.”

The Hebrews frequently attributed their ſucceſs in battle to the animation given the troops by the trumpets, which were always blown by prieſts and Levites, whom the people highly reverenced, and regarded as inſpired perſons.

“ And behold, God himſelf is with us, for our captain, and his prieſt with ſounding trumpets, to cry alarm againſt you.—And when Judah looked back, behold the battle was before and behind, and they cried unto the Lord, and the prieſts ſounded with the trumpets. Then the men of Judah gave a ſhout; and it came to paſs as the men of Judah ſhouted, that God ſmote their enemies.”

It was, in like manner, the part of the ancient Gallic, German, and Britiſh druids, who were not only prieſts, but muſicians, to animate their countrymen to the fight.

Thus far we have only had to ſpeak of the cultivation and improvement of muſic among the Hebrews; we have little more to add, except what will indicate its neglect and decline.

But few memorials remain concerning it, from the victory obtained by Abijah, till the captivity and deſtruction of Jeruſalem and the temple, by the Babylonians, in the reign of Jehoiakim. Before this period, muſic, and other ſacred rites, had been frequently much corrupted, during the wars, and by intercourſe with foreign nations; and at every attempt to reſtore them to their former purity and ſplendour, we find the number of thoſe employed in the ſervice of the temple diminiſhed, and their efforts more feeble and ineffectual. At the reſtoration of the royal family, after the crown had been uſurped by Athaliah, we are told that “ the princes and the trumpets ſtood by the king: and all the people of the land rejoiced, and ſounded with trumpets, alſo the ſingers with inſtruments of muſic; and ſuch as taught to ſing praiſe.” And Jehoiada, during the minority of Joaſh, “ appointed the offices with rejoicing, as it was ordained by David.” B. C. 878. And in this reign we find that “ the ſingers, the ſons of Aſaph,” were reſtored to their places.

Theſe continued, however, but a ſhort time in the miniſtry, before they were driven out, and the king and people became proſelytes to another form of worſhip. But after various revolutions both in religion and government, a powerful attempt was made, during the reign of Hezekiah, about 726 years B. C. to reſtore the temple to all its ancient ſplendour.

“ And he ſet the Levites in the houſe of the Lord with cymbals, with pſalteries, and with harps, according to the commandment of David.—And the Levites ſtood with the inſtruments of David, and the prieſts with the trumpets.—But the prieſts were too few” to perform all the ceremonies formerly ſolemnized in the temple. However, “ there was now great joy in Jeruſalem; for ſince the time of Solomon, there was not the like in Jeruſalem.”

But this happy period was of ſhort continuance; new ſchiſms and new misfortunes ſoon put an end to it. And in the year 606, B. C. the Hebrew nation was ſubdued; the temple plundered and deſtroyed; and, ſoon after, both king and people were, by Nebuchadnezzar, ſent captives to Babylon.

During the ſeventy years captivity, it is natural to ſuppoſe that the Hebrews were denied the celebration of their religious rites; nor could they have much time or inclination for domeſtic amuſements or feſtivity; ſo that muſic, the child of leiſure and happineſs, and parent of innocent pleaſure, muſt have been neglected, and ſhut out of their houſes, as an unwelcome gueſt. The idea of every thing that awakened recollection of former felicity, muſt have been painful in a ſtate of ſlavery. “ By the waters of Babylon we ſat down and wept: when we remembered thee, O Sion. As for our harps we hanged them up upon the trees that are therein. For they that led us away captives, required of us then a ſong, and melody in our heavineſs: Sing us one of the ſongs of Sion. How ſhall we ſing the Lord's ſong in a ſtrange land? If I forget thee, O Jeruſalem, let my right hand forget her cunning.”

Theſe are the natural ſentiments and feelings of a people but lately fallen from a ſtate of proſperity and happineſs, into that of bondage and miſery.

All that has been hitherto collected relative to the muſic of the Hebrews, only ſhews that it was in general uſe among them, from the time of their quitting Egypt, till they ceaſed to be a nation; but what kind of muſic it was with which they were ſo much delighted, no means are now left to determine. That they had their firſt muſic and inſtruments, whatever they were, from the Egyptians, appears to admit of no doubt; but theſe ſeemed to have remained in a very rude ſtate till the reigns of David and Solomon, when, perhaps, they were more improved in quantity than quality; for the great number of Levites, of ſinging men and ſinging women, as well as of trumpets, ſhawms, cornets, ſacbuts, cymbals, and timbrels, could only augment the noiſy cry of joy, or the clamour of petition.

However, we have no authentic account of any nation, except the Egyptians, where muſic had been cultivated ſo early as the days of David and Solomon, the brighteſt period of the Jewiſh hiſtory, the Greeks at that time having hardly invented their rudeſt inſtruments: for Homer and Heſiod, the refiners, if not the inventors, of Greek poetry; and Orpheus, Muſæus, and Linus, to whom they attribute the invention of their muſic and inſtruments, all flouriſhed, according to ſir Iſaac Newton, after theſe Hebrew monarchs.

With reſpect to the modern Jewiſh muſic, we have been informed by a Hebrew high prieſt, that all inſtrumental, and even vocal performances, have been baniſhed the ſynagogue ever ſince the deſtruction of Jeruſalem: that the little ſinging now uſed there is an innovation, and a modern licence; for the Jews, from a paſſage in one of the prophets, think it unlawful, or at leaſt unfit, to ſing or rejoice before the coming of the Meſſiah, till when they are bound to mourn and repent in ſilence: but the only Jews now on the globe, who have a regular muſical eſtabliſhment in their ſynagogue, are the Germans, who ſing in parts; and theſe preſerve ſome old melodies, or ſpecies of chants, which are thought to be very ancient. At Prague they have an organ. The ſame prieſt ſays that, being at Peterſburg ſome years ſince, the grand caliph of Perſia was there likewiſe on an embaſſy, and had the ſervice of his religion regularly performed in a kind of moſque fitted up in the czar's palace for his uſe. That when he firſt heard this ſervice performed, he found the ſinging ſo like that in the German ſynagogues, that he thought it had been done in deriſion of the Jews, and on that account ſoon left. But, upon enquiry, finding it to be nothing more than the manner of ſinging common in Perſia, he concluded that the Perſians had borrowed this kind of chant from the ancient Oriental Jews. At preſent, he ſays, they ſing it firſt ſingle, and then add parts to it, in a kind of chorus, like the German Jews.

Padre Martini has inſerted from the “ Eſtro-Poetico-Armonico” of Marcello, 1724, and from an inedited MS. by the cavaglier Ercole Bottrigari, called “ Il Trimerone de' Fondamenti Armonici,” 1599, a great number of ſuch Hebrew chants as were ſung in the ſynagogues of different parts of Europe, at the time when theſe works were compoſed. But as no two Jewiſh congregations ſing theſe chants alike, if tradition has been faithful in handing them down from the ancient Hebrews to any one ſynagogue, who ſhall determine to which ſuch permanence can be attributed.

HEBREW *Poetry* deſerves particular notice, not only on account of its intrinſic excellence, but becauſe the moſt admirable and intereſting ſpecimens of it are contained in theſe ſacred writings of the Old Teſtament, to which our attention is and ought to be frequently directed. While the hiſtorical books, and legiſlative writings of Moſes, are evidently proſaic in the compoſition, the book of Job, the Pſalms of David, the Song of Solomon, the Lamentations of Jeremiah, a great part of the prophetical writings, and ſeveral paſſages ſcattered occaſionally through the hiſtorical books, bear the moſt plain and diſtinguiſhing marks of poetical writing. We can have no reaſon for doubting that theſe were originally written in verſe or ſome kind of meaſured numbers; though as the ancient pronunciation of the Hebrew language is now loſt, we are not able to aſcertain, or at moſt very imperfectly, the nature of the Hebrew verſe. Let any perſon read the hiſtorical introduction to the book of Job, contained in the firſt and ſecond chapters, and then proceed to Job's ſpeech in the beginning of the third chapter, and it muſt appear that he paſſes all at once from the region of proſe to that of poetry. He is warned of the change, not merely by the poetical ſentiments and the figured ſtyle; but by the ſenſible alteration that occurs in the cadence of the ſentence and the arrangement of the words:—a change as great as when he paſſes from reading Cæſar's Commentaries to read Virgil's Æneid. The peculiar excellence of the Hebrew poetry muſt alſo appear, when we conſider that its origin and earlieſt application, as biſhop Lowth obſerves, have been clearly traced into the ſervice of religion. To celebrate in hymns and ſongs to the praiſe of Almighty God; to decorate the worſhip of the Moſt High with all the charms and graces of harmony; to give force and energy to the devout affections were the ſublime employment of the ſacred muſes. The ſame learned author adds, it is more than probable, that the very early uſe of ſacred muſic in the public worſhip of the Hebrews contributed not a little to the peculiar character of their poetry, and might impart to it that appropriate form, which, though chiefly adapted to this particular purpoſe, it nevertheleſs preſerves on every other occaſion. In the Old Teſtament we have ample evidence, that muſic and poetry were cultivated from the earlieſt times among the Hebrews. In the days of the Judges we find mention of the ſchools or colleges of the prophets, in which perſons were educated for the purpoſe of ſinging the praiſes of God, with the accompaniment of various inſtruments. (See 1 Sam. x. 7.) In the days of king David muſic and poetry were carried to their greateſt height. For the ſervice of the tabernacle he appointed 4000 Levites, divided into 24 courſes, and marſhalled under ſeveral leaders, whoſe ſole buſineſs it was to ſing hymns, and to perform the inſtrumental muſic in the public worſhip. Aſaph, Heman, and Jeduthun, were the chief directors of the muſic; and from the titles of ſome pſalms we may infer that they were alſo excellent compoſers of hymns or ſacred poems. We have an account in 1 Chron. ch. xxv. of David's inſtitutions, pertaining to the ſacred muſic and poetry; which were more coſtly, ſplendid, and magnificent, than any which ever obtained in the public ſervice of any other nation. (See Hebrew *Muſic*.)

The general conſtruction of the Hebrew poetry is of a ſingular nature, and peculiar to itſelf. It conſiſts in dividing every period into correſpondent, for the moſt part into equal members, which anſwer to one another, both in ſenſe and ſound. In the firſt member of the period a ſentiment is expreſſed; and in the ſecond member the ſame ſentiment is amplified, or is repeated in different terms, or ſometimes contraſted with its oppoſite; but in ſuch a manner that the ſame ſtructure, and nearly the ſame number of words is preſerved. This is the general ſtrain of all the Hebrew poetry; inſtances of which occur in almoſt every part of the Old Teſtament, particularly in Pſalm xcvi. (See Parallelism.) This form of poetical compoſition among the Hebrews has been ſatisfactorily deduced by the learned biſhop, of whoſe work we are now availing ourſelves, from the manner in which they were accuſtomed to ſing or chant their ſacred hymns. They were accompanied with muſic, and they were performed by choirs or bands of ſingers and muſicians, who anſwered alternately to each other. Thus, *e. g* one band began the hymn with the words: "The Lord reigneth, let the earth rejoice:" then the chorus, or ſemichorus, took up the correſponding verſicle: "Let the multitudes of the iſles be glad thereof." "Clouds and darkneſs are round about him," ſung the one: the other replied, "Judgment and righteouſneſs are the habitation of his throne." In this manner their poetry, when ſet to muſic, naturally divided itſelf into a ſucceſſion of ſtrophes and antiſtrophes correſponding to each other: and hence it is probable, the antiphon, or reſponſory, in the public religious ſervice of many Chriſtian churches, derived its origin. Thus, as we learn from the book of Ezra (ch. iii. 11.), the Levites ſung, alternatim or by courſe: and ſome of David's pſalms bear evident ſignatures of having been compoſed in order to be performed in this manner. This was particularly the caſe with reſpect to the 24th Pſalm; the mode of performing which is particularly illuſtrated by Dr. Lowth, and it muſt have had a very noble and impreſſive effect. The mode of compoſition above ſtated prevailed in the prophetical writings as much as in the Pſalms of David. (See Iſaiah, lx. 1.) However, independently of the ſolemn majeſty which this form of conſtruction gave to the ſacred poetry of the Hebrews, it was in itſelf diſtinguiſhed by the higheſt beauties of ſtrong, conciſe, bold, and figurative expreſſions. Conciſeneſs and ſtrength are two of its moſt remarkable characteriſtics. To the conciſeneſs and ſobriety of expreſſion of the Hebrew poetical writers, their poetry is indebted for much of its ſublimity; and all writers, ſays Dr. Blair, who attempt the ſublime, might profit much by imitating, in this reſpect, the ſtyle of the Old Teſtament. (See Sublime.) Bold and animated figures abound in the ſacred books: and we find recurring inſtances of metaphors, compariſons, allegories, and perſonifications. The Hebrew poets borrow their metaphors and compariſons from the country in which they lived; and they preſent to us a very beautiful view of its natural objects, and of the arts and employments of their common life. We cannot forbear evincing the truth of this remark by appropriate examples, deduced from the particular circumſtances of the land of Judea. During the ſummer months this country had little or no rain, and on this account it was much parched; want of water was grievouſly diſtreſſing; and the refreſhment and benefit which were derived from a plentiful ſhower, and the burſting forth of a rivulet, were very ſenſibly experienced by the inhabitants of Judea. Images of diſtreſs or of proſperity deduced from theſe circumſtances frequently occur. (See Iſaiah, ch. xxxv. 1, 6, 7.) Judea was alſo a hilly country, and during the rainy months ſubject to frequent inundations from the ruſhing of torrents, deſcending ſuddenly from the mountains, and from the annual overflowing of Jordan. Great calamities are therefore often compared to the overflowing torrent. (Pſalm, xlii. 7.) Lebanon and Carmel were two of the moſt remarkable mountains of the country; the former noted for its height and the lofty cedars that covered it, and the latter for its beauty and fertility, the richneſs of its vines and olives. In reference to theſe, ſee Iſaiah, ch. xxxv. 2.. Solomon's Song, v. 15. vii. 5. Earthquakes were not unfrequent in Judea; and the tempeſts of hail, thunder, and lightning, accompanied with whirlwinds and darkneſs, far exceeded any thing which happens in more temperate regions. See Iſa. xxiv. 10. Pſal. xviii.

The Hebrews, we ſhould recollect, were a people chiefly occupied with agriculture and paſturage, which were not diſdained by their patriarchs, kings, and prophets: but they were little addicted to commerce, and ſeparated from other nations by their laws and religion. They were, in the better days of their ſtate, ſtrangers in a great meaſure to the refinements of luxury. Hence ſprung their frequent alluſions to paſtoral life and to rural employments, inſtances of which continually recur. (See particularly Pſ. xxiii.) We alſo find figurative alluſions to the rites and ceremonies of their religion. Upon the whole, the face of their territory, the circumſtances of their climate, the manners of the people, and the auguſt ceremonies of their religion are conſtantly paſſing under different forms before us; and we ſhould duly recollect them when we are peruſing ſpecimens of their poetry, in order to our feeling its force and reliſhing its beauties. The happy influence of good government upon a people is exhibited by a fine compariſon in the laſt words of David, 2 Sam. xxiii. 3. “He that ruleth over men muſt be juſt, ruling in the fear of God; and he ſhall be as the light of the morning, when the ſun riſeth; even a morning without clouds; as the tender graſs ſpringing out of the earth, by clear ſhining after rain.” The Pſalms and the prophetical writings are full of allegories and parables. But the poetical figure which, more than any other, elevates the ſtyle of ſcripture, and gives it a peculiar boldneſs and ſublimity, is proſopopœia or perſonification; and it may be obſerved, that no perſonifications employed by any poets are ſo magnificent and ſtriking as thoſe of the inſpired writers. The peſtilence is perſonified in Pſ. xci. 6. Habak. iii. 5. The waters, the mountains, &c. in Pſ. lxxvii. 16. cxiv. 4. Iſ. xliv. 23. 27. Habak. iii. 4. Job. xxviii. 22. Iſa. xiv. 9, &c. Jer. xlvii. 6. See PROSOPOPŒIA.

As to the ſeveral kinds of poetical compoſition that occur in the ſacred books, they are chiefly the didactic, elegiac, paſtoral, and lyric. Of the firſt of theſe, or the didactic, the book of Proverbs is the principal inſtance (ſee PROVERBS); the book of Eccleſiaſtes, and ſome of the Pſalms, particularly the 119th, belong to the ſame claſs. Many very beautiful ſpecimens of elegiac poetry occur in ſcripture; ſuch as the lamentation of David over his friend Jonathan, ſeveral paſſages in the prophetical books, and ſeveral of David's Pſalms, particularly the 42d. But the moſt regular and perfect elegiac compoſition is that work entitled “The *Lamentations* of Jeremiah,” which ſee. Of paſtoral poetry we have a peculiar exemplification in the Song of Solomon. (See CANTICLES.) Of lyric poetry, or that which is intended to be accompanied with muſic, the Old Teſtament is full. Beſides a great number of hymns and ſongs, ſcattered in the hiſtorical and prophetical books, ſuch as the ſong of Moſes, the ſong of Deborah, and others of a ſimilar kind, the whole book of *Pſalms*, (which ſee,) may be conſidered as a collection of ſacred odes. See ODE.

The moſt eminent of the ſacred poets are Job, David, and Iſaiah. The compoſitions of David are of the lyric kind: and he chiefly excels in the pleaſing, ſoft, and tender manner; and though in his Pſalms there are many lofty and ſublime paſſages, yet in ſtrength of deſcription he yields to Job; in ſublimity, to Iſaiah. For the characters of the other poetical writers, ſee JOB, ISAIAH, JEREMIAH, EZEKIEL, HOSEA, JOEL, MICAH, HABAKKUK, and NAHUM, as they are ſketched out by biſhop Lowth. (See their reſpective articles.) In the prophecies of Jonah and Daniel, there is no poetry. Lowth's “De Sacra Poeſi Hebræorum,” or Gregory's tranſlation of this learned and highly intereſting work, entitled “Lectures on the Sacred Poetry of the Hebrews,” in two vols. 8vo. 1786. For an abridged account of it, ſee Blair's Lectures, vol. iii.

HEBREW *Points* or *Vowels*, are uſually reckoned five, which are the ſame with ours, *viz. a, e, i, o, u;* but then each vowel is divided into two, a long and a breve, or ſhort; the ſound of the former is ſomewhat graver and longer, and that of the latter ſhorter and more acute. It muſt be added, that the two laſt vowels have quite different ſounds; different, we mean, in other reſpects beſides quantity and degree of elevation. To theſe 10 or 12 vowels muſt be added ſome others, called “ſemi-vowels,” which are only ſlight motions ſerving to connect the conſonants, and make the tranſitions more eaſy from one to another. On the ſubject of Hebrew vowels, ſee POINTS. See alſo HEBREW *Language*.

HEBREWS, *Epiſtle to the*, a canonical book of the New Teſtament, bearing no writer's name, but generally aſcribed to the apoſtle Paul. Concerning the date of this epiſtle, and occaſion of writing it, ſee EPISTLE.

We ſhall here give a conciſe account of ſome queſtions that have been diſcuſſed among biblical critics concerning this epiſtle. The firſt queſtion relates to the perſons for whom it was deſigned. Sir Iſaac Newton thought that it was written to Jewiſh believers, who left Jeruſalem about the time when the war broke out, and went into Aſia; and therefore he dates it in the year 66, beyond, as others conceive, the life-time of St. Paul, the ſuppoſed author of it. Mr. Wetſtein conceived that it was addreſſed by Paul to the Jewiſh believers at Rome, ſoon after he had been releaſed from his confinement in that city. But this opinion is unſupported by ancient authority, and deſtitute, ſays Lardner, of all appearance of probability. The more probable opinion is that of Lightfoot, Whitby, Mill, Pearſon, L. Capellus, Beza, Hallet, Michaelis, &c. which is, that it was ſent by Paul to the believing Jews of Judea, who were perſecuted by their unbelieving countrymen, and thus tempted to apoſtatize from Chriſtianity, and to think that there was ſtrength in the arguments urged by the perſecutors in favour of Judaiſm; againſt both which dangers the apoſtle guards them. This opinion is adopted by Dr. Lardner, who alleges the following reaſons in ſupport of it. This was the opinion of the ancient Chriſtian writers, who received this epiſtle, ſuch as Clement of Alexandria, Jerom, Euthalius, Chryſoſtom, Theodoret, Theophylact, &c. Beſides, many things occur in this epiſtle that rendered it peculiarly ſuitable to the believers in Judea. To the objections urged by Wall, Wetſtein, and others, againſt this opinion, Lardner has ſatisfactorily replied. The next queſtion pertaining to this epiſtle concerns the language in which it was written. On this queſtion there have been two principal opinions; one, that it was written in Greek, and the other, that it was originally written in Hebrew, and tranſlated into Greek. The former opinion has been very generally adopted by modern authors, among whom we may reckon J. A. Fabricius, Beauſobre, Capellus, Baſnage, Mill, Wetſtein, Lardner, &c. One argument particularly urged, both by Spanheim and Wetſtein, is taken from the Greek paronomaſias that occur in this epiſtle, or the frequent concurrence of Greek words of like ſound; and this argument, ſays Lardner, ſeems not eaſy to be anſwered. Another argument, called the moſt ſpecious by Michaelis, is founded on the word διαθηκη, as uſed in ch. ix. 16, 17.; which word admits of two ſenſes, and may denote either “covenant” or “teſtament;” but in the paſſage now cited it neceſſarily ſignifies teſtament;

and this application could not have taken place in Hebrew, becauſe ברית, *berith*, the correſponding Hebrew word, does not admit of this ſenſe, and could only have taken place in the Greek, in which διαθηκη admits of a twofold meaning; conſequently the epiſtle was written in Greek. Again, the Hebrew name Μελχισεδεκ is interpreted, Heb. vii. 2. by the Greek words Βασιλευς δικαιοσυνης, and the Hebrew word Σαλημ by ειρηνη, which interpretation would have been ſuperfluous if the epiſtle had been written in Hebrew. Moreover, it is ſaid, that if the epiſtle to the Hebrews was written originally in Hebrew, it is very extraordinary that the original ſo ſuddenly diſappeared; that no eccleſiaſtical writer, even of the third or fourth century, ever ſaw a copy of it; and what is the reaſon, it is aſked, that the Nazarites and the Ebionites, who made uſe of the Hebrew goſpel of St. Matthew, are not mentioned, either by Jerom or Epiphanius, as having had a copy of the Hebrew epiſtle to the Hebrews; and why did the author of the Syriac verſion tranſlate this epiſtle from the Greek, if its original was Hebrew? It is alſo urged, that the quotations in this epiſtle from the Old Teſtament are made in the words of the Septuagint; and that this epiſtle is more free from Hebraiſms than moſt other books of the New Teſtament, which would hardly have been the caſe if it had been a tranſlation of a Hebrew original. Again, the epiſtle to the Hebrews contains many allegorical interpretations, ſuch as were in uſe among the Helleniſt Jews, and are found in the writings of Philo; whereas allegories of this kind were not adopted by the rabbins, who wrote in Hebrew, the Hebrew language being too pure to admit of them. Beſides, the quotation made in ch. i. 7. ὁ ποιων τȣς αγγελȣς αὐτȣ πνευματα, cannot be expreſſed in Hebrew. Again, the word "anchor" occurs, ch. vi. 19. a term which is hardly to be expected in a Hebrew work, as the Jews were not a ſeafaring nation; and the word θεατριζομενοι, ch. x. 33. has a manifeſt alluſion to Greek cuſtoms, and the notion conveyed by it cannot be expreſſed in Hebrew, becauſe theatres were not permitted among the Jews. Theſe arguments are fairly ſtated by Michaelis, though, as he has adopted the other opinion, he has endeavoured to obviate and refute them. The opinion that this epiſtle was originally written in the Hebrew language, and tranſlated into Greek, has been maintained by ſome ancient Chriſtian writers, among whom have been enumerated Clement of Alexandria, Jerom, and as ſome have ſaid, though probably without ſufficient authority, Origen. Among the moderns, Michaelis is a ſtrenuous advocate for this opinion. He premiſes an obſervation that the term Hebrew thus applied, may denote either, 1. The language in which the greateſt part of the Old Teſtament was written, and which we call Hebrew, which was not a living language when the New Teſtament was written, though the Jews uſed it as the language of prayer, both in Paleſtine and in the Eaſtern Aſia; and it was underſtood by every man of education; or, 2. Chaldee, *i. e.* the Aramæan dialect, ſpoken in Babylon or Aſſyria, which was the language ſpoken by the Jews of Jeruſalem and Judea in the time of Chriſt, as the Jews of Galilee ſpoke Syriac, another Aramæan dialect, though very corruptly. Michaelis, in his diſquiſition on this ſubject, takes the word Hebrew, in its moſt extenſive ſenſe, as including both Syriac and Chaldee, as well as that which is commonly called Hebrew. The firſt argument he alleges in favour of his opinion, that this epiſtle was written in Hebrew is, that it was written for the uſe of the Hebrews, or Jewiſh Chriſtians in Jeruſalem. But ſome have ſet aſide this argument by alleging that Greek was the native language of the Jews of Jeruſalem; and Lardner argues, that Greek, if not the native language of the Jews, as Voſſius thought, was at leaſt underſtood by many of them. Another argument is deduced from the Greek ſtyle of this epiſtle, which, it is ſaid, cannot be St. Paul's original; for his manner of writing Greek is totally different, whether we regard the choice of ſingle words, the mode of connecting them, or the conſtruction and rotundity of the periods. Carpzovius, however, after ſome conceſſions, contends that the Greek epiſtle to the Hebrews was written by St. Paul, and that its ſuperiority to St. Paul's other epiſtles aroſe from the circumſtance, that the apoſtle had reſolved to exhibit a ſpecimen of fine writing, and to ſhew how well he was able to write Greek whenever he choſe it. He has alſo collected, in his "Prolegomena" to this epiſtle, expreſſions, which, in his opinion, betray the ſtyle of St. Paul; Heb. ix. 14. compared with 1 Theſſ. i. 9. Heb. iv. 16. compared with Epheſ. iii. 12. It has likewiſe been alleged, that long parentheſes occur in the epiſtle to the Hebrews, as well as in the epiſtles of St. Paul; but this, ſays Michaelis, is no proof that the Greek is St. Paul's original, for parentheſes are commonly retained in a tranſlation. If the epiſtle to the Hebrews, ſays this writer, was written originally in Greek, it was not written by St. Paul, in which caſe we have no ground for pronouncing it canonical. On the other hand, if St. Paul was the author, the Greek can only be a tranſlation, and the original muſt have been Hebrew. A new argument adduced by Michaelis in favour of his opinion is, that the quotations from the Septuagint, which occur in the epiſtle to the Hebrews, were made by a tranſlator, and not by the author; which, he ſays, appears from this circumſtance, that theſe quotations are ſometimes foreign to the purpoſe for which they were introduced, whereas the ſame paſſages, as worded in the Hebrew, are exactly in point. If in ſuch places the author himſelf had quoted the Old Teſtament in Greek, he would not have uſed the words of the Septuagint, but would have given his own Greek tranſlation of the Hebrew, as other writers of the New Teſtament have ſometimes done, eſpecially St. Paul. One example of this kind occurs in Heb. xi. 21. cited from Gen. xlvii. 31. Another inſtance is Pſ. civ. 4. quoted in Heb. i. 7. Moreover, Pſ. cx. 4. is often quoted and explained in the epiſtle to the Hebrews. Further, there are ſeveral paſſages in this epiſtle which, as worded in the Greek, appear to be inaccurate; but as ſoon as they are repreſented in the Hebrew we perceive that the inaccuracy is only in the tranſlation. Ch. iii. 3, 4. vi. 19. ix. 4. See alſo ch. ix. 11. If the epiſtle to the Hebrews was written in Greek, and conſequently the words quoted from the LXX were quoted by the author himſelf, it is very extraordinary that in the 11th chapter he ſhould have omitted to have mentioned in v. 4, 5. between Abel and Enoch, the name of Enoch, concerning whom language is uſed, Gen. iv. 26. which is ſo obviouſly to the writer's purpoſe. On the other hand, if we aſſume a Hebrew original of this epiſtle, the cauſe of this omiſſion is eaſily aſſigned; for the Hebrew text in Gen. iv. 26. at leaſt in the copies now extant, expreſſes a different meaning from the text of the Septuagint. In anſwer to this argument, however, it may be ſaid, that the author of the epiſtle conſulted the Hebrew text; and finding that the Greek differed from it, omitted the quotation. Of thoſe ancient Chriſtian writers who were of opinion that the epiſtle to the Hebrews was written in the Hebrew language, ſome of them maintained that it was tranſlated into Greek by Luke, or by Clement of Rome. Admitting the opinion, that it is only a tranſlation, Michaelis thinks that it proceeded from a perſon who was not infallible, and who was conſequently expoſed to the danger of miſtaking the ſenſe of his author. It muſt be allowed, however, by every one who underſtands

Greek, that the tranſlator, whoever he was, executed his taſk with ability; for, in general, his language is perſpicuous, his ſentences are well arranged, and the epiſtle is more eaſy to be underſtood than any of thoſe which were written by St. Paul. There are nevertheleſs inaccuracies; *e. g.* the word *αἰωνας*, ch. i. 2.; *μη ποτε παραῤῥυωμεν*, ch. ii. 1.; *χαριτι θεȣ*, ch. ii. 9.; *ὁ κατασκευασας αὐτον* for בנו in the original, which ſhould have been *ὁ ὑιος αὐτȣ*, ch. v. 13. harſh and obſcure; ch. vi. 4. ch. vi. 19, 20. ch. vii. 14. ch. ix. 14—17. ch. ix. 19 ch. x. 1. ch. xi. 35. ch. xii. 15. ch. xii. 18. ch. xii. 25. ch. xiii. 9. ch. xiii. 15. As to the Greek ſtyle of this epiſtle, it is obſerved to be different from that of every other book in the New Teſtament. It is likewiſe ſuperior to that of every other book, if we except the ſpeeches of St. Paul, recorded in Acts, xvii. 22—31. xxiv. 10—21. xxvi. 1—21. But though the language of theſe ſpeeches is equally good and fluent with that of the epiſtle to the Hebrews, it is ſtill of a very different kind.

Another inquiry relating to this epiſtle reſpects the author of it. Many of the ancients aſcribe it to the apoſtle Paul. Ignatius and Polycarp, in the beginning of the ſecond century, allude to this epiſtle; but the earlieſt writer, who expreſsly and frequently cites it as St. Paul's, is Clement of Alexandria, about the year 194. It is alſo received and quoted as Paul's by Origen, about 230; and by the manner in which this learned father cites it, it is evident that many churches and writers, who were ancient with reſpect to him, had one common tradition, that St. Paul was author of the epiſtle to the Hebrews. Dr. Lardner enumerates the Greek fathers and later Greek writers, who concurred not only in receiving this epiſtle as genuine, but in aſcribing it to St. Paul. Euſebius, biſhop of Cæſarea, in particular, about A.D. 315, often quotes it as St. Paul's, and as ſacred ſcripture. With regard to the Latin writers, though it was not expreſsly quoted as Paul's by any of them in the three firſt centuries, it was received as his by many of them in the fourth, fifth, and following centuries. Moreover, there is nothing in the epiſtle itſelf that renders it impoſſible or unlikely to be his. For it appears to have been written before the deſtruction of Jeruſalem, as was of old obſerved by Chryſoſtom and Theodoret, and as has been argued by many modern writers; and this is agreeable to paſſages that occur in the epiſtle itſelf, *e. g.* ch. viii. 4. ch. xiii. 10. and alſo to the ſcope of the author's reaſoning. There are alſo ſeveral exhortations in this epiſtle, that much reſemble ſome in the acknowledged epiſtles of St. Paul; *e. g.* Heb. xii. 3. compared with Gal. vi. 9. 2 Theſſ. iii. 13. Eph. iii. 13. —Heb. xii. 14. compared with Rom. xii. 18.—Heb. xiii. 1., &c. compared with Eph. v. 2, 3, 4—Heb. xiii. 16. compared with Philip. iv. 18. See alſo Acts, ii. 42. Rom. xv. 26. 2 Cor. viii. 24. ch. ix. 13. Beſides, there are ſome inſtances of agreement in the ſtyle or phraſes of the epiſtle to the Hebrews, and the acknowledged epiſtles of St. Paul. Heb. ii. 4. compared with Rom. xv. 19 2 Cor. xii. 12. 2 Theſſ. ii. 9.—Heb. ii. 14. compared with 2 Tim. i. 10. 1 Cor. xv. 26.—Heb. iii. 1. compared with Philip. iii. 14. 2 Tim. i. 9.—Heb. v. 12. compared with 1 Cor. iii. 2.—Heb. viii. 1. Eph. i. 21.—Heb. viii. 6. ix. 15. xii. 24. Gal. iii. 19, 20. 1 Tim. ii. 5.—Heb. viii. 5. x. 1. Col. ii. 17.—Heb. x. 33. 1 Cor. iv. 9. Further, St. Paul often alludes, in his acknowledged epiſtles, to the exerciſes and games which were then very reputable and frequent in Greece and in other parts of the Roman empire. There are alſo divers alluſions in this epiſtle, which have alſo great elegance. Ch. vi. 18. xii. 1, 2, 3, 12. ch. xii. 4—ch. xiii. 9. Eph. iv. 14.—Heb. xiii. 10. 1 Cor. ix. 13. x. 18.—Heb. xiii. 20, 21. compared with Rom. xv. 33. xvi. 20. Philip. iv. 9. 1 Theſſ. v. 23. 2 Cor. xiii. 11. Further, the concluſion of this epiſtle has a remarkable agreement with the concluſion of St. Paul's epiſtles in ſeveral reſpects. Ch. xiii. 18. Rom. xx. 30. Eph. vi. 18, 19. Col. iv. 3. 1 Theſſ. v. 25. 2 Theſſ. iii. 1.—Ch. xii. 18. 22. compared with Acts, xxiv. 16.—Ch. xiii. 20, 21. compared with Rom. xv. 30—33. Eph. vi. 19—23. 1 Theſſ. v. 23. 2 Theſſ. iii. 16.—Ch. xiii. 24. compared with Rom. xvi. 1 Cor. xvi. 19—21. 2 Cor. xiii. 13. Philip. iv. 21, 22.—Ch. xiii. 25. compared with 2 Theſſ. iii. 18. Col. iv. 18. 1 Tim. vi. 21. Eph. vi. 24. 2 Tim. iv. 22. Titus, iii. 15. Moreover, the circumſtances of the epiſtle lead us to the apoſtle Paul. Ch. xiii. 24. compared with Acts, xxviii.—Ch. xiii. 19. compared with Philem. v. 22.—Ch. xiii. 23. compared with Philip. ii. 19. 1 Tim. i. 2. 2 Tim. i. 2. 2 Cor. i. 1. Col. i. 1. 1 Theſſ. iii. 2. Titus, i. 4. 2 Cor. ii. 13. All the conſiderations above recited, and ſtated more at large by Dr. Lardner, make out an argument, which, added to the teſtimony of many ancient writers, may warrant our concluding that the apoſtle Paul is the writer of this epiſtle. One of the chief objections againſt this opinion is the ſuperior elegance of this epiſtle compared with that of St. Paul's other writings. Hence Grotius and Le Clerc conclude, that it was not written by this apoſtle. To obviate this objection ſome have ſuppoſed that St. Paul was aſſiſted in compoſing it. The ſentiments, ſays Origen, are the apoſtle's, but the language and compoſition are thoſe of another perſon, who committed to writing the apoſtle's ſenſe, and as it were reduced into commentaries the things ſpoken by his maſter. Dr. Lardner conjectures, that St. Paul dictated the epiſtle in Hebrew, and another, who was a great maſter of the Greek language, immediately wrote down the apoſtle's ſentiments in his own elegant Greek. The ancients, beſides Paul, have mentioned Barnabas, Luke, and Clement, as writers or tranſlators of this epiſtle. But there is an obvious difference between the ſtyle of this epiſtle and that of theſe other writers. Another objection that has been repeatedly urged againſt aſcribing this epiſtle to St. Paul is the omiſſion of his name, which occurs in all his thirteen epiſtles. The elegance of the ſtyle, and the want of a name and inſcription, which are the two great objections againſt this being a genuine epiſtle of the apoſtle, ſays Lardner, are both owing to ſome particular circumſtances of the writer, and of the people to whom it was ſent. The people to whom it was ſent are plainly Jews in Judea; and the writer, very probably, is Paul, whoſe circumſtances, at the breaking up of his confinement at Rome, and his ſetting out upon a new journey, might be attended with ſome peculiar embarraſſments; which obliged him to act differently from his uſual method. Michaelis is of opinion, that if there be any preponderance in the arguments on both ſides, which are nearly of equal weight, it is in favour of the opinion, that St. Paul was not the author; but he thinks it impoſſible abſolutely to decide upon this queſtion.

As to the time and place of writing this epiſtle, it ſeems moſt probable that it was written at Rome or in Italy, ſoon after Paul had been releaſed from his confinement at Rome, in the beginning of the year 63.

Another queſtion, which Michaelis has particularly conſidered, regards the canonical authority of this epiſtle; or whether it ought to be received as an infallible rule of faith, and placed among the canonical books of the New Teſtament. The ancients entertained different opinions on this ſubject. Allowing the principle laid down by this biblical writer, that a canonical book of the New Teſtament is a book written by an apoſtle, it will follow, that if the apoſtle Paul was the writer of it, it is canonical; but otherwiſe, it is not canonical; for, however excellent its contents may be, they alone will not oblige us to receive it as a work inſpired by the Deity. Lardner's Works, vol. vi. Michaelis' Introd. by Marſh, vol. iv.

HEBRIDES, or Hebudes, in *Geography*, the name of ſeveral iſlands, ſituated in the Atlantic ocean, on the N.W. of Scotland, of which kingdom they conſtitute an integral part. In a geographical point, they are found to be included within 56° and 59° of N. latitude, and 5° and 8° of W. long. The various inſulated tracts of ground and cluſters of rock, thus detached from the main land, are calculated to amount to 300; and are ſaid to ſupport a population of 48,000 perſons. Theſe iſlands have at different times, and by different perſons, been denominated Ebridæ, Hebudæ, and Weſtern Iſlands; the latter of which is the moſt popular appellation. The names of the moſt conſiderable of theſe are Lewis and its ſmaller dependent iſlands belonging to the diſtrict of Roſſ-ſhire; Harris, North Uiſt, Benbeeula, South Uiſt, Skye, Barra, Eigg, attached to the county of Inverneſs; Rum, Muck, Canna, Call, Tyrie, Mull, Liſmore, Staffa, Lering, Scarba, Colonſay, Oranſay, Jura, Iſla, Gigha, Cara, and ſome ſmaller, are ſubject to the civil juriſdiction of the ſhire of Argyle. Some other iſlands, ſituated in the frith of Clyde, are alſo reckoned among the Hebrides, and are within a few leagues of the coaſt of Scotland. Theſe, called the Interior Hebrides, are named Bute, Arran, Cumblays, (Greater and Leſſer) and Inchmarnock. As theſe inſulated diſtricts are commonly called the Weſtern Iſlands, we ſhall refer to that article, in a ſubſequent part of our work, for a hiſtory and deſcription of the whole. The reader, if deſirous of ample information on the ſubject, is referred to Johnſon's "Tour to the Weſtern Iſlands;" Boſwell's "Journal of a Tour to the Hebrides;" Martin's "Deſcription of the Weſtern Iſlands," a ſcarce and intereſting work; Buchanan's "Travels in the Weſtern Hebrides from 1782 to 1790;" Pennant's Tours in Scotland; Mrs. Murrays "Companion and uſeful Guide to the Beauties of Scotland." But more particularly to Chalmer's elaborate and intereſting work, entitled "Caledonia," and Sinclair's Statiſtical Account of Scotland.

Hebrides, or *Hebudes, New*, a group of iſlands in the South Pacific ocean, particularly ſurveyed, with regard to their ſituation and extent, by Capt. Cook in the year 1774. The northern iſlands of this Archipelago were firſt diſcovered by Quiros in 1606, and conſidered by him as part of the ſouthern continent, which at that time, and till very lately, was ſuppoſed to exiſt. They were next viſited by M. de Bougainville in 1768; who, beſides landing on the iſle of Lepers, did no more than diſcover that the land was not connected, but compoſed of iſlands, which he called the "Great Cyclades." Capt. Cook ſurveyed the whole, and diſcovered ſeveral new ones, which were not known before, and named them the New Hebrides. They are ſituated between S. lat. 14° 29′ and 20° 4′, and between E. long. 166° 41′ and 170° 21′, and extend 125 leagues in the direction of N.N W. ½ W. and S S.E. ½ E. The moſt northern iſland is that called by M. de Bougainville Peak of the Etoile; it is ſituated, according to his account, in S. lat. 14° 29′. E. long. 168° 9′, and N. by W. 8 leagues from Aurora. The next iſland, which lies fartheſt north, is that of Tierra del Eſpiritu Santo. (See Terra *Auſtralis de l'Eſpiritu Santo.*) The next conſiderable iſland is that of *Mallicollo*; which ſee. St. Bartholomew lies between the S.E. end of Tierra del Eſpiritu Santo, and the north end of Mallicollo, and the diſtance between it and the latter is eight miles. This is the paſſage through which M. de Bougainville went; and its middle is in S. lat. 15° 48′. The iſle of Lepers lies between Eſpiritu Santo and Aurora iſland, 8 leagues from the former and three from the latter, in S. lat. 15° 22′ and nearly under the ſame meridian as the S.E. end of Mallicollo. It is of an egg-like figure, and 18 or 20 leagues in circuit. At the N.E. part there is anchorage half a mile from the land. Aurora, Whitſuntide, Ambrym, Paoom, and its neighbour Apee, Three-hills, and Sandwich iſlands, lie all nearly under the meridian of 167° 29′ or 30′ E., extending from the lat. of 14° 51′ 30″ to 17° 53′ 30″. Aurora lies N. by W. and S. by E., and in that direction is 11 leagues long, and hardly any where exceeds 2 or 2½ in breadth. It has a good height, and hilly ſurface, and is every where covered with wood, except where the natives have their dwellings and plantations. Whitſuntide iſle, 1½ league S. of Aurora, is of the ſame length, and lies in the direction of N. and S., but is ſomewhat broader than Aurora iſland. It is conſiderably high, and clothed with wood, except ſuch parts as ſeemed to be cultivated, which were pretty numerous From the S. end of Whitſuntide iſland to the N. ſide of Ambrym is 2½ leagues. This iſland is about 17 leagues in circuit. Its ſhores are rather low, but the land riſes to a tolerably high mountain in the middle of the iſland, from which aſcended great columns of ſmoke; but Capt. Cook and his companions could not determine whether or not it was occaſioned by a volcano. It is ſuppoſed to be fertile and well inhabited. Paoom towers up to a great height, in the form of a round hay-ſtack; and the extent of this and an adjoining iſle (if there are two) cannot exceed three or four leagues in any direction; for the diſtance between Ambrym and Apee is hardly five; and they lie in this ſpace, and E. from Port Sandwich, diſtant about 7 or 8 leagues. The iſland of Apee is not leſs than 20 leagues in circuit. Its longeſt direction is about 8 leagues N.W. and S.E; it is of a conſiderable height, and has a hilly ſurface, diverſified with woods and lawns, eſpecially the W. and S. parts. Shepherd's iſles are a group of ſmall ones, of unequal ſize, extending from the S.E. point of Apee about 5 leagues, in the direction of S.E. The iſland Three-hills lies S. 4 leagues from the coaſt of Apee, and S.E. ¼ S. diſtant 17 leagues from Port Sandwich. There is W. by N., 5 miles from the W. point, a reef of rocks, on which the ſea continually breaks. Nine leagues, in the direction of S. from Three-hills lies Sandwich iſland. Two-hills, the Monument, and Montagu-iſlands lie to the E. of this line, and Hinchinbrook to the W., as alſo two or three ſmall iſles, which lie between it and Sandwich iſland, to which they are connected by breakers. Sandwich iſland is 25 leagues in circuit, its greateſt extent is ten leagues; and it lies in the direction of N.W. by W. and S.E. by E. The diſtance from the S. end of Mallicollo to the N.W. end of Sandwich iſland is 22 leagues in the direction of S S.E. ½ E. In the ſame direction lie Erromango, Tanna, and Annatom. The firſt is 18 leagues from Sandwich iſland, and is 24 or 25 leagues in circuit. The middle of it lies in S. lat. 18° 54′. E. long. 169° 19′; and it is of a good height. *Tanna*, (which ſee,) lies ſix leagues from the S. ſide of Erromango, extending S.E. by S., and N.W. by N. about 8 leagues long in that direction, and every where about three or four leagues broad. The iſle of Immer lies in the direction of N. by E. ½ E., 4 leagues from Port Reſolution in Tanna; and the iſland of Erronan or Footoona Eaſt, in the ſame direction, diſtant 11 leagues. This, which is the moſt eaſtern iſland of all the Hebrides, appeared to be about five leagues in circuit, of conſiderable height, and flat at top. On the N.E. ſide is a little peak, ſeemingly disjoined from the iſle, but thought to be connected by low land. Annatom, which is the ſouthernmoſt iſland, is ſituated in S. lat. 20° 3′. E. long. 170° 4′, and S. 30° E., 11 or 12 leagues from Port Reſolution. It is of a good height, with a hilly ſurface. For an account of the natives and productions of theſe iſlands, ſee MALLICOLLO and TANNA. Cook's Second Voyage, vol. ii.

HEBRON, in *Ancient Geography*, one of the moſt ancient cities of Paleſtine, built ſeven years before Tanis, the capital of Lower Egypt. (Numb. xiii. 22.) Some think, that it was founded by Arba, an ancient giant in Paleſtine, and hence called Kirjath-arba, or Arba's city, (Joſh. xiv. 15.) which name was afterwards changed into that of Hebron. Some have ſuppoſed that Caleb, having conquered this city, gave it the name of one of his ſons; whilſt others think that it was more ancient, and that Caleb gave to his ſon the name of this celebrated place. It was ſituated on an eminence, 20 miles S. of Jeruſalem, and 20 miles N. of Beerſheba. Abraham, Sarah, and Iſaac were buried near Hebron, in the cave of Machpelah. (Gen. xxiii. 7, 8, 9) This city was allotted to Judah; and aſſigned to Caleb for inheritance. (Joſh. xiv. 13.) Joſhua firſt took it and ſlew its king; (Joſh. x. 3. 23. 37.) but Caleb again conquered it. It was appointed for a dwelling of the prieſts, and a city of refuge. David, after the death of Saul, made it the ſeat of his kingdom. During the Babyloniſh captivity, the Edomites took it, and therefore Joſephus makes it a part of Edom. Hebron, or Hebroun, is ſtill in being; ſituated, ſays Volney, (Travels in Egypt, &c. vol. ii.) ſeven leagues to the S. of Bethlehem. The Arabs call this village, for ſuch is its preſent ſtate, "El-kalil," the *Well-beloved*, which is the epithet they uſually apply to Abraham, whoſe ſepulchral grotto they ſtill ſhow. It is ſeated at the foot of an eminence, on which are ſome miſerable ruins, the remains of an ancient caſtle. The adjacent country is an oblong hollow, five or ſix leagues in length, agreeably varied by rocky hillocks, groves of fir-trees, ſtunted oaks, and a few plantations of vines and olive trees. The grapes are not uſed for wine, which is prohibited by the Mahometans, but dried for raiſins. The peaſants cultivate cotton, which is ſpun by their wives, and ſold at Jeruſalem and Gaza. They have alſo ſome ſoap manufactories, the kali for which they purchaſe of the Bedouins, and a very ancient glaſs-houſe, the only one in Syria. In conſequence of its manufacture, Hebron is the moſt powerful village in this quarter, and is able to arm eight or nine hundred men, who adhere to the faction Kaigi, and are the perpetual enemies of the people of Bethlehem. This part of the country is in almoſt a continual ſtate of contention, depredation, and anarchy.

HEBRON, in *Geography*, a town of America, in Grafton county, New Hampſhire, containing 281 inhabitants.—Alſo, a town in Cumberland county, Maine, on the N. E. ſide of Little Androſcoggin, incorporated in 1792; 35 miles N. by W. of Portland.—Alſo, a poſt-town in Waſhington county, New York, containing 2528 inhabitants.—Alſo, a poſt-town in Tolland county, Connecticut, ſettled in 1704, and containing 2266 inhabitants, lying between Lebanon and Glaſtenbury, about 18 miles S. E. of Hartford.—Alſo, a Moravian ſettlement in Pennſylvania, begun in 1757, and ſituated 16 miles from Litiz, which is 70 miles northerly from Philadelphia.

HEBRUS, in *Ancient Geography*, the largeſt river of Thrace, riſing from mount Scomius, running into two channels, till it comes to Philippolis, where they unite. It empties itſelf at two mouths into the Ægean ſea, near Melanes Sinus, between Ænos, on the E. and Sala, on the W. It was ſuppoſed to roll its waters on golden ſands.

HEBUDA CHANNEL, in *Geography*, a name given by Pinkerton to that part of the Atlantic, which paſſes between Scotland and the extreme range of the Hebrides, or Hebudæ, from Barra to Lewis.

HECATE, in *Mythology*, a name of the infernal Diana, repreſented with all the characteriſtics of fury, holding inſtruments of terror in her hands, and graſping either cords, or ſwords, or ſerpents, or flaming torches. Under this character ſhe was exhibited with three bodies, and invoked in inchantments. Prof. Voſs, in the firſt volume of the "Nova Acta Soc. Lat. Jenenſis," endeavours to trace the origin of this deity, which he finds in Thrace, with a view of ſhewing the probable cauſe of the great variety of attributes beſtowed on her, and of reducing them to ſome ſort of unity. He adopts it as a principle, the truth of which is confirmed by the hiſtory of Hecate, whoſe image Pauſanias found ſtill in a ſimple ſhape at Ægina, that all deviations from the noble figure of man in the repreſentation of deities owe their origin to later myſtics and artiſts; and he conſiders it as ſingular, that the triple goddeſs has never been transformed into one multiplied by the ſacred numbers 7 or 9, or even by 100; that, though the name of Hecate is often uſed for Selene, Artemis, and Perſephone, we never find a triple Selene, or Perſephone, but often a three-headed Artemis mentioned; and that frequently by the ſide of Hecate, an Artemis is introduced, and likewiſe three-headed.

HECATEA, in *Botany*, ſo called by M. Aubert du Petit Thouars; whether with any reference to ἑκατη, a ſurname of Diana, or more directly to the epithet of Apollo ἑκατος, *long-darting*, and whether the appellation is juſtified by the wood ſerving for darts or arrows, we are altogether in the dark, not having that author's book before us, nor any further information reſpecting this genus, than what occurs in Willdenow, who is totally barren on its hiſtory.—Willd. Sp. Pl. v. 4. 513.—Claſs and order, *Monœcia Monadelphia*. Nat. Ord. *Euphorbiæ*.

Eſſ. Ch. Male, Calyx in five deep ſegments. Corolla none. Anthers three.

Female, Calyx in five deep ſegments. Corolla none. Style one. Stigmas three. Berry with three ſeeds.

1. H. *oppoſitifolia*. Willd.—Aubert Hiſt. Inf. Afr. 28. t. 5.—"Leaves of the branches oppoſite, or three together; the floral ones alternate. Flowers in corymboſe panicles."—Native of Madagaſcar. A *tree* or *ſhrub*. *Leaves* two inches long, entire, veiny, abrupt, with two glands underneath at the baſe. *Flowers* panicled in a corymboſe manner, the corymbs three-forked, leafy.

2. H. *alternifolia*. Willd.—"Leaves alternate. Flowers in cluſters."—Native of the ſame country. It differs principally in having much larger, as well as alternate, *leaves*, and racemoſe *flowers*. Aubert as above quoted.

HECATOMB, HECATOMBE, in *Antiquity*, a ſacrifice of a hundred beaſts of the ſame kind, at a hundred altars, and performed by a hundred prieſts, or ſacrificers.

The word is formed of the Greek ἑκατομβη, which properly ſignifies a *ſumptuous*, or *magnificent ſacrifice*. Others derive it from the Greek ἑκατον, *centum*, a *hundred*, and βȣς, *bos*, *bullock*, &c. On which footing the hecatomb ſhould be a ſacrifice of a hundred bullocks. Others derive the word from ἑκατον, and βȣς, *pes*, *foot*; and on that principle hold, that the hecatomb might conſiſt of only twenty-five four-footed beaſts. They add, that it was of no importance what kind of beaſts were choſen for victims, provided the quota of feet were but had.

Pythagoras is ſaid to have ſacrificed a hecatomb to the Muſes, of a hundred oxen, in joy and gratitude for his diſcovering the demonſtration of the 47th propoſition of the firſt book of Euclid; *viz.* that in a rectangled triangle, the ſquare of the hypothenuſe is equal to the ſquares of the other ſides.

For the origin of hecatombs, Strabo relates, that there were a hundred cities in Laconia; and that each city uſed to ſacrifice a bullock every year, for the common ſafety of the country; whence the inſtitution of the celebrated ſacrifice of a hundred victims, called hecatombs. Others refer the origin of hecatombs to a plague, with which the hundred cities of Peloponneſus were afflicted; for the removal of which, they jointly contributed to ſo ſplendid a ſacrifice.

Julius Capitolinus relates, that for a hecatomb they erected a hundred altars of turf, and on theſe ſacrificed a hundred ſheep, and a hundred hogs. He adds, that when the emperors offered ſacrifices of this kind, they ſacrificed a hundred lions, a hundred eagles, and a hundred other beaſts of the like kind.

HECATOMBÆON, in *Chronology*. See Ecatombæon.

HECATOMPHONIA, 'Εκατομφονια, an ancient ſacrifice among the Meſſenians; offered by ſuch as had ſlain a hundred enemies in battle.

The word comes from ἑκατον, a *hundred*, and φονευω, *to kill*.

HECATOMPOLIS, in *Ancient Geography*, an appellation given to the iſland of Crete, from its hundred cities. The ſame appellation was alſo given to Laconia.

HECATOMPYLOS, the metropolis of Parthia, and royal reſidence of Arſaces, ſituated at the ſprings of the Araxes. The ſame name was alſo given to Thebes in Egypt, from its hundred gates.

HECATONIA, in *Botany*, is derived from ἑκατον, *an hundred*, becauſe each flower produces about an hundred naked ſeeds. Loureir. Cochinch. 302.—Claſs and order, *Dodecandria Polygynia*. Nat. Ord. *Ranunculaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of five leaves; leaflets ovate, concave, coloured, reflexed. *Cor.* Petals five, ovate, ſtriated, ſmooth, ſpreading, about the length of the calyx. *Stam.* Filaments eighteen, thread-ſhaped, erect, unequal, ſhorter than the corolla, ſtanding round the baſe of an elongated receptacle; Anthers ovate, of two cells, upright. *Piſt.* Germens lenticular, about an hundred, placed round the ſame receptacle, which is raiſed in the ſhape of a column; ſtyle none; ſtigma a little prominent point at the top of each germen. *Peric.* none. *Seeds* lenticular, equal in number to the germens, affixed to the ſame cylindrical receptacle.

Eſſ. Ch. Calyx of five leaves, inferior. Petals five. Seeds numerous, naked.

1. H. *paluſtris.* Loureir —"Leaves wedge-ſhaped, ſmooth. Germens collected into a cylinder."—Found in moiſt places near Canton in China.—An annual herb. *Stem* a foot high, nearly erect, thick, hollow, branched, ſmooth. *Leaves* ſtalked, ternate, wedge-ſhaped, cut, ſmooth *Flowers* ſmall, yellow, on nearly terminal, ſimple, ſolitary ſtalks.

2. H. *piloſa.* Ibid —" Leaves lanceolate, hairy. Germens collected into a globe."—Plant hairy, and not quite ſo tall as the laſt. *Leaves* ternate, lanceolate, ſerrated, ſome of them cloven. *Flowers* yellow. *Fruit* globular, found with the laſt.

We know nothing of this genus but what we have taken from Loureiro. Dr. Smith has ſuggeſted that the plants are moſt probably ſpecies of *Ranunculus*, but this however cannot be determined with certainty, as the author ſays nothing of the peculiar nectary of that genus, with which ſurely he could not be totally unacquainted.

HECATONSTYLON, 'Εκατονϛυλον, in the *Ancient Architecture*, a porch with a hundred columns. This deſignation was peculiar to the great porch of Pompey's theatre at Rome.

HECHINGEN, in *Geography*, a town of Swabia, the reſidence of a prince, which gives name to a branch of the family of Hohenzollern; 30 miles S. of Stuttgart.

HECK, among *Huſbandmen*, a rack, at which horſes are fed with hay.

It is alſo uſed as the name of an engine, wherewithal to take fiſh in the river Ouſe. A ſalmon heck is a grate for the catching that ſort of fiſh. See *Salmon*-Fishing.

Hence alſo *Heckagium*, or *Heccagium*, which occurs in ancient records for a rent paid the lord for the liberty to uſe ſuch engines.

Heck, in *Rural Economy*, a name frequently applied to a ſort of ſmall or half door, often employed in farm buildings.

HECKILA, in *Geography*, a town of Sweden in the province of Tavaſtland; 50 miles N. N. E. of Jamſio.

HECKLE, among *Hemp Dreſſers*. See Hatchel.

HECKLING of Hemp. See Hemp.

HECLA, or Hekla, *Mount*, in *Geography*, a mountain ſituated in the ſouthern part of the iſland of Iceland, about four Britiſh miles from the ſea coaſt, above which it riſes to the height of about 5000 feet. The ſummit is covered with ſnow, except ſome ſpots where the heat predominates. On the higheſt point, where Fahrenheit's thermometer was at 24° in the air, it roſe to 153° when placed on the ground. The barometer ſtood at 22′.247. The craters of this volcanic mountain are numerous, but the eruptions rare; there having been only ten from the year 1104 to 1693, after which it remained quiet till 1766, when it emitted flames and lava, and when ſome of the ignited matter was thrown to the diſtance of 150 miles, and a circuit of between 60 or 70 miles laid waſte by the lava. In 1772 Hecla was viſited by Dr. Van Troil, a Swediſh gentleman, accompanied by Mr. Crow, ſir Joſeph Banks, Dr. Solander, and Dr. James Lind of Edinburgh. The lava, which they obſerved on their firſt landing, covered a tract of land 60 or 70 miles in extent, and appeared to have been in the higheſt ſtate of liquefaction. Having travelled 300, or 360 Engliſh miles, over an uninterrupted tract of lava, in their way to the top of the mountain, they had the pleaſure of being the firſt who had arrived at the ſummit of the mountain. On the ſummit they experienced at the ſame time a high degree of heat and cold, the thermometer being in different ſituations as above ſtated, and the wind became ſo violent, that they were ſometimes obliged to lie down for fear of being blown down the moſt dreadful precipices. The mountain ſeems to be compoſed, not of lava, but of ſand, grit, and aſhes; which are thrown up with the ſtones partly diſcoloured, and partly melted by the fire. Several ſorts of pumice ſtones were obſerved; among which was found one with ſome ſulphur. Some pumice was ſo much burnt, that it was as light as tow. Its form and colour were very fine, but ſo ſoft that it would not bear being removed from one place to another. The common lava was found in pieces of different ſizes; and likewiſe a quantity of black jaſper, burnt at the extremities, and reſembling trees with their branches. Among the ſtones thrown out by the volcano was obſerved ſome ſlate of a ſtrong red colour; and in one place the lava had taken the form of chimneys half broken down. In their deſcent they obſerved three openings; in one, every thing appeared as red as brick; in another, the lava had flowed in a ſtream about 50 yards broad, and in its progreſs had divided into three large branches. Further they perceived an opening, at the bottom of which was a mountain, in form of a ſugar-loaf, in the accumulation of which the fire ſeemed to have exhauſted itſelf. Moſt kinds of lava found in other volcanic countries are to be found about Hecla, and other Iceland volcanoes; as the dark, grey, perforated kind, reſembling the Derbyſhire load-ſtone; the Iceland agate, pumex vitreus, both the black and green, which ſome have thought to be the lapis Obſidianus, of which the ancients formed ſtatues. The lava is ſeldom found near the places of eruption, but looſe grit and aſhes, which compoſe the greateſt part of the Iceland mountains; but when it is grown cold, it aſſumes an arched form, the upper cruſt becoming hard and ſolid, and the melted matter under it remaining liquid. This forms large cavities, whoſe walls, bed, and roof are of lava, and in which great quantities of ſtalactite lava are found. In the iſland there are many caves of this kind, ſome of which, being large, are uſed by the inhabitants for ſheltering their cattle. The largeſt in the iſland is 5034 feet long, and from 50 to 54 broad, and between 34 and 36 high. See ICELAND and VOLCANO.

HECQUET, PHILIP, in *Biography*, a celebrated French phyſician, was born at Abbeville, in Picardy, on the 11th of February, 1661. At the age of ſeventeen, after having received a domeſtic education under the eyes of pious parents, he went to Paris, where he ſtudied philoſophy and theology; to which laſt ſcience he retained an attachment, which greatly influenced his character and writings. By the perſuaſion of his uncle, however, he ſtudied medicine for two years, and in 1684 went to Rheims, where he took his degree of M. D., and then returned to Abbeville to commence the practice of his profeſſion. But his deſire for knowledge induced him to return and ſettle in the metropolis; which, not being a member of the faculty there, he was about to quit in deſpair, when he was made phyſician to the religious foundation of Port-Royal, in 1688. He entered into all the auſterities of the place, and devoted himſelf ardently to attending the poor; and by exceſs and over-exertion in theſe reſpects he almoſt deſtroyed his health and conſtitution, ſo that his friends prevailed upon him to quit Port-Royal in 1693. In the year following, he was entered of the faculty at Paris, and in 1697 again received the doctor's cap from that more honourable faculty. He roſe to high reputation, both as a practitioner and teacher of medicine, which was probably favoured rather than impeded by the religious ſeverity of his manners. He was a declared enemy to all luxury of the table, and a patron of abſtinence and vegetable diet. His fondneſs for the uſe of the lancet and diluents was expoſed by Le Sage, in his character of *Sangrado*: yet he was much in faſhion, eſpecially among thoſe of the Janſeniſt party. He refuſed his aſſiſtance to no one, however, while his health allowed him; but he always attended the poor moſt readily, to whom his door was at all times open. In 1710, he was choſen phyſician to the hoſpital of La Charité, the duty of which he performed with all the zeal of principle, carrying his exertions and attention to the poor objects of his care beyond his ſtrength. In 1712 he was elected dean of the faculty, in which office he introduced a new code of medicines, or pharmacopœia. About the end of the year 1726, infirmities multiplied upon him, and he ſuffered an almoſt total loſs of power in the legs and right arm; upon which he determined to quit public life: and among the various offers of accommodation, and invitations which he received, he at length acceded to that of the Carmelite nuns, in the ſuburb of St. Jacques, to whom he had acted as phyſician upwards of thirty years. He there occupied a ſmall apartment, continuing the auſterities of his regimen with great rigour. Even in this retreat, he did not abandon the duties of his profeſſion; for ſtill his door was never ſhut againſt thoſe who wiſhed to conſult him, particularly the poor, of whom he was the friend and father. At whatever hour, or whatever might be his occupation, they were ſure of a kind reception; and when he knew their inability to purchaſe the medicines, or to purſue the regimen which he recommended, he generouſly furniſhed them with the means. He died in April 1737, at the age of 76, and was buried in the church of the Carmelites, where his tomb is diſtinguiſhed by a Latin epitaph, compoſed by Rollin.

Hecquet was a man of great reading, and a voluminous writer, a great advocate of the principles of the mechanical ſchool, and adverſe to the uſe of chemical medicines; he entered warmly into controverſy upon theſe ſubjects, and exhibited much falſe reaſoning in his works; and in practice he allowed obſervation to be clouded and falſified by hypotheſis. It is unneceſſary to copy the titles of works no longer read; but it ſhould be mentioned, to the author's credit, that, although ſo much attached to the Janſeniſts, he wrote againſt the fanatics, who exhibited their convulſions in the cementery of St. Medard, and proved that there was nothing preternatural in their exhibitions. See Eloy. Dict. Hiſt. Gen. Biog.

HECTIC FEVER, in *Medicine*, a ſlow, and irregularly remittent fever, commonly accompanying ſome local diſeaſe, and eſpecially a ſuppuration or ulceration of ſome part of the body, either internal or external.

The word is derived from the Greek, *hexis*, ἕξις, the *habit of body*, whence *hectica*, ἑκτικὴ, or *hectic-fever*, ſignifies an habitual or *conſtitutional fever*; becauſe it was believed by the ancients that the whole habit was diſeaſed in this fever, which they attributed to a conſtant preternatural degree of heat, generated and inherent, as it were, in the ſolids of the body. The hectic has received various other denominations from different authors; ſuch as *febris lenta*, or ſlow fever; *febricula*, or little fever; ſuppurative fever, &c. The Greek phyſicians, however, did not conſider the hectica as always a ſecondary complaint, depending merely on internal ſuppuration, or any local defect; but alſo as ariſing from a failure of ſtrength in old age, from an exhauſted ſtate of conſtitution, occaſioned by fatigue, long faſting, anxiety, or loſs of ſleep; and ſometimes a conſequence of *cauſus*, or other fevers. Actuarius particularly diſtinguiſhes the ſecondary ſpecies of hectic, connected with internal inflammation, ſuppuration, and ſcirrhus. (Med. lib. ii. cap. 1. See alſo Galen, de Maraſmo, et de Different. Pulſ. cap. 10. Paulus Ægineta, lib. ii. cap. 32, &c.) Several modern writers have likewiſe viewed the ſubject in a ſimilar light; of whom we may mention Etmuller (Opera Omnia, tom. ii. part 1.), Sauvages (Noſol. Method. claſs ii. gen. 5.), and Dr. Willan (Reports on the Diſeaſes of London); as well as Hoffman, Sydenham, and other writers of authority.

The hectic fever, under all its modifications, is characterized by the recurrence of a train of febrile ſymptoms every twenty-four hours, or ſometimes every twelve hours, with a remiſſion, rather than a complete intermiſſion, of thoſe ſymptoms in the intervals. Dr. Cullen, indeed, has affirmed, that there are two exacerbations every day. The firſt of theſe, he remarks, occurs about noon, ſometimes a little ſooner or later; and a ſlight remiſſion of it happens about five in the afternoon. This laſt, he ſays, is ſoon ſucceeded by another exacerbation, which gradually increaſes till after midnight; but after two o'clock of the morning a remiſſion takes place, which becomes more and more conſiderable as the morning advances. The exacerbations are frequently attended with ſome degree of chillineſs and ſhivering; or, at leaſt, the patient is exceedingly ſenſible to any coolneſs of the air, ſeeks external heat, and often complains of a ſenſe of cold, when to the thermometer his ſkin is preternaturally warm. After the chillineſs goes off, a general increaſe of heat ſucceeds; and the face, which is commonly pale, becomes of a florid red, the redneſs generally appearing in a circumſcribed ſpot, however, on one or both cheeks. Before the remiſſion of the morning takes place, a ſweat generally breaks out; and theſe ſweats continue to recur, and become more and more profuſe, through the whole courſe of the diſeaſe.

Of the two daily exacerbations, of which Dr. Cullen ſpeaks, "that of the evening," he obſerves, "is always the moſt conſiderable." It muſt be remarked, however, that other phyſicians have not generally witneſſed this double exacerbation, and uſually deſcribe the hectic as conſiſting only of one, and that an evening exacerbation, terminating in the morning ſweats.

It may be obſerved, that the progreſs of the paroxyſm above deſcribed reſembles in ſeveral reſpects the paroxyſm of intermittent fever, or common ague; and in popular language it is in fact uſually denominated an intermittent fever. But in the recurrence and the phenomena of theſe exacerbations, there is nothing approaching to the regularity and uniformity of the true intermittent, as Dr. Heberden has well pointed out. "The hectic fever," ſays that accurate obſerver, "will return with great exactneſs, like a quotidian, or tertian, or quartan, for two, or perhaps three fits; but I do not remember ever to have known it keep the ſame period for four fits together. The fit will now and then keep off for ten or twelve days; and at other times, eſpecially when the patient is very ill, it will return ſo frequently on the ſame day, that the chillineſs of a new fit will follow immediately the ſweat of the former. It is not unuſual to have many threatenings of a ſhivering in the ſame day."

The ſeries of ſymptoms are not leſs irregular in their variety and ſucceſſion, than the whole exacerbation in its periods of return. "The chillineſs of hectic fever," ſays the ſame author, "is ſometimes ſucceeded by heat, and ſometimes immediately by a ſweat, without any intermediate ſtate of heat; and the heat will ſometimes come on without any remarkable previous chillineſs, and the chillineſs has been obſerved to go off without being followed either by heat or ſweat. The duration of theſe ſtages is ſeldom the ſame for three fits together." "The hectic patient is little or not at all relieved by the coming on of the ſweat; but is often as anxious and reſtleſs in the ſweat, as in the chillineſs and heat. When the ſweat is over, the fever will ſometimes continue, and in the middle of the fever the chillineſs will return, which is a moſt certain mark of this fever: almoſt all others begin with a chillineſs; but the return of this, ſo as to laſt half an hour or longer, while the fever is ſtrong upon the patient, is what I never ſaw, except only in this fever." (Heberden, in Medical Tranſact. of the College, vol. ii. art. 1. Alſo in his Commentar. de Morbor. Hiſt. et Curat. cap. 39.)

The urine is frequently clear in the early parts of the exacerbations, and depoſits a copious pink ſediment at the decline of it, and during the interval, as in the true intermittent. But there are all ſorts of irregularities in this reſpect in the hectic. Sometimes it will be equally clear or equally turbid in both ſtages; or even turbid in the fits and clear in the intervals; and ſometimes almoſt from the firſt appearance of the diſeaſe the urine is high coloured, and depoſits a copious branny red ſediment, which ſeldom falls cloſe to the bottom of the veſſel.

In the hectic, the appetite for food is generally leſs impaired than in any other kind of fever. The thirſt is ſeldom very conſiderable; the mouth is commonly moiſt; and as the diſeaſe advances, the tongue becomes free from all fur, appears preternaturally clean, and, in the advanced ſtages of the diſeaſe, it appears, as well as the throat, to be ſomewhat inflamed, and more or leſs of an aphthous ulceration takes place. For ſome time in the courſe of the diſeaſe the bowels are bound: but in the advanced ſtages of it, a diarrhœa almoſt always comes on, and continues to recur frequently, alternating in ſome meaſure with the ſweatings mentioned above.

Hectic fever is always attended with debility, which gradually increaſes during its progreſs, and emaciation takes place to a greater extent, than in almoſt any other diſeaſe. Towards the end, the feet are often affected with œdematous ſwellings. The exacerbations of the fever are ſeldom attended with any head-ache, and ſcarcely ever with delirium; the ſenſes and judgment commonly remaining entire to the very cloſe of the diſeaſe.

The *diagnoſis* of this fever, as it is commonly ſymptomatic of ſome internal or external diſeaſe, does not conſiſt ſo much in diſtinguiſhing it from the true intermittent or remittent fever, (from which the difference is very obvious from the hiſtory of the diſeaſe, as above detailed,) as in aſcertaining the ſeat and nature of the local affection by which it is excited. This is to be done, of courſe, by inveſtigating the derangement of the functions in particular organs, *e. g.*, the lungs, liver, glands, and other parts. Where the progreſs of the fever is inſidious, however, and the preſence of local diſeaſe is obſcure, an attention to the ſtate of the pulſe, as Dr. Heberden ſuggeſts, is one of the greateſt helps to detecting the degree of diſeaſe going on. "Gentle as the ſymptoms may ſeem," he ſays, "if the pulſe be quicker than ordinary, ſo as to have the artery beat at leaſt ninety times, and perhaps a hundred and twenty times in a minute, there will be the greateſt reaſon to be apprehenſive of the event. There is perhaps no diſorder of the body, in which the pulſe is of more uſe to guide our judgment, than in the complaint which has been deſcribed. And yet even here we muſt be upon our guard, and ought not to truſt entirely to it; for one in about twenty patients, with all the worſt ſigns of decay from ſome incurable cauſe, which irreſiſtably goes on to deſtroy his life, will ſhew not the leaſt degree of quickneſs, nor any other irregularity of the pulſe, to the day of his death." Loc. cit.

The cauſes of hectic fever have been the ſubject of conſiderable difference of opinion. The ancients conſidered it as often the conſequence of internal diſeaſe; and many moderns, among whom Dr. Cullen ſtands conſpicuous, deemed it in all caſes a ſecondary fever, and aſcribed it excluſively to the abſorption of *pus*. "I have never ſeen it in any caſe," that able phyſician obſerved, "when there was not evidently, or when I had not ground to ſuppoſe there was, a permanent purulency or ulceration in ſome external or internal part. Indeed it appears to me to be always the effect of an acrimony abſorbed from abſceſſes or ulcers, although it is not equally the effect of every ſort of acrimony; for the ſcorbutic and cancerous kinds often ſubſiſt long in the body without producing a hectic. What is the preciſe ſtate of the acrimony producing this I cannot determine, but it ſeems to be chiefly that of a *vitiated purulency*." (Firſt Lines, parag. 861.) In favour of this opinion the great majority of inſtances of hectic may undoubtedly be cited. The moſt numerous caſes are certainly connected with the ſuppuration of the lungs, in pulmonary conſumption: with cancerous, ſcrofulous, and other ſlow ulcerations and ſuppurations, in the glands of the ſurface and in the abdomen, with the progreſs of deep-ſeated abſceſſes in membranous and muſcular parts, as in the pſoas abſceſs, &c. But very many caſes are alſo recorded, and frequently obſerved, in which a variety of other cauſes have been connected with hectic, and which agree with each other in one common operation, as well as with thoſe ulcers and ſuppurating tumours, namely, in keeping up a conſtant *irritation* in the ſyſtem. Dr. Gregory, the preſent profeſſor of medicine at Edinburgh, ſeems to be juſtified, therefore, in aſcribing hectic in general to ſome great local irritation. So far from a "*vitiated* purulency" being the chief cauſe of hectic, according to Dr. Cullen's hypotheſis, we have the authority of Dr. Heberden for ſtating that "this anomalous fever is never leſs dangerous, than when it belongs to a kindly ſuppuration, into which all the diſeaſed parts are melted down, and for which there is a proper outlet."

Among the varieties of hectic enumerated by Sauvages, few are referable to the preſence of ſuppuration. The Hectica *infantilis*, H. *chlorotica*, H. *à calculis*, H. *hydropum*, H. *cachectarum*, H. *verminoſa*, H. *noſtalgica*, all ariſe independently of any ſuppuration in the body, and ſeem to depend either upon ſome extraordinary irritation, corporeal and mental, or upon an increaſed debility and irritability of the habit, which render it too ſuſceptible of the operation of ordinary irritations. Dr. Willan has made ſome obſervations worthy of attention on this ſubject. After remarking, that he employs the *hectica* in the ſignification given to it by the Greek phyſicians, among whom it was not conſidered merely as a ſecondary complaint, depending on internal ſuppuration, or any local defect; but as ariſing from a failure of ſtrength in old age, from an exhauſted ſtate of conſtitution, occaſioned by fatigue, long faſting, anxiety, or loſs of ſleep, and ſometimes as a ſequel of *cauſos* or other fevers;—Dr. Willan ſtates, that "in infancy, childhood, youth, and old age, hectic takes place, without any local affection, from changes in the conſtitution, connected with the different ſtages of life." (Reports on the Diſeaſes of London, pref. x.) "A ſpecies of hectic," he obſerves in another place, "occurs in infants and children from conſtitutional circumſtances, without any apparent local affection. It is attended with a very quick pulſe; with heat and fluſhing during the paroxyſm; and throughout with an extreme degree of irritability and inquietude; ſometimes with loſs of appetite, ſometimes with a craving for ſtrong food; and an equal irregularity reſpecting the ſtate of the bowels. Theſe ſymptoms continue for a length of time, and occaſion a waſting, with loſs of ſtrength; they uſually precede a conſiderable increaſe of ſtature." (Reports, p. 19.) Again "in the liſt of periodical diſeaſes, the complaint termed hectica *adoleſcentium* frequently affects young perſons, during the period of their growth, after the age of puberty. It is characterized by febrile paroxyſms occurring every day, pain in the limbs, often with painful ſwellings in the joints, loſs of ſleep and appetite, and great emaciation. If a cough does not ſupervene, the patients recover in ten or twelve weeks." (loc. cit.)

Dr. Willan obſerves, moreover, that a ſimilar ſtate of diſorder is often produced in perſons of the middle age, when the conſtitutional vigour firſt appears to decline, not reſiſting as uſual the operation of cold, fatigue, and other occaſional cauſes of diſeaſe; and that this ſtate is moſtly accompanied with aphthous ulcerations of the tongue and fauces, and a large ſecretion of frothy phlegm. This he calls hectica *aphthoſa*, and has detailed its progreſs minutely. He concludes the hiſtory of it by obſerving, that, "after the tongue, fauces, &c. have been healed, the aphthous ulcerations return again, with internal heat, general uneaſineſs, and the ſame train of ſymptoms as at firſt. By frequent relapſes of this kind, the patient is often reduced to an extreme degree of debility and emaciation; and the whole duration of the complaint is from five to twelve weeks." Ibid. Pref.

For an account of the hectica *ſenilis*, or that form of the hectic which occurs in old age, Dr. Willan refers to Hoffmann; who, we find, ſpeaks of it under the denomination of *maraſmus ſenum*. "The hectic," he ſays, "which is common and fatal in old people, is called by the Greek term μαράσμος. The appetite fails, the ſtrength gradually decays, the body waſtes, and the bones appear like a ſkeleton covered with ſkin. The mouth is dry, the ſaliva viſcid, the ſkin cold, parched, and rigid; the internal parts are hot; the pulſe is hard and frequent; the ſleep ſcanty and unrefreſhing; there is ſome dyſpnæa, and the voice is hoarſe. Theſe ſymptoms gradually increaſe until the patient, in the courſe of five or ſix months, ſinks under them." (Hoffmann, Med. Ration. Syſt. tom. ii. ſect. ii. cap. xiii.)

Treatment of Hectic.—It muſt be obvious, from the preceding obſervations, that, ſince hectic fever is moſt commonly a ſecondary diſeaſe, and depends upon ſome local irritation or derangement of ſtructure, no one ſyſtem of treatment can be expected to cure it. The cure, indeed, under ſuch circumſtances, can only be effected by the removal of the primary diſeaſe. Therefore to deſcribe the method of cure for hectic, would be to give a general detail of the modes of treating conſumption, tabes meſenterica, ſcrofula, and other diſeaſes, in which a ſlow ſuppuration or ulceration is going on. The general indications, however, ſo far as relate to the alleviation of the febrile ſymptoms of heat, thirſt, languor, ſweating, diarrhœa, &c. are to withdraw every ſtimulus, which may add to the morbid irritation from the local diſeaſe; to leſſen the ſuſceptibility to ſtimuli; and to ſupport the ſtrength by the mildeſt nutriment; as well as to check the urgency of particular ſymptoms, which tend to reduce the powers of the conſtitution.

1. The abſtraction of ſtimuli is effected partly by diet and regimen, ſuch as has already been preſcribed under the head of CONSUMPTION; namely, by excluding all ſolid animal food, and vinous, ſpirituous, or fermented liquors, and confining the patient to a diet of milk, and vegetables; including whey, butter-milk, and the milk of various animals, the farinaceous ſubſtances, ſummer fruits, &c; with aqueous liquors, as various infuſions of herbs, ptiſan, &c. rendered grateful by the juices of ſub-acid fruits, with ſugar. Exerciſe, performed without much muſcular exertion, and not carried to fatigue, eſpecially geſtation, ſailing, and ſwinging, may in many caſes be employed with advantage. (See EXERCISE.) The oppoſite irritations of cold and heat ſhould be carefully obviated; the former being guarded againſt by warm clothing, a warm apartment, and avoiding expoſure to the immediate influence of cold air; and the latter, which is generally troubleſome and prejudicial in the paroxyſm only, by a partial and temporary removal of the coverings of the patient, and by diminiſhing with caution the temperature of his apartment.

2. The ſuſceptibility to the impreſſion of irritations, is principally to be diminiſhed by medicines of the narcotic claſs, ſuch as opium, the extract of poppy, conium, (hemlock), hyoſcyamus (henbane), &c. It is probably by their operation in this manner, by giving relief to the feelings of the patient, and by rendering the whole of the involuntary organs of circulation, ſecretion, and excretion, leſs ſuſceptible of excitement, that the conium or cicuta eſpecially has contributed ſo extenſively to the relief and cure of glandular ulcerations. In this way opium is alſo exceedingly beneficial, in allaying inordinate actions of the bowels, in procuring ſleep, and in preventing the debilitating effects of purging and watching.

3. The neceſſity of ſupporting the ſtrength by the mildeſt forms of aliment, has already been inſiſted on above. The ſtrength is ſcarcely more depreſſed by the want of nutri-

ment, than by the uſe of that which is too heavy for the weakened powers of digeſtion, and which, while it fails to afford the requiſite nutrition, excites an additional febrile irritation in the ſyſtem.

4. The occaſional ſeverity of particular ſymptoms is to be reſtrained by medicines adapted to the circumſtances. Thus where a diarrhœa, as is not uncommon in hectic of ſome continuance, becomes violent, reducing the body by the frequency and quantity of the diſcharge from the bowels, the uſe of opiates, with or without the addition of cretaceous or aſtringent medicines, muſt be reſorted to; or, on the other hand, when the morning ſweats, which terminate the exacerbation, become profuſe and colliquative, the adminiſtration of the mineral acids, eſpecially the ſulphuric (or vitriolic) acid, diluted, will generally contribute to diminiſh the diſcharge. The ſweating and diarrhœa are very apt to alternate with each other, and the medicines which ſuſpend the one, are rather liable to induce the other.

Soon after the general introduction of the Peruvian bark into practice in this country, the ſimilarity of hectic to the intermittent fevers, and alſo ſome prevalent hypotheſis, that the bark "rendered ſuppuration more kindly," it was given copiouſly in the different modifications of hectic; but Dr. Heberden, while he affirms, that he never ſaw any material harm done by the bark in hectic, yet he acknowledges, that he had never ſeen any good from it. We believe that experience has now decided upon its rejection from the practice in hectic from ulceration, at leaſt from that connected with pulmonary conſumption; and the ſteel draught of Dr. Moſes Griffith has nearly met with the ſame fate. Theſe medicines, however, as well as the mineral acids, have been preſcribed with advantage in the hectica adoleſcentium, where there was little or no cough, and where the hectic ſeemed to originate from a general debility of habit, approaching to the chlorotic ſtate.

On the whole, perhaps, theſe few lines of Dr. Heberden contain the ſum of the practical precepts relative to hectic in general. "In moſt caſes, the principal, if not the ſole attention of the phyſician muſt be employed in relieving the ſymptoms, by tempering the heat, by preventing both coſtiveneſs and purging, by procuring ſleep, and by checking the ſweats; and if, at the ſame time, he endeavours to put the body into as good general health as may be, by air, exerciſe, and a proper courſe of mild diet, he can perhaps do nothing better, than to leave all the reſt to nature." (See Medical Tranſactions, vol. ii p. 12.)

HECTO, in the new *Meaſures* and *Weights* of France, ſignifies 100 times, when uſed as a prefix; thus hectometre ſignifies 100 metres, and hectogramme ſignifies 100 grammes; ſo hectolitre ſignifies 100 litres = 10 cubic metres; hectoſtere ſignifies 100 cubic metres, &c.

HECTOR, in *Geography*, a military townſhip in New York, on the E. ſide of Seneca lake, near the Send.

Hector, in *Ancient Hiſtory*, the ſon of Priam and Hecuba, and the father of Aſtyanax, celebrated for the valour with which he defended the city of Troy againſt the Greeks. He was killed by Achilles, who dragged his body, faſtened to his chariot, thrice round the walls of Troy, and afterwards reſtored it to Priam for a large ranſom. See Troy.

HECUBA, in *Fabulous Hiſtory*, the ſecond wife of Priam, and mother of Hector and Paris, was, according to Homer, the daughter of Dymas, or as Virgil, following Euripides, ſays, of Ciſſeis, king of Thrace, and ſiſter of Theano, the prieſteſs of Apollo at Troy during the war. After the capture of Troy, ſhe attempted to revenge the death of her ſon Polydorus, and was ſtoned to death by the Greeks. Some ſay that ſhe became a ſlave to Ulyſſes, and that this prince left the unfortunate princeſs in the hands of her enemies, who cauſed her to be ſtoned. It is probable, however, that Ulyſſes himſelf was the cauſe of her death. Becauſe, it is ſaid, that upon his arrival in Sicily, he was ſo tormented with dreams, that in order to appeaſe the gods, he built a temple to Hecate, who preſided over dreams, and a chapel to Hecuba.

HED, in *Geography*, a town of Sweden, in Weſtmanland; 25 miles W. N. W. of Weſteraks.

HEDAGIUM, anciently ſignified a toll or cuſtom, paid at the hythe or wharf, &c. for landing merchandize, goods, &c.

The word is formed from *heda, a hythe, port,* or *wharf.* From ſuch toll or cuſtomary duty, exemptions were ſometimes granted by the ſovereign to particular perſons and ſocieties.

HEDDING, in *Geography*, a town of Denmark, in the iſland of Zealand; 32 miles S. S. W. of Copenhagen.

HEDE', a town of Sweden, in Harjedalen; 10 miles S E. of Langaſahantz.—Alſo, a town of Sweden, in the province of Weſt Gothland; 32 miles N. W. of Uddevalla.

Hede', a town of France, in the department of the Ille and Vilaine, and chief place of a canton, in the diſtrict of Rennes. The place contains 685, and the canton 9494 inhabitants, on a territorty of 175 kiliometres, in 11 communes. N. lat. 48° 18′. W. long. 1° 43′.

HEDEMORA, a town of Sweden, in the province of Dalecarlia, and one of the principal towns of the kingdom, ſituated near a lake, well built and commercial. In this town is a large manufacture of gun-powder; 53 miles N. W. of Upſal. N. lat. 60° 13′. E. long. 15 54.

HEDEN, a town of Sweden, in Weſt Bothnia; 30 miles N. W. of Lulea.

HEDERA, in *Botany*, has been ſaid to owe its derivation to the word *hædus*, a kid, becauſe it was given to goats by the ancients, in order to make them have abundance of milk for the nouriſhment of their kids. It has alſo been ſpelled thus, *edera*, and then its origin is ſuppoſed to be from the word *edita*, either becauſe it flouriſhes in *lofty* ſituations, or becauſe it lays waſte whatever it adheres to, and thus may be ſaid to *eat* it; for this plant is vulgarly ſuppoſed to appropriate to its own uſe the eſſential juices of ſuch trees as ſupport it. It is called κισσος in Greek, from Ciſſos, a favourite of Bacchus, whom the poets fable to have been transformed into this plant, and hence it became ſacred to that god.—Linn. Gen. 111. Schreb. 155. Willd. Sp. Pl. v. 1. 1179. Mart. Mill. Dict. v. 2. Sm. Fl. Brit. 267. Ait. Hort. Kew. v. 1. 281. Juſſ. 214. Tournef. t. 384. Lamarck Dict. v. 3. 511. Illuſtr. t. 145. Gærtn. t. 26.—Claſs and order, *Pentandria Monogynia.* Nat. Ord. *Hederaceæ*, Linn. *Caprifolia*, Juſſ.

Gen. Ch. *Cal.* Perianth very ſmall, five-toothed, encircling the germen. *Cor.* Petals five, oblong, broad at the baſe, ſpreading, their tops incurved. *Stam.* Filaments five, awl-ſhaped, erect, as long as the corolla; anthers cloven at the baſe, incumbent. *Piſt.* Germen turbinate, encircled by the receptacle; ſtyle ſimple, very ſhort; ſtigma ſimple. *Peric.* Berry globoſe, of one cell, (or, according to Gærtner, of five cells). *Seeds* five, large; on one ſide gibbous, on the other angular.

Eſſ. Ch. Calyx five-toothed. Petals five, dilated at the baſe. Berry with five ſeeds, encircled by the calyx.

Among the ſpecies of this well-known and ornamental genus, the *quinquefolia* has been referred by Juſſieu to *Vitis*, and we think with great propriety. *Hedera helix* is the only ſpecies indigenous to Great Britain.

1. *H. Helix* Common Ivy. Linn. Sp. Pl. 292. Engl.

Bot. t. 1267.—“ Leaves ovate and lobed.”—“ Every one is acquainted with the ivy, ſo common and ſo pictureſque upon old walls and the trunks of aged trees. Nor does it leſs commonly creep on the ground in dark woods, forming an evergreen carpet. It is the lateſt of all our flowering plants, bloſſoming in October and November, and ripening its berries in the ſpring. The whole plant partakes of a peculiar aromatic flavour. From the old ſtems, when bruiſed, a very fragrant reſin exudes.”—*Stem* and *branches* long and flexible, creeping, attached cloſely to trees or walls by ſhort fibres; upper branches ſpreading, round and ſmooth. *Leaves* evergreen, dark, having white veins, upper ones ovate, lower ones five-lobed, all ſtanding on footſtalks. *Flowers* green, of many umbels, forming a corymbus. *Berry* globular, black, mealy within.

Mr. Curtis remarks, that when ivy trails on the ground its branches are ſmall and weak, its leaves divided into three lobes. Hence, this difference of appearance induced old botaniſts to ſeparate the plant in queſtion into two or three diſtinct ſpecies. In its variegated ſtate it ſometimes appears almoſt white, and may, perhaps, be the *Hedera alba*, or *pallentes Hederæ* of Virgil.

2. H. *pendula*. Swartz. Ind. Occ. v. 1. 512.—“ Leaves ovato-lanceolate, entire. Umbels ſomewhat capitate. Stems very long, pendulous.”—Native of high mountains in the weſt of Jamaica, flowering in May.—The *trunk* of this ſhrub is about ten or twelve feet high, having a ſmooth bark. *Branches* ſpreading, ſubdivided; leſſer ones erect. *Leaves* on long footſtalks, ſcattered, oppoſite, or ternate, very ſmooth and ſomewhat rigid. *Umbels* axillary, on long ſtalks, pale.

3. H. *nutans*. Swartz. Ind. Occ. v. 1. 514.—“ Leaves elliptical, leathery. Umbels drooping, hemiſpherical. Stems erect.”—Native of the Blue mountains in the ſouth of Jamaica, and gathered on their very ſummit.—It is nearly allied to *H. pendula*, but differs in its leaves; the *ſtems* alſo are ſhorter and nearly erect; and the *umbels* are ſmaller.—*Branches* round, furrowed, grey. *Leaves* on footſtalks about their own length, extremely ſmooth. *Petals* ovate, acute, reflexed, deciduous. *Filaments* inſerted into the baſe of the calyx.

4. *H. capitata*. Swartz. Ind. Occ. v. 1. 516. Smith. Ic. Pict. Rar. t. 4. (Aralia capitata; Jacq. Amer. 89. t. 61.)—Leaves elliptical, ſcattered. Cluſters compound, terminal, downy. Flowers capitate.—Native of mountains in the Caribbee Iſlands and Jamaica, where it flowers in February. It exiſted in the collection of the late marquis of Rockingham long before 1777, but whence that plant was procured is not known. It flowered for the firſt time in Europe in the ſtove of the late marchioneſs in the year 1787, from which period it has continued flowering annually, but as no ſeed has been produced it muſt be propagated by cuttings. This ſpecies was transferred from *Aralia* to *Hedera* by Dr. Smith, who has been followed by Swartz, and hence the latter was induced to refer *Aralia arborea* in like manner to the ſame genus. This plant is rendered extremely ornamental by its browniſh grey *bark*, aſcending *branches*, and innumerable *flowers* terminating each branch in doubly compound, pale, downy cluſters, which are white, and form denſe heads at the extremity of each ſtalk.

5. *H. arborea*. Swartz. Ind. Occ. v. 1. 518. (Aralia arborea; Linn. Sp. Pl. 392. Jacq. Amer. 89. Hedera arbor folio haſtato; Plum. Ic. 139. t. 148.)—Leaves elliptical, ſcattered. Cluſters ſimple, terminal, ſmooth. Flowers umbellate, with a ſimple, many-toothed involucrum.—Native of Jamaica, and other parts of the Weſt Indies, flowering in December. Jacquin ſays this is an inelegant tree, 15 feet high, with a diſagreeable ſmell. Its *leaves* greatly reſemble the laſt, but the infloreſcence eſſentially diſtinguiſhes it. The radiating, many-toothed involucrum under each of the little umbels is very peculiar.

6. *H. Sciodaphyllum*. Swartz. Ind. Occ. v. 1. 519. Brown Jam. 190. t. 19. f. 1.—Leaves in terminal tufts. Cluſters compound, very long, drooping.—Native of the woody parts of the Blue mountains in Jamaica, flowering in February. This has the habit of *H. capitata*, and is remarkable for its leaves forming a ſort of umbel. *Bark* unequally furrowed, grey, of a brittle corky ſubſtance. *Leaves* from eight to ten or more, in a terminal, umbel-like tuft, ovato-lanceolate, on longiſh ſtalks; the central ones being largeſt. Cluſters a foot and half long, cylindrical, compoſed of innumerable, ſcattered umbels, on ſhort ſtalks.

7. *H. heptaphylla*. (Vitis heptaphylla; Linn. Mant. 212. Willd. Sp. Pl. v. 1. 1182.)—Leaves of ſeven-ſtalked, elliptical leaflets. Cluſters compound, very long; partial flower-ſtalks whorled.—Native of the Eaſt Indies. We have never ſeen it but in the Linnæan herbarium. *Stem* climbing. *Leaves* alternate, compound, on long ſtalks; leaflets alſo ſtalked; radiant, from five to ſeven, broader and ſhorter than in the laſt. *Cluſter* long, pendulous, compoſed of numerous ſtalks, whoſe ſhort partial ſtalks are irregularly whorled; the terminal ones tufted, all downy. *Flowers* ſmall. We refer it to this genus on account of its ſtrict affinity to the three preceding ſpecies.

8. *H. terebinthinacea*. Willd. Sp. Pl. v. 1. 1179.—Leaves of ſeven-ſtalked, elliptical leaflets. Cluſters compound; partial flower-ſtalks umbellate.—Native of woods in Ceylon. This we have not ſeen. Willdenow deſcribes it as differing from the laſt in its infloreſcence, and ſmooth *calyces*.

HEDERA, in *Gardening*, compriſes plants of the ſhrubby, climbing, ever-green, and deciduous kinds; of which the ſorts moſtly cultivated in this climate are the common ivy (H. helix), and the five-leaved ivy (H. quinquefolia.) The firſt of which is a ſhrub of the paraſitical kind, which raiſes itſelf to a conſiderable height by means of the ſupport of walls, buildings, trees, or other ſimilar ways, inſinuating its fibres into their joints, crevices, barks, and other parts, and thereby eſtabliſhing and ſecuring itſelf. But where none of theſe ſorts of ſupports are met with, its ſtems trail upon the ſurface of the ground, and ſtrike root through the whole of their length, cloſely covering it ſo as to be eradicated with difficulty, as wherever the ſmalleſt portion of the ſtem is left it ſoon ſpreads and multiplies itſelf. But while the ivy plant is fixed to any kind of ſupport, or trails upon the ſurface of the ground, the ſtalks are ſlender and flexible; though after it has reached the extent of its ſupport, they become ſhorter and more woody, forming themſelves into large buſhy heads, their leaves being larger and more oval in their ſhape, but not divided into lobes in the manner of the lower leaves. And while the ſtems continue to trail on the ground, the plants do not produce any flowers, in which ſtate the ivy is denominated *barren* or *creeping* ivy; however, when the branches get above their ſupport, they produce flowers at the end of every ſhoot, which are ſucceeded by berries, formed into round bunches, that turn black before they get ripe. In this ſtate it is called *climbing* or berried ivy. In the old trees the bark is covered with an aſh-coloured chopped bark, which, in the young branches, is of a green or purple tinge.

It has been remarked by the late Mr. Curtis, that but few people are appriſed of the beauty of the ivy plant, when it is permitted to run up a ſtake, and ultimately to form itſelf into a ſtandard, as the ſingular complication of its branches, and the vivid hue of its leaves give it one of the firſt places among plants of the ever-green kinds in ſhrubbery grounds.

There are varieties of ivy with ſilver-ſtriped leaves, and with yellowiſh leaves on the tops of the branches.

The latter ſpecies has long ſlender ſhrubby climbing ſtems that riſe upon ſupport to a great height, by means of fixing themſelves in the crevices of the walls as they advance in height.

This plant is admirably calculated to cover the naked walls of elevated buildings, which it effects in a very ſhort period, as it is capable of ſhooting nearly twenty feet in the courſe of a year, but in conſequence of the leaves falling off in the autumnal ſeaſon, and being late before they appear in the ſpring, it is not held in much eſtimation by the gardener. But as it is but little affected by ſmoke or confined air, it may be found very convenient for covering buildings in large towns and ſome other places.

Method of Culture.—Both theſe ſpecies and varieties of plants are capable of being readily increaſed by their trailing branches, which throw out numerous roots to their very extremities. Alſo by planting the cuttings of the young branches in the autumnal ſeaſon in a ſhady border, which, as ſoon as they have ſtricken root, in the following autumn ſhould be removed into the ſituations where they are to remain and grow.

And they may be raiſed by ſowing the ſeed in the early ſpring months in a moiſt ſhady ſituation, providing ſuch as has been perfectly ripened.

In regard to the buſineſs of training the plants, nothing more is required than to direct a few of the principal branches againſt the walls or other places at firſt, when they will ſpeedily attach themſelves to them, and advance in their climbing growth.

It is obvious that theſe plants are capable of being made uſe of in many different ſituations of gardens and pleaſure grounds in the way of ornamental effect.

HEDERA *terreſtris.* See GLECHOMA.

HEDERICK, BENJAMIN, in *Biography*, was born at Giethen, a town of Miſnia, and loſt his father at a very early age, but having at this period laid the foundation of claſſical learning, he was ſent to Leipſic, and then to Wittenberg to finiſh his ſtudies. He next engaged as private tutor in a family, in which he continued more than ſix years, and being allowed free acceſs to the univerſity library, he improved himſelf in different branches of learning till he became teacher in the ſchool of a monaſtery near Magdeburg. In 1705 he was appointed rector of the ſchool of Groſſenhagen, where he ſpent the remainder of his life, employed either in the education of youth or in the compoſition of uſeful books. He died in the year 1748. His principal works are "Reales Schul-Lexicon," a dictionary of every thing that relates to geography, chronology, hiſtory, antiquities, &c.: and "Lexicon manuale Græcum." This was firſt publiſhed at Leipſic in 1722, and has been re-printed in almoſt all the countries of Europe; in England it has gone through many editions, and has been augmented by the labours of Patrick, Young, and Morell. The laſt-mentioned editor has given extracts from the preface of Auguſtus Erneſtus, in which he ſays "Hedericum illum, virum bonum cetera et laborioſum, ſed Græce doctum, et ad tale lexicon rite conficiendum ſatis a lectione Græcorum ſcriptorum inſtructum non fuiſſe; that Hederick was a good man, and laborious, but by no means a profound ſcholar in the Greek language, nor properly qualified to compile a lexicon for the illuſtration of Greek authors." Gen. Biog.

HEDESUNDA, in *Geography*, a town of Sweden, in the province of Geſtricia; 18 miles S. of Geffle. N. lat. 60° 25′. E. long. 16° 49′.

HEDGE, in *Agriculture*, a name applied to ſuch fences as are formed from ſome kind of underwood plants, either in their living or dead ſtate; hence they are diſtinguiſhed into *living* and *dead* hedges. The former are conſtantly compoſed of ſome deſcription of hedge plants in their living ſtate, ſuch as the white-thorn, holly, &c.; while the latter are always conſtituted wholly of dead ſubſtances, ſuch as various kinds of bruſh-wood, thorn, hazel, &c., which have been cut down at a proper ſeaſon with this intention.

Live hedges, properly formed of white-thorn, are conſidered by many as not only the moſt common, uſeful, and ornamental, but, in ſoils ſuited to their growth, the moſt proper and leaſt expenſive of any. The methods of planting and rearing hedges of this ſort are extremely various, proceeding from the difference of ſoil, ſituation, and expoſure. See FENCE.

In conſtructing dead hedges, the moſt ſuitable materials are thoſe of the thorn kinds; which ſhould be well wattled together, by having proper ſupplies of good ſtakes and edders. See FENCE.

HEDGE, in *Gardening*, a ſort of fence employed occaſionally both for uſe and ornament in gardens, as for incloſing and dividing the internal parts of the ground and ſeveral other purpoſes.

Fences of this ſort are of two kinds, *dead* and *living*; but it is only the latter kind that is made uſe of in gardens. They are the cheapeſt and moſt ornamental fences that can be employed where walls, &c. are not neceſſary, for planting wall-trees againſt, and other ſimilar purpoſes.

And there are a great variety of ſhrub and tree plants, both of the deciduous and ever-green kinds, that may be occaſionally employed for hedges in garden grounds; the principal of which are, in the firſt ſort, white-thorn, black-thorn, crab-tree, alder, elder, poplar, willow, hornbeam, beech, elm, lime, privet, berberry, ſweet-briar, roſe, ſyringa, and honey-ſuckle.

Alſo in the latter kind, holly, yew, furze, laurel, lauruſtinus, phillyrea, alaternus, box, ever-green oak, ſavin, roſemary, pyracantha, and ſea-purſlain ſhrub, &c.

For outſide Hedges.—It is obvious that for this purpoſe the white or haw-thorn plant forms the beſt material, which, by being properly trained, by trimming or clipping annually, is rendered a quite cloſe, hardy, and durable fence. Hedges of this ſort may be formed by planting young plants or ſets raiſed from ſeed in the nurſery, which, when a year or two old, or when as big as a gooſe-quill, up to the ſize of the little finger, are proper for this purpoſe. See CRATÆGUS.

And the black or ſloe-thorn is alſo proper for garden-hedges, and forms a very ſtrong durable fence; but by its producing ſuch abundance of ſuckers from the root, it is leſs eſteemed; but as it is well armed with thorns, and of quick growth, it may be uſeful where the white-thorn cannot be procured in ſufficient quantity.

With reſpect to hedges of this nature, they may be raiſed by ſowing or ſetting the ſeed or ſloes in autumn, when fully ripened, in one or two ſmall drills or trenches in the place where the hedge is to be, at the diſtance of five or ſix inches, or more, from each other, and to the depth of two or three inches. Where there are two rows, they may be about ſix or eight inches apart, ſo as to have room for cleaning them.

But it is a much better method to firſt raiſe the plants in the nurſery till of a proper ſize, as two years old, and then plant them out in rows as above-directed.

Plants of the crab-tree, of the apple, as well as thorny ſorts, are ſometimes planted for hedges; but the plants for this purpoſe ſhould be ſuch as are raiſed from the kernels of the wild crabs, which come up more thorny than thoſe of the cultivated kinds, and ſhoot more branchy and cloſe, quite from the bottom. Theſe ſhould, however, only be made uſe of, as being of quick growth, and where the others cannot be procured in plenty.

The hedges of theſe kinds may either be raiſed by ſowing the kernels of the fruit in autumn or winter, in the place where the hedge is intended, in drills, the whole length an inch deep, covering them that depth with earth, or the plants raiſed firſt from ſeed in the nurſery, which, when a year or two old, may be planted out. Some of the plants of the hedge may, in this way, be ſuffered to grow up, and afford an annual crop of crabs for verjuice. A proper number of the plants may likewiſe be uſed, as they ſtand in the hedge, for ſtocks to graft on with uſeful family or cyder apples. Theſe methods however ſeldom anſwer any good purpoſe.

Elder plants are alſo uſed for outward hedges, where a fence is wanted as quickly as poſſible, as being very expeditious in their growth, though not the moſt beautiful. Hedges are likewiſe readily formed by planting large truncheons or cuttings of the ſtraighteſt upright ſhoots and branches, from two or three, to ſix feet long, planted either upright, a foot diſtance, and wattled along the top to preſerve them firm and even, or placed ſlanting acroſs one another checquer-wiſe, forming a ſort of lattice-work, which is the moſt effectual method. In either way of planting the lower ends of the cuttings, muſt be ſharpened, making holes to receive them, fifteen or eighteen inches deep, either in the level ground, or the ſides or tops of the banks, where they are to be planted.

And the alder is alſo proper to plant for hedges in wet or marſhy grounds, as being an aquatic, and growing readily by ſmall or large cuttings like the elder. It quickly forms a hedge.

This is very proper on the borders of rivers, brooks, or other waters, as its roots, and numerous ſuckers ariſing from their lower parts, form ſuch a cloſe thicket, as effectually to preſerve the earth of the banks from being undermined, and waſhed down by the water.

Alſo the Lombardy poplar, as emitting numerous ſide-branches quite from the bottom, and being of very quick growth, is alſo occaſionally employed to form an expeditious outward hedge along the ſide or top of a bank or ditch, or to train as a loftier hedge for ſhelter, ſhade, blind, and other purpoſes.

Indeed, hedges of this plant are formed at once, if wanted, of five or ſix feet or more in height, by having young trees, well-branched from the bottom, heading the top to the above height, and planting them in a ſingle row a foot or two aſunder. Younger ſets of two or three feet in height may be planted and trained. When deſigned as an outward hedge, they ſhould generally have an outſide ditch. They may be kept to an orderly thick growth, by proper clipping in the ſummer ſeaſon when it may be neceſſary.

Willow is alſo ſometimes planted to form outward hedges along the ſides of watery ditches, brooks, rivulets, &c. or any marſhy or moiſt ſituation. They are planted either by ſmall cuttings, or larger long ſets of ſeveral feet, and inſerted in the manner directed for the older cuttings, ſo as to form an immediate hedge. In either method they run up quickly, and may be kept cloſe and regular by proper cutting in the ſummer ſeaſon.

And the holly forms an excellent and beautiful hedge. It is the beſt evergreen hedge that can be planted for an outward fence, as it grows cloſe, and is well furniſhed with leaves, which being armed with thorns, no cattle browſe upon them; and being always in foliage, it affords good ſhelter in winter, and is ornamental at all ſeaſons. The only objection to it is, its ſlowneſs of growth the firſt four or five years. The holly makes a beautiful garden hedge in mixture with the hawthorn.

Hedges of this ſort of plants are formed either by ſowing the ſeeds at once in the places where the hedges are to be, in drills an inch and a half deep; or by planting young plants of two or three years old from the nurſery: this is rather the beſt practice. They may be planted in one or two rows; though two rows planted a foot aſunder, and the ſame diſtance in each row, form the thickeſt and moſt effectual hedge. They may be kept in order by clipping once or twice a year, or as there may be occaſion.

Yew is occaſionally uſed as a boundary hedge, and when full grown, is very thick and cloſe, and has a good appearance.

It is neceſſary that theſe hedges ſhould be guarded by a ditch or bank on the outſide. They are beſt raiſed by ſetting the young plants after they have been raiſed from the berries.

The furze plant is ſometimes uſed for an outward evergreen hedge, but which makes only an indifferent one, being apt to die off in gaps. As it grows well, however, upon dry banks, or any poor dry ſoil, it may be uſed for a hedge in ſuch caſes: theſe are raiſed by ſowing the ſeeds in autumn at once in the place where it is deſigned to have the hedge, in drills an inch and a half deep, or more.

With regard to the general management of theſe hedges, it may be obſerved that all outward ones, deſigned as fences, ſhould have a ditch and bank; the ditch, &c. ſerving as a defence to the young hedge againſt cattle, &c. till it is grown up, and afterwards rendering the whole a more effectual outward fence. When planted on the level ground, they ſhould be defended with railings, open pales, hurdles, or a ſtake and buſh dead hedge, till advanced to the above growth. Where a ditch and bank is intended, the ditch on the outſide ſhould be three feet wide at top, two or three deep, ſloping to one ſide at bottom; raiſing a low bank on the inſide on which to ſet the plants, which may be planted either on the ſide of the inner bank in two rows one above the other a foot aſunder, as commonly practiſed for quick hedges, putting them in, in forming the ditch and bank; or be planted entirely on the top of the bank, firſt forming the ditch and bank, and levelling the top ſo as to form a ſort of border or bed extending longways, planting the ſets in one or two rows the whole length; but two rows a foot aſunder is the moſt eligible for all outward fences, as they always form the thickeſt, ſtrongeſt, and moſt effectual hedge-fences.

In which-ever way the planting is performed, the roots of the ſets ſhould always be bedded in on the fineſt looſe mellow mould that can be procured. With this care large plants will ſucceed in the moſt perfect manner, and ſoon form excellent hedges.

For Diviſion Hedges.—When hedges are deſigned for middle fences to divide grounds, two-ſided banks are uſually raiſed a yard high, and as broad at top, having a ſlight ditch on each ſide of the bank, and the different ſides of the bank formed with ſquare ſpit-turfs from the adjoining ground, and the middle filled up with mould from the ditches on each ſide; ſo that, when finiſhed, it forms a yard-wide bed all the way on the top. Along the middle of this plant two rows of hedge-ſets, or ſow the ſeed in drills as has been directed above.

But where no ditch or raiſed bank is required, the place for the hedge ſhould be marked out on the level ground, two or three feet broad, digging it along, one or two good ſpade's depth. The ſets ſhould then be planted in one or two rows, ranging along the middle; or the ſeeds ſown at once, where it is intended to have the hedge in two drills, a foot aſunder, the whole length. For interior garden hedges one row is generally ſufficient, either of ſets planted or ſeeds ſown. In this mode, where the ſets are of a tolerable large ſize and ſtrength, it will be proper to form a trench, in which to plant each row, with the roots all a regular depth, and the tops upright; or, if quite ſmall young ſets, they may be planted with a dibble, but the former is the better mode.

In the firſt method, one or two narrow branches ſhould be formed longways, for a ſingle or double row of ſets with the ſpade, by cutting out a narrow trench ſix or eight inches deep all along, for each row of plants, making one ſide upright; then the ſets ſhould be placed in the trench againſt the upright ſide, ſix, eight, or ten inches aſunder in the row, with their tops all upright, ſeveral inches above the ground; turning in the earth directly upon the roots, &c. to the depth of the trench, treading the earth thereto moderately firm, to fix the plants in the proper poſition as the work proceeds;—and if intended to plant two rows of ſets to form a double hedge, make another trench a foot diſtance; placing thoſe of the ſecond trench oppoſite to the interval ſpaces of the firſt row of ſets, earthing them in regularly as the others, and treading the whole down cloſe to the ſets, evenly along the ſurface in the line of the hedge.

And in trench-planting, the ſets may likewiſe be put in, by planting them as you proceed in digging the trench out, working out with the ſpade a foot-wide trench, digging out a ſpade depth of earth at one end, the width of the trench, then placing a ſet therein cloſe to one ſide; or, if intended to have a double hedge, placing two ſets, one to each ſide of the trench; and then, in either method, proceeding in digging, turning one or two ſpades of earth in upon the roots of the ſets; and at eight or ten inches from theſe, plant one or two ſets more in the ſame order, digging and earthing them in as the others; and thus proceed, digging along and planting the rows of ſets as the work advances; obſerving in double rows to place the ſets oppoſite to the intervals in the rows of each other.

In planting with the dibble, the ground ſhould be previouſly well dug over a ſpade's depth; then trimming the ſtraggling roots and tops of the plants with the dibble, make a hole for each ſet at the above diſtances, inſerting the roots a proper depth, and cloſe the earth well about each ſet as they are planted.

In forming hedges by ſowing the ſeeds at once in the intended places for the plants to remain, the ground ſhould be properly dug, and then either one drill for a ſingle row, or two for a double hedge, ſhould be formed a foot aſunder, ſowing the ſeed tolerably thick in them, and covering it an inch or two in depth with the earth. The place ſhould be kept very clear from weeds, both before and after the plants appear; and if the plants are any where too thick, they may be thinned out at the proper ſeaſon.

All ſuch hedges as are expoſed to cattle, muſt, as ſoon as planted, be protected either with a ſtake and buſh hedge, hurdles, or rails, for four or five years till they grow up. They ſhould alſo be duly hoed and weeded while young, and kept very well cleared from all ſorts of weeds. This ſhould be particularly attended to the firſt two years of their growth.

And where deſigned to be trained, they ſhould be annually clipped over in ſummer, being topped ſparingly while young, only juſt trimming off the tops of the ſtraggling and run-away ſhoots, to preſerve a little regularity, that the whole may advance equally, and promote lateral wood to thicken them as they advance, and cut in moderately on the ſides. But when arrived at nearly their proper height, as four, five, or ſix feet, or more, they may be trimmed in cloſe on the ſides and tops annually, to preſerve them thick and within their proper bounds, cutting the ſides always firſt as even as poſſible; then the tops, which ſhould alſo be cut as even as a line, always cutting in nearly to the old wood of the former year's clipping, otherwiſe the hedges will be too broad; the tops being always kept narrower than the bottoms, in order that they may not become thin.

The neateſt mode of cutting them at the tops is that of the ridge form, which is eaſily done by a proper tool.

It is well known that regular hedges were formerly in great requeſt in gardens: almoſt all the different compartments and diviſions of pleaſure-grounds were ſurrounded with them, being formed of various ſorts of trees and ſhrubs, both evergreens and deciduous, which being neatly trained and clipped once or twice annually, ſometimes appeared very ornamental; but from their ſurrounding, ſhutting out, and obſtructing the ſight of the different ſhrubbery borders, clumps, and other parts, as well as their concealing the grounds, and appearing ſtiff and formal, they are at preſent little in uſe. They are only introduced occaſionally, either as outward or diviſion fences, or for ſhelter, ſhade, &c. in particular compartments, and to cover unſightly objects, or parts of the gardens.

The hedges formed of lofty elm, lime, beech, and ſome other ſorts of deciduous trees in pleaſure-grounds, for ornamental training, are alſo laid aſide, as being ſtiff, aukward, and troubleſome in keeping in order. And the various fancy devices in hedge-work have likewiſe given way to a better and more eaſy rural taſte in garden grounds.

In addition to what has been ſaid on hedges, formed of the more common ſorts of plants, it may be obſerved, that the laurel, though a ſingularly beautiful evergreen adorned with a noble large foliage, forming various ſhoots, never grows ſo compact, or is ſo eaſily kept in form as ſome other ſorts; beſides its leaves being very large, when clipped with ſhears, they are unavoidably cut through, and ſo ſtubbed and mangled as to have a diſagreeable appearance. In theſe hedges, therefore, inſtead of performing their annual trainings with ſhears, the ſhoots ſhould be trimmed off with a knife, to preſerve the leaves entire. This plant is proper to train hedge-faſhion to hide any diſagreeable fence, and will grow either under trees, in the ſhade, or in an open expoſure, and is of quick growth. Hedges of this nature ſhould be planted in one row, at from 18 inches to three feet diſtance, according to the ſize of the plants at the time of planting them out in the line of the fence.

The lauruſtinus, from its being not only an evergreen but a beautiful flowering ſhrub, forms a delightful hedge for ornament, as it is covered with flowers in winter and ſpring. It is alſo well adapted for training hedge-faſhion againſt any ſhabby fence or naked wall. In either method, it ſhould be planted in one row, at from 18 inches to three feet diſtance in the line.

The phillyrea and alaternus, being beautiful evergreens, form very ornamental hedges. They greatly reſemble each other; but the phillyrea being the ſtrongeſt grower, as well as thickeſt ſhooter, is the more proper for a hedge; for variety both may be uſed: they are alſo good evergreen ſhrubs for training hedge-faſhion againſt unſightly or naked walls, or paling fences, as they ſoon cover them; and if the common green and variegated kinds are intermixed, in either mode of hedge-work, they have a delightful effect at all ſeaſons of the year. They ſhould be planted in one row, at from about 15 or 18 inches, to two or three feet diſtance between plant and plant in the lines of the fences.

The bay is alſo capable of forming a tolerable evergreen hedge for variety, and may be led up ſix or ſeven feet high, placing the plants half a yard diſtance from each other in the lines.

The evergreen oak is likewiſe a proper plant to form a tall hedge, as it may be trained 15 or 20 feet high, if required. It ſhould be planted in one row, ſetting the plants one, two, or three feet aſunder, according to their ſize or ſtrength.

The evergreen privet will alſo form a handſome good hedge, five or ſix feet high, by planting the ſets a foot aſunder, and training it up narrow at top in the manner noticed above.

The tree box makes a very cloſe and beautiful low evergreen hedge, four or five feet high, when the ſets are planted about a foot aſunder in the rows of the hedge.

The leſſer ſorts of evergreens are ſometimes employed for variety to form moderate hedges, from about three or four to five or ſix feet in height; they ſhould be planted in a row at from 12 to 18 inches, to two feet aſunder in the lines.

All ſorts of evergreens are proper for hedges, when from about 12 or 18 inches, to two or three feet in height, though the holly ſucceeds better when planted in its younger growth.

The proper ſeaſon for planting them is either in autumn or in the ſpring; for it is not ſafe to tranſplant evergreens in the middle of winter. Where the ſoil is moiſt, the latter is the beſt period; but in dry gravelly ſoils, the former anſwers perfectly.

In planting theſe ſorts of evergreens, for middle or internal hedges, no ditches or banks are neceſſary as for outward hedges or fences; ſo that in the place where the hedge is deſigned, a ſort of border ſhould be marked out the whole length, two or three feet wide, and dug or trenched over for the reception of the plants: the plants need only, in theſe caſes, be planted in a ſingle row or line.

Among the deciduous plants, the hornbeam forms a beautiful ſummer hedge, being a moderate but very cloſe ſhooter, well furniſhed with leaves, and capable of being trained up from ſix or eight, to about 12 or 15 feet high; but the leaves, though they wither in autumn, remaining firmly attached to the branches all winter, make but a ſhabby appearance at that ſeaſon. It is, however, on this account ſuperior to moſt other deciduous hedges for the purpoſe of forming ſhelter in the winter. For hedges it ſhould be planted in ſingle rows, at about half a yard aſunder in the plants, to form a cloſe moderate hedge as ſoon as poſſible; but if deſigned to be brought up pretty tall, and the plants are ſpreading, they ſhould be ſet about three feet diſtant in the rows or lines.

The beech alſo forms a cloſe regular hedge, from about ſix or eight to fifteen or twenty feet high: the leaves withering on the branches in autumn, continue dropping off moſt part of the winter. Theſe plants ſhould be planted in the ſame manner as the hornbeam.

The elm forms a cloſe, even, and beautiful hedge, and may be trained from ſix or eight, to ten, twenty, or thirty feet high, forming a cloſe fence from top to bottom. The plants for this purpoſe may be from three or four, to eight or ten feet or more in height, and ſhould be planted in a ſingle row from two or three, to ſix or eight feet diſtant, according as they are leſs or more ſpreading, and as wanted to form a cloſe hedge as ſoon as poſſible

The lime-tree is ſometimes employed for ornamental hedges for variety, but is much inferior to the other deciduous ſorts, as it becomes thin and ſhabby by clipping, and is thinly leaved.

Other low kinds of ſhrubs of this ſort are ſometimes employed for variety: ſome ſorts, ſuch as roſes, honey ſuckles, and ſyringas, when formed into low hedges, beſides their property as hedges, produce great quantities of flowers, and afford a fine fragrance.

The plants for this uſe are of a proper ſize when from about one foot to a yard in height, according to the ſorts. It is beſt to plant them young, chooſing ſuch as are well furniſhed with plenty of ſide or lateral ſhoots, that they may form a cloſe head quite from the bottom. They may all be planted either in autumn or early ſpring, in open weather. The method of planting them is nearly the ſame as in the evergreen kinds.

Theſe ſorts of hedges ſhould be trained and clipped in the ſame manner as directed above.

In order to keep garden hedges in perfect good order, they ſhould be clipped twice every ſummer: the firſt time about Midſummer, when they have made their ſummer ſhoot; and the ſecond clipping towards the middle or latter end of Auguſt. But where this is done only once in the ſummer, the clipping ſhould not be performed until the beginning of Auguſt, as when cut ſooner the plants ſhoot again, and appear almoſt as rough the remainder of the ſummer, and all winter, as if it had not been done at all, which renders ſuch hedges very unpleaſant to the eye. See Fence.

Hedges, *Eſpalier*. See Espalier.

To line a Hedge, in *Military Affairs*, is to plant muſketeers along it under cover; either to fire upon an enemy that is advancing to ſave themſelves from the horſe, or to defend a paſs or defile.

Hedge-*hog*, in *Zoology*. See Erinaceus.

Sea-Hedge-*hog*. See Centronia and Echinoderma.

Hedge-*hog*, in *Botany*. See Medicago.

Hedge-*hog-thiſtle*. See Cactus.

Spaniſh Hedge-*hog-thorn*. See Anthyllis.

Hedge-*hog*, or *Weir-hedge*, in *Engineery*, is a temporary erection of wood, to collect the ſilt and contract the wide parts of rivers. See Smeaton's Report, v. i. p. 118.

Sir Thomas Hyde Page, Mr. Samuel Crawley, Mr. Anthony Tatlow, and others, have practiſed this method of gaining land from wide rivers; on the Trent this was accompliſhed on a conſiderable ſcale by merely ſtaking down rows of furze ſaggots, as mentioned in our article Canal.

Hedge-*hyſſop*, in *Botany*. See Gratiola.

Hedge-*muſtard*. See Erysimum.

Hedge-*nettle*. See Galeopsis.

Hedge-*nettle-ſhrub*. See Prasium.

Hedge-*ſparrow*, in *Ornithology*. See Motacilla *Modularis*.

Hedge-*clipping Machine*, in *Gardening*, a ſort of machine ſcaffolding, or ſtage, formed ten, twenty, or thirty feet high, or more, with platforms at different heights, to ſtand upon, the whole being made to move along upon four low wheels. It is compoſed of four long poles for uprights, well framed together, eight or ten feet wide at bottom, narrowing gradually to four or five at top, having a platform or ſtage fixed at every ſeven or eight feet of height, with one near the top, each having a rail waiſt-high: there is a ſort of ladder formed on one ſide to aſcend by, &c. Upon this machine a man or two may be employed on each ſtage or platform, trimming the hedge with ſhears, and ſometimes with a light garden hedge bill, fixed in a handle from three to five or ſix feet long, which is more expeditious, though it will not make ſo neat work as cutting with ſhears. It is very uſeful in clipping high hedges or trees. And it may be employed for dreſſing, cleaning, pruning, and nailing different ſorts of trees, as well as various other purpoſes. In extenſive pleaſure-grounds and gardens theſe machines are eſſentially neceſſary in various intentions.

Hedge-*fence*, a term applied to that ſort which conſiſts of ſome kind of hedge. See Fence.

Hedge-*row*, a term denoting the line or direction of a hedge-fence; which in general ſhould be ſet out as ſtraight as poſſible. It is of great advantage to have the hedge rows well cleared up and freed from all ſorts of trumpery both of the weed and buſhy kind, as by ſuch attention much land is not only gained, but great convenience experienced, as well in feeding as ploughing ſuch grounds.

Hedge-*row-timber*, a name applied to that kind which is raiſed in the hedge rows of fields. The growing of timber in hedge-rows, is not, however, by any means, a method of practice that ought to be generally adviſed, though, in particular inſtances, it may perhaps be had recourſe to with propriety and advantage. The great inconveniences in ſuch caſes are, that the trees ſoon produce gaps in the hedges by their ſhade and droppings, and at the ſame time do great injury to the crops; while their roots obſtruct the operations of the plough. Great numbers of trees in the ſtate of pollards, are frequently met with in particular diſtricts, which, while they diſguſt by their appearance, are alſo highly injurious to the hedges, and ſhould never be ſuffered to continue in ſuch ſituations longer than can poſſibly be avoided. See Pollard and Timber.

HEDGING, the practice of forming and repairing fences of the hedge kind. This is a ſort of work that is but ſeldom well executed, though it is of the utmoſt importance to the proprietor of lands to have it performed in the moſt perfect manner, in the view that he may be as ſecure as poſſible from the danger of ſtock breaking in, and at the ſame time have his hedges in neat order.

The proper ſeaſon for the performance of work of this nature, is any time during the winter months, when the ſtate of the weather will admit of it; as from about the beginning of November to the latter end of March, but not by any means earlier or later, as in the former caſe the buſineſs could not be properly done; while in the latter there would be danger to the plants from the riſing of the ſap in them.

It is always a good practice to have the hedges of farms made and repaired in a complete manner, as ſoon as poſſible after the tenants enter upon them; they being afterwards apportioned in ſuch a way as that a certain extent may be done annually. By this means they may be kept in a proper condition with much greater eaſe and facility.

In regard to the moſt proper modes of executing this ſort of buſineſs, they can only be directed by the nature and ſtate of the hedges. It ſhould, however, be a rule to avoid as much as poſſible all ſorts of dead hedges, as they are not only conſtantly attended with great expence but of ſhort duration. As there ſhould always be as little mixture as poſſible of living and dead materials in hedge fences, plaſhing is a practice that anſwers well in old thin hedges, as it keeps them up, and they conſequently laſt much longer than where much dead matters are made uſe of in them; and form a far better defence againſt live ſtock.

Immediately after the hedges have been properly made and repaired, the ditches on their ſides, where they may have any, ſhould be well ſcoured and cleaned out in order that the water may readily get off from them. All the bruſh and other wood ſhould likewiſe be faggotted, and brought away, in the view of being placed in proper ſtacks near the farmſtead, and thus the field be left free from all ſorts of rubbiſh of that nature. See Fence.

HEDJADIE, in *Geography*, a town of Aſiatic Turkey, in the government of Diarbekir, on the Tigris; 35 miles S.S.E. of Tecrit. N. lat. 60° 25′. E. long. 16° 49′.

HEDJAS, a province of Arabia, lying along the Arabic gulf, between Mount Sinai and Yemen, and extending inland as far back as to the confines of Nedsjed; it is bounded on the E. by Nedsjed, on the N. by the deſart of Sinai, on the S. by Yemen, and on the W. by the Arabic gulf. From the ſea-ſhore, a plain, varying in breadth, ſtretches backwards to the bottom of a chain of mountains, running in a direction parallel to the Red-ſea. This plain is ſandy and barren, with the exception of the openings of the vallies, watered by torrents from the mountains. This barren plain cannot be populous. Jambo, Jidda, and Ghunfude are the only towns or harbours on the whole of this extenſive coaſt. The other villages interſperſed here and there are too few and too inconſiderable to deſerve notice. In the interior parts there is no city of any importance except *Taaif*; which ſee. The two capitals of Hedjas are *Mecca* and *Medina*; which ſee reſpectively. The highlands of Hedjas produce abundance of fruits, and other commodities of various kinds. Balm of Mecca is obtained from theſe lofty regions, and chiefly from the extenſive mountain of Safra, at the diſtance of three days journey from the Arabic gulf. Theſe highlands are poſſeſſed by a number of independent ſovereign ſcheicks; of whom the moſt powerful is the ſcheick of the tribe of Harb, who can bring into the field 2000 men. His domains contain ſeveral cities and a number of villages. During the months favourable for paſturage the moſt diſtinguiſhed perſons of this tribe live in tents; and in the other parts of the year, they inhabit towns and villages. Thoſe of the lower claſs live, commonly through the whole year, in huts thatched with graſs. This principality is ſituated upon the mountains between Mecca and Medina. The other independent ſcheicks in this province live with their ſubjects in towns and villages, through the whole year, and for their defence occupy ſome caſtles built upon precipitous rocks. They ſometimes join their neighbours to attack the Turkiſh caravans; but theſe never paſs through *their* dominions. The chief of the tribe of Harb is the perſon who principally haraſſes the caravans, and lays them under contribution. The moſt remarkable and leaſt known of theſe highland communities, is that which the Jews have formed upon the mountains lying N.E. of Medina, in a tract of country called "Kheibar;" they have independent ſcheicks of their own, and are divided into three tribes. They are very odious to the Mahometans, who unjuſtly accuſe them of pillaging the caravans, ſo that in Syria the greateſt affront that can be offered to a perſon is to call him "Beni Kheibar." Theſe Jews do not ſeem to keep up any intercourſe with their brethren who are diſperſed over Aſia. They belong to the ſect of the Karaites, who are not numerous, and are much ſcattered; and by the other Jews, who are in general attached to the ſect of the Phariſees, are ſtill more deteſted than the Chriſtians or Mahometans.

The grand ſignior ſtyles himſelf ſovereign of Hedjas, and ſome of our geographers take occaſion from hence to repreſent this part of Arabia as a province of the Turkiſh empire. But the authority of the ſultan is a mere ſhadow, and his power in Arabia conſiſts ſolely in a few trivial prerogatives. He ſends annually caravans to Mecca, with troops to protect them, that are often obliged to advance by force of arms. When he chooſes to oppreſs a weak neighbour, he can depoſe the reigning ſherriffe, and exalt another, while his caravan lords it at Mecca. He ſends a pacha to Jidda, who ſhares the government of the city with the ſherriffe, but who dares neither to go to the ſeat of his government, nor to return from it, unleſs when he can be protected by the great caravan. Laſtly, the Arabs ſuffer the Turkiſh ſovereign to maintain, for the ſecurity of the pilgrims, and in order to guard the walls, a few Janiſaries, cooped up in ſome wretched towns. The revenues which the ſultan draws from this province, and ariſing chiefly from duties paid at the cuſtom-houſe of Jidda, are not ſufficient to defray the expences of the pacha's houſhold. But in return for theſe ſcanty revenues, he is obliged to ſecure the favour of the Arabs by annual preſents, to allow penſions to the ſherriffes, and to the principal nobility of Hedjas, or guardians of the ſacred family. With theſe penſions, and the freight of four or five large veſſels, ſent every year to Jidda, laden with proviſions, he ſupports almoſt all the inhabitants of Mecca and Medina. While the pilgrims remain in the city of Mecca, as much water as 2000 camels can bear is daily diſtributed gratis, not to mention the great number of preſents with which he adorns the "Caaba," and gratifies the deſcendants of Mahomet. The ſultan no longer commands reſpect upon the Arabic gulf. Poſſeſſing only a precarious authority over Egypt, and having but a poor navy, he cannot hinder the Arabs from plundering Turkiſh ſhips, whenever they approach near enough to the ſhore, nor yet puniſh ſuch acts of inſolent piracy. Niebuhr's Travels.

HEDLINGER, John Charles, in *Biography*, an artiſt and die-cutter, was born at Schweitz in the year 1691. He was intended by his father for buſineſs, but his own inclination led him to ſtudy the fine arts, and while he was very young, he determined upon becoming a die-cutter, for which he had prepared himſelf by learning to draw. He reſolved to be his own inſtructor, not being able to bear the tedium of regular leſſons from a maſter in the profeſſion. He accordingly began to cut dies without any aſſiſtance, forming the tools which he employed, and he ſoon gave promiſe of excelling in the art. He was at length placed under the care of William Cramer, director of the mint, by whoſe aſſiſtance he made a rapid progreſs. In 1712 he ſerved as a lieutenant among the volunteers at the battle of Toggenbrug; and in 1717 he viſited Paris, where he applied himſelf to his buſineſs with great ardour, and where he was ſoon engaged to execute ſome medals for his majeſty, by whom he was preſented with a gold box. He next went to Sweden, and was made director of the mint, a place that was conferred upon him for life, and, independently of the ſalary, he was paid for all the pupils he inſtructed in his art. In 1723 he was invited to Ruſſia, with the offer of being appointed medalliſt to Peter the Great, an honour which he declined, being well ſatisfied with the protection and patronage of the queen of Sweden. He conceived an earneſt deſire of viſiting Italy, and having obtained permiſſion for this purpoſe, he left Stockholm in 1726, and continued his tour as far as Naples, where he not only examined every thing worthy of notice, but extended his acquaintance with eminent artiſts. At Rome he executed a medal of pope Benedict XIII., and made an excellent likeneſs, though he had only ſeen him occaſionally. In about eighteen months he returned to Stockholm, and ſtruck ſeveral medals relating to Swediſh commerce, manufactures, and mines, with a chronological ſeries of the Swediſh kings. He was now invited by many of the crowned heads in Europe, and ſtruck medals of the empreſs of Ruſſia; the princeſs Anne of Mecklenburg; and other diſtinguiſhed perſonages. In 1741 he returned to his native land, where he married. After paſſing ſome years, partly in Switzerland, and partly at Stockholm and Berlin, at length he ſettled in his own country, and died at Schweitz of a fit of apoplexy in March 1771, at the age of eighty. All his medals were engraved and publiſhed in Switzerland, under the title of "Œuvres de Chevalier Hedlinger," to which is prefixed an account of his life. Gen. Biog.

HEDON, or Heydon, in *Geography*, a borough, market town, and pariſh, in the diſtrict of Holderneſs, and Eaſt-Riding of Yorkſhire, England, is ſeated on a ſmall creek of the Humber, at the diſtance of ſeven miles from Hull, and 178 north of London. In the year 1800 its population was aſcertained to conſiſt of 592 perſons, and its houſes 144. Here were formerly three churches, but only one remains. It ſent members to parliament in the 23d year of Edward I.; but diſcontinued to return again till the firſt of Edward VI. The corporation conſiſts of a mayor, recorder, two bailiffs, and nine aldermen; and the number of freemen, having the right of voting, is about 140. The right of election is obtained either by deſcent, by apprenticeſhip, or by honorary gift. Here are a weekly market on Saturdays, and four annual fairs.

HEDONA, in *Botany*, from ἡδονη, *pleaſantneſs*, on account of the elegance of its flowers.—Loureir. Cochinch. 286.—This genus, which was founded by Loureiro, and which he conſiders as cloſely allied to *Dianthus*, having miſtaken the bracteas for ſcales of the calyx, appears to be the *Lychnis coronata*, Willd. Sp. Pl. v. 2. 808; *L. grandiflora* of Jacquin, fig. 3 in his Icon. Rar. t. 84.

HEDWIG, John, in *Biography*, a botaniſt particularly celebrated for his diſcoveries relative to the fructification of Moſſes, and for a new and very ingenious generic diſtribution of them, which was the reſult of thoſe diſcoveries, (ſee Fringe *of Moſſes*,) was born Oct. 8. 1730, at Cronſtadt, in Tranſylvania, where his father filled a reſpectable ſtation in the magiſtracy. After the firſt rudiments of domeſtic education, and with them an ardent fondneſs for the cultivation and obſervation of plants of all kinds, had been imbibed under his parents' roof, he ſtudied for four years at the public ſchool of his native town. On the death of his father in 1747, though he inherited but a very ſlender patrimony, he was enabled to go for further improvement to the univerſity of Preſburg in Hungary, where he remained two years, and then proceeded to Zittau in Upper Luſatia, led by the fame of the rector Gerlach, a learned grammarian, a relation probably of Stephen Gerlach; ſee that article. In 1752 he removed to Leipſic, where his diligence and talents, as well as his perſonal character, procured him the favour and friendſhip of the celebrated Ludwig in particular, by whoſe lectures of various kinds, as well as thoſe of Hebenſtreit, Boehmer, and others, he rapidly and abundantly profited. Hedwig uſed often, in after life, to expreſs his regret, that Ludwig had been too much occupied by the practice of phyſic and other buſineſs, to perfect a ſyſtem of botanical arrangement which he had in contemplation, as well as to bring the phyſiology of plants to greater perfection. So much eaſier is it to ſpeculate than to execute! ſo greatly do the miſts which envelope unexecuted ſyſtems magnify their ingenuity! Ludwig had already publiſhed on botanical phyſiology as well as arrangement. His works are marked with genius, but not of the firſt order. They are rather the performances of a profeſſor, who felt himſelf obliged to do ſomething, but would have found it difficult to go much further, nor did even Hedwig under him imbibe any thing of the true philoſophical principles of arrangement, the talents for which are granted to very few, and are ſcarcely ever of German growth. We mean no invidious reflections on any nation or people. Each has its appropriate merits, and all are uſeful together in ſcience, like different characters on the theatre of human life.

In 1756 young Hedwig was taken into the houſe of profeſſor Boſe, to aſſiſt him in the demonſtration of plants in his botanical lectures, as well as in the care of patients at the Infirmary; and it is ſuppoſed that this engagement was full as advantageous to the maſter as to the pupil. Like Haſſelquiſt, he was obliged to turn his abilities to various methods for the augmentation of his ſcanty income, and his ſobriety and economy enabled him to live decently on what he could procure, and to purſue every means of improvement within his reach. Having finiſhed his ſtudies, he was deſirous of ſettling as a phyſician in his native place, but was prevented by an excluſive law in favour of ſuch as are educated in ſome Auſtrian ſchool. In 1759 he took his degree of Doctor of Phyſic at Leipſic, on which occaſion he publiſhed a theſis on the uſe of emetics in acute fevers, and was induced, by the perſuaſion of a mercantile friend at Chemnitz in Saxony, to eſtabliſh himſelf there, having married a young woman of good family at Leipſic. He was now ſo far maſter of his own time, that he found himſelf able to alleviate the labours of his profeſſion by almoſt daily attention to his favourite ſtudies. No longer under the guidance of profeſſors, he was now left to improve himſelf, in the very beſt of all ſchools, that of Nature. His morning hours in ſummer, from five till breakfaſt-time, were ſpent in the fields and woods, and his evenings in the inveſtigation of what he had collected, or elſe in the care of a little garden of his own. The acquiſition of an excellent compound microſcope, from his friend Koehler of Dreſden, proved of the utmoſt importance in deciding and aſſiſting the peculiar bent which his mind was now taking, for the ſtudy of the minuteſt kinds of plants, as well as for ſcrutinizing the anatomy of all. To purſue with ſucceſs his enquiries relative to theſe matters, he found it neceſſary, at 40 years of age, to learn drawing, as well to aſſiſt his own memory, as to communicate his diſcoveries to others. Hence he has been enabled to publiſh ſome of the moſt curious and authentic botanical figures.

The firſt and greateſt fruit of Hedwig's labours, was the determination of the male and female flowers of moſſes, the parts of which had been made out by Micheli, at leaſt in a great meaſure, and even the true office of each ſuggeſted; but the theory of the whole was firſt clearly detailed, as it was ſubſequently illuſtrated on every poſſible occaſion, by Hedwig. Juſt ſo Linnæus reviſed the obſervations of preceding philoſophers on the ſexes of plants in general, confirmed them by new ones, founded, in conſequence, a ſyſtem of arrangement, and to his lateſt hour elucidated both the one and the other by practical application. Yet the ſexual doctrine in both inſtances has been attacked, and Hedwig has ſtill a liberal adverſary in M. Paliſot de Beauvois, of whoſe opinions we propoſe to ſpeak in their proper place, under the article Mosses.

Our author is recorded to have firſt beheld the bladder-like anther, of the Linnæan *Bryum pulvinatum*, diſcharging its pollen, on the 17th of January 1770. He was already ſatisfied that what Linnæus, miſled by Dillenius againſt his own previous opinion, had taken for anthers, were in fact the capſules of moſſes, and produced real ſeed. A hiſtory of his diſcoveries was publiſhed in a German periodical work at Leipſic in 1779. In 1782 appeared his valuable *Fundamentum Hiſtoriæ Naturalis Muſcorum Frondoſorum*, a handſome Latin quarto, in two parts, with 20 coloured microſcopical plates. The earlieſt account given of Hedwig's opinions in England, was from the communications of the late profeſſor J. Sibthorp, who had juſt then viſited him, to the writer of the preſent article, in 1786, and it is annexed to a tranſlation of Linnæus's *Diſſertation on the Sexes of Plants*, publiſhed that year.

Hedwig loſt his firſt wife in 1776. She had brought him nine children, ſix of whom ſurvived their mother. This loſs, though deeply felt, was ſpeedily, and, as it ſeems, effectually ſupplied, by his marrying a very accompliſhed lady the following year, who was likewiſe a native of Leipſic. She perceived that the merits of her huſband were in a manner buried at Chemnitz, where his time was laboriouſly occupied for a ſlender remuneration, ſcarcely ſufficient to maintain and educate his family. Theſe conſiderations induced her to urge his removal to Leipſic, which took place at Eaſter 1781, and the following year the work abovementioned was there publiſhed, on which his fame as an original phyſiologiſt and botaniſt moſt ſecurely reſts. The ſame ſubject is happily followed up in his *Theoria generationis et fructificationis plantarum cryptogamicarum Linnæi*, publiſhed at Peterſburg in 1784. This work gained its author the prize from that academy in 1783, of 100 gold ducats, which Linnæus had in 1759 obtained for his Diſſertation on the Sexes of Plants above-mentioned. In it the fructification and germination of Moſſes is further illuſtrated, and a view is alſo taken of the fructification of the other cryptogamic families, the author being very naturally deſirous of extending his diſcoveries throughout that obſcure tribe of plants. His ſucceſs has not been equal in all. In the *Hepaticæ* he has indeed fully eſtabliſhed his own doctrine, confirming what had been obſerved or believed by preceding writers, which may alſo perhaps be ſaid of his account of the *Fungi*, the obſcure, though not properly cryptogamic genus, *Chara*, and *Lichen*. His entirely novel explanation of the impregnation of *Equiſetum*, ſee that article, though wonderful, has not been controverted; but of the flowers of the proper ferns, neither he, nor any one elſe, has, in our opinion at leaſt, detected the ſecret; ſee Filices. A new and encreaſed edition of this work appeared in 1798.

The literary fame of Hedwig, and his medical practice, were now every day encreaſing. He was made phyſician to the town guards, profeſſor of phyſic and of botany at Leipſic. The latter appointment, in which he ſucceeded Dr. Pohl removed to Dreſden in 1789, was accompanied with a houſe, and the ſuperintendance of the public garden. In 1791 the ſenate appointed him phyſician to the ſchool of St. Thomas. The duties of all theſe various ſtations might be ſuppoſed to have fully occupied his time, yet he ſtill found leiſure to attend to new communications from his friends. Many nondeſcript moſſes were ſent him from Pennſylvania by the Rev. Dr. Muhlenberg, and many Weſt Indian ones by Dr. Swartz. A fine collection of new or rare ferns, in full fructification, was forwarded to him by ſir Joſeph Banks, at the ſuggeſtion of the writer of this, in hopes that he might be induced to take up their examination; it not being then known, in this country, that he was already intent on the ſubject, and preparing his eſſay for the Peterſburgh academy. The fruits of theſe communications were not given to the world in his life-time. But the former ones contributed, with other matter, to a poſthumous work, publiſhed by his able pupil Dr. Schwaegrichen, entitled *Species Muſcorum*, in 4to. with 77 coloured plates; and the latter to ſome ſubſequent works of his ſon. If the plates of the *Species Muſcorum* be leſs elaborate or full than thoſe of his great work hereafter mentioned, the book is extremely valuable as a ſynopſis of ſpecies, and a ſummary of his knowledge on that ſubject.

The great and truly excellent work to which we allude, is his *Cryptogamia*, as it is generally called, entitled *Deſcriptio et Adumbratio microſcopico-analytica Muſcorum Frondoſorum, nec non aliorum vegetantium e claſſe Cryptogamicâ Linnæi novorum dubiiſque vexatorum*, in four volumes folio, with 40 excellent coloured plates to each. Of this the firſt volume came out in 1787; the laſt in 1797. In the figures the moſt minute parts are detailed with a fidelity rarely to be elſewhere ſeen, except in the cryptogamic publications of Hoffmann, Schrader, and Perſoon, for theſe are unrivalled. The letter-preſs is equally complete. Scarcely any thing can ever be added to the illuſtration of the ſubjects treated in theſe volumes of Hedwig, at leaſt of the moſſes, which compoſe the whole of them, except 14 plates in the ſecond.

The author lived to witneſs the general applauſe which his labours received, notwithſtanding ſome attacks made on his theories of impregnation by Gærtner, Necker, and others, and he enjoyed alſo the general reſpect of thoſe who knew or correſponded with him. But he was not exempt from domeſtic afflictions. Of ſeven children brought him by his ſecond wife, ſix had died in their infancy, and the only remaining one, a darling daughter, was taken from him at the age of 16, by a conſumption, in December 1797. His grief, locked up in his own breaſt, could not be diſſipated even by the ſcientific purſuits, to which he wiſely reſorted for the occupation of his thoughts. His health declined. A ſucceſſion of feveriſh attacks impaired his conſtitution, and he died of a typhus, after nine days confinement, on the 17th of Feb. 1799, aged 68. He left four children, all the offspring of his firſt marriage, two daughters and two ſons. Of the former, one married profeſſor Beck of Leipſic, the other Dr. Sulzberger of Burgſtaedt in Saxony. One of his ſons is an eminent painter at Magdeburg; the other, named Romanus Adolphus, adopted his father's taſtes and purſuits, ſettled as a phyſician at Leipſic, publiſhed two faſciculi of a ſplendid work on ferns, with coloured plates, as well as ſome phyſiological treatiſes, but unfortunately did not long ſurvive his diſtinguiſhed parent.

To ſum up the ſcientific character of Hedwig; as an obſerver and faithful deſcriber he cannot be ranked too high; as a vegetable phyſiologiſt, if not always infallible, he ſtands in the firſt order, and his knowledge was enhanced by modeſty, candour, affability, the ſtricteſt probity, and the moſt elevated piety. His ſyſtematic talents were inferior to his phyſiological ones. His methodical diſtribution of moſſes, and the genera he has eſtabliſhed, are altogether artificial in principle, though they prove in many caſes natural, without his having adverted to it. His ſpecific characters are ſeldom well conſtructed or defined, and his phraſeology liable to much exception. He adopts the expreſſion *ductorum faſciculus*, inſtead of the Linnæan *nervus* or *coſta*, for the ribs of the leaves of moſſes, though it is a diſtinction without a difference, and far leſs conciſe and commodious. We have already mentioned his overſight in calling the ſeeds of moſſes *ſporæ*, ſee Gemma; though the adoption of that word tended only to overſet his own theory of impregnation, the whole end and aim of which were to prove them real *ſemina*. Hence he uſes *ſporangium* for *pericarpium*; or rather for that kind of ſeed-veſſel called a capſule, ſo that his term is both indefinite and ſuperfluous.

The ſame objections lie in full force againſt his *truncus*, which is a real *caulis*. We poſtpone all further remarks till we come to treat of the natural order of moſſes in its proper place. The memory of this illuſtrious botaniſt is preſerved by his friend Swartz in a fine Weſt Indian tree; ſee Hedwigia. For much of the above account we are indebted to a hiſtory of his life, annexed to his *Species Muſcorum*, by Schwaegrichen. He appears by a miniature portrait, in a ring ſent by his now deceaſed ſon to the writer of the preſent article, to have had a countenance marked with benevolence and intelligence. The latter perhaps is ſtill more ſtrongly indicated in a German print publiſhed ſeparately, while the medallion in the antique ſtyle, prefixed to his great folio work, has more of a mild and placid expreſſion. His complexion and hair were light, and his eyes of a blueiſh hazel. S.

HEDWIGIA, in *Botany*, ſo named by Swartz in honour of the great muſcologiſt; ſee Hedwig. This juſt tribute had been paid him already by Ehrhart in the Hanover Magazine for 1781, and accepted by himſelf in his *Fundamentum Hiſtoriæ Naturalis Muſcorum*, part ii. p. 86; but the genus to which it was applied was afterwards ſunk in *Gymnoſtomum* by Swartz and others. Now it is, we believe with great propriety, reſtored, by the appellation of *Anictangium*, it muſt ever be regretted that the original name had been taken away, a moſs being much more appropriate to Hedwig than any other plant could be. See Gymnostomum.—Swartz. Prodr. 62. Ind. Occ. 670. t. 13. Schreb. 800. Willd. Sp. Pl. v. 2. 332. Mart. Mill. Dict. v. 2.—Claſs and order, *Octandria Monogynia*. Nat. Ord. *Tribilatæ*, Linn. *Meliæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, cup-ſhaped, with four minute, ovate, acute, upright teeth. *Cor.* of one petal, tubular; tube the length of the calyx, contracted upwards; limb in four ovate, acute, erect, converging ſegments. *Stam.* Filaments eight, broad, inſerted into the baſe of the corolla, lying upon the germen; anthers minute, oblong, acute, converging over the ſtigma. *Piſt.* Germen ſuperior, conical, with eight furrows; ſtyle none; ſtigma obtuſe. *Peric.* Capſule large, three-lobed, (as if compoſed of three ovate pointed ones,) of three cells. *Seeds*, Nuts ſolitary, ovate, pointed, convex and very ſmooth on one ſide, rugged and uneven on the other; kernel of the ſame ſhape.

Eſſ. Ch. Calyx inferior, four toothed. Corolla tubular, four-cleft. Style none. Capſule three-lobed, three-celled. Nuts ſolitary.

Obſ. This genus ſhould be placed between *Guarea* and *Amyris* in the Linnæan ſyſtem.

1. H. *balſamifera.* Swartz. Ind. Occ. 672. (Bois cochon; Nicolſon. Hiſt. de St. Domingue, 169, according to Swartz.)—Native of woods on the hills in the weſtern part of Hiſpaniola. A tall *tree*, rendered conſpicuous at a great diſtance in the woods by the whitiſh grey bark of its trunk. The branches are rather aſcending, but their extremities are often drooping or pendulous. *Leaves* alternate, ſcattered, erect, pinnate, a foot long, ſmooth; their leaflets on ſhort partial ſtalks, oppoſite, ovato-lanceolate, pointed, entire, ribbed, veiny, ſomewhat rigid. *Cluſters* about the ends of the branches, terminal and axillary, ſhorter than the leaves, erect, ſtraight, compound, with angular ſtalks. *Flowers* ſmall, whitiſh. *Capſule* as big as a large hazel-nut, with a coriaceous ſkin, full of an aromatic gum. *Nuts* hard, with an oily bitter kernel to each.—This tree flowers in May, and is called by the inhabitants of its native country *Bois de cochon*, or Wild-boar's tree, becauſe thoſe animals are, when wounded, reported to ſtrip off its bark, and heal their wounds with the gum that exudes from

it. This exudation is, according to Swartz, of a balſamic nature, very like balſam of Copaiva, both in ſcent and virtues. It is given in complaints of the cheſt or lungs, and is copiouſly procured by wounding the trunk of the tree.

HEDYCARYA, from ἡδυς, *ſweet*, and καρυα, *a nut*, becauſe the tree in queſtion bears extremely ſweet nuts.—Forſt. Gen. 64. Linn. Suppl. 67. Schreb. 702. Mart. Mill. Dict. v. 2. Juſſ. 401. Lamarck Dict. v. 3. 78. Illuſtr. t. 827.—Claſs and order, *Diœcia Icoſandria*. Nat. Ord. *Scabridæ*, Linn. *Urticæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, flat-wheel-ſhaped, eight or ten-cleft: ſegments lanceolate, nearly equal. *Cor.* none.—Male, *Stam.* Filaments none; anthers numerous, about fifty, oblong, four-furrowed, barbed at the top, arranged along the whole baſe of the calyx.—Female, *Piſt.* Germens numerous, flat-globe-ſhaped, each ſtanding on a cylindrical pedeſtal, in the middle of the calyx; ſtyles none; ſtigmas little protuberances ſcattered over the germens. *Peric.* none. *Seeds*, ſix to ten ſtalked, globular, bony, ſingle-ſeeded nuts; kernels ſolitary, globular. *Recept.* woolly, in the middle of the calyx.

Eſſ. Ch. Calyx eight or ten-cleft. Corolla none.—Male, Filaments none; anthers in the bottom of the calyx, four-furrowed, bearded at the tip.—Female, Germens ſtalked. Nuts ſtalked, ſingle-ſeeded.

1. H. *dentata*. Linn. Suppl. 431. Forſt. Gen. t. 64. This is the only ſpecies known, and is a native of New Zealand.—A ſmooth *ſhrub*. *Leaves* alternate, oblong, ſerrated, on ſhort foot-ſtalks, very ſmooth, veins running almoſt tranſverſely. *Cluſters* axillary. *Calyx* hairy. *Nuts* very ſweet.

HEDYCHIUM, from ἡδυς, *ſweet* or *pleaſing*, and χιων, *ſnow*, alluding to the fragrance, elegance, and whiteneſs of the flowers, at leaſt of the firſt and original ſpecies.—Kœnig in Retz. Obſ. Bot. faſc. 3. 73. Willd. Sp. Pl. v. 1. 10. Roſcoe Tr. of Linn. Soc. v. 8. 342. t. 20. f. 6. Sm. Exot. Bot. v. 2. 95. Dryandr. in Ait. Hort. Kew. ed. 2. v. 1. 3. Juſſ. 448. (Gandaſuli; Lamarck. Dict. v. 2. 603.) Claſs and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Linn. *Cannæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, tubular ſheathing, membranous, ſplitting on one ſide. *Cor.* of one petal, reverſed; tube very long, cylindrical, curved; outer limb in three equal, ſpreading, oblong, involute ſegments; inner two-lipped, the upper lip of two elliptical divaricated lobes, lower rounded, or inverſely heart-ſhaped, broadeſt, turned uppermoſt. *Stam.* Filament one, reverſed, declining, ſimple, linear, channelled, about as long, or longer than the corolla; anther attached by its back, direct, oblong, recurved, of two linear marginal lobes, meeting round the ſtyle, burſting at their outer edge. *Piſt.* Germen inferior, ſmall, roundiſh; ſtyle thread-ſhaped, embraced by the filament; ſtigma obtuſe, concave, fringed, projecting a little beyond the anther. *Peric* . . . . .

Eſſ. Ch. Anther two-lobed, recurved, terminal, embracing the ſtyle, without any appendage. Outer limb of the corolla in three equal linear lobes; inner in three parts, two-lipped. Flower reverſed. Tube longer than the limb.

1. *H. coronarium*. Sweet-ſcented Garland-flower. Curt Mag. t. 708. Sm. Exot. Bot. t. 107. (Gandaſulium; Rumph. Amb. v. 5. 175. t. 69. f. 3.)—Leaves lanceolate Bracteas imbricated, elliptical. Lip cloven.—Native of the Eaſt Indies, where alſo it is very generally cultivated for ornament. The Malay women decorate their heads with the flowers, which they uſe alſo emblematically, according to the oriental manners, ſending them to any young man whom they wiſh to reproach with inconſtancy in love, perhaps becauſe the duration of each flower is ſo very tranſient. Dr. Buchanan found this plant, or at leaſt a pale yellowiſh variety of it, wild about the borders of fields among the elevated mountains of Upper Nepal, a country rich in the moſt beautiful and uncommon vegetable productions. In our ſtoves it is now not uncommon, blooming in autumn, and is not difficult of cultivation. The *root* is perennial, fleſhy, producing many offsets. *Stem* ſimple, leafy, three feet high, herbaceous, ſmooth. *Leaves* ſpreading in two rows, alternate, lanceolate, pointed, a foot long, downy or ſilky beneath; their footſtalks claſping the ſtem, and each crowned with an oblong ſtipula. *Spike* terminal, erect, many-flowered. *Bracteas* large, cloſely imbricated, elliptical, obtuſe, hairy at their points. *Flowers* two, three, or four to each bractea, large, pure white, with more or leſs yellow on the diſk of their broadeſt ſegment, and in Nepal they are all over yellowiſh; yet we can find no reaſon to ſuſpect any ſpecific difference. They are very ſweet-ſcented. The *fruit* is unknown, the plant being ſaid never to produce ſeed, even in Indian gardens, probably as it increaſes ſo much by root. The Nawars, or primæval inhabitants of Nepal, call this flower *Lutiſu Swa* in their language.

2. H. *ellipticum*. Broad-leaved Garland-flower.—Leaves elliptical, ſmooth. Bracteas imbricated, elliptical. Lip entire.—Gathered by Dr. Buchanan, July 26, 1802, at Narainhetty, in Upper Nepal, where it grows about the borders of fields among the mountains. No other botaniſt has ever obſerved this ſpecies, which would be as deſirable an acquiſition to our gardens as the foregoing. The *root* is fleſhy, perennial, encreaſing much. *Stem* two feet high, compreſſed, erect, covered with the long ſheathing footſtalks. *Leaves* in two ranks, ſix or eight inches long, broadly elliptical, pointed, ſmooth on both ſides. *Spike* terminal, drooping, of numerous, denſe, ſomewhat level-topped, whitiſh *flowers*, one only to each *bractea*, whoſe lip is rather rounded and undivided than heart-ſhaped, and whoſe filament and ſtyle are longer than in *H. coronarium*. The tube alſo of each flower is longer and more expoſed.—This ſpecies, according to Dr. Buchanan, ſerves as commonly for ornament as the former in its native country, where it is called *Tocucha Swa*.

3. H. *ſpicatum*. Long-ſpiked Garland-flower.—Leaves lanceolate. Spike elongated. Bracteas convoluted, ſingle-flowered. Stamen much ſhorter than the lip.—Native of the borders of fields, among the hills of Upper Nepal, where it is called *Wohutty Swa*, and admired for its beauty and fragrance, the latter being, according to Dr. Buchanan, of a very powerful kind. Its habit is rather moſt like the firſt, the *ſtem* being three feet high, and *leaves* lanceolate, pale and ſomewhat ſilky beneath. But the infloreſcence is totally different, conſiſting of a long, ſlender, curved *ſpike*, a foot in length, yet not riſing above the top leaf. The *flowers* as they expand become diſtant, each enveloped at the baſe by its own ſheathing, convoluted, obtuſe *bractea*, which, however, is ſhorter than the calyx. The *corolla* is white; two ſegments of the inner limb linear and widely ſpreading, the third, or lip, deeply divided or obcordate, with a claw which exceeds in length the unuſually ſhort and inflexed filament and ſtyle.

4. H. *thyrſiforme*. Denſe-ſpiked Garland-flowers.—Leaves elliptic-lanceolate. Spike ovate, denſe. Bracteas convoluted. Stamen longer than the corolla.—Gathered by Dr. Buchanan in Auguſt 1802, at Narainhetty, in Upper Nepal, with the laſt, from which the natives do not by name diſtinguiſh it. It differs, however, in its much ſhorter and very denſe *ſpike*, and long *ſtamen* and *ſtyle*. The *calyx*, moreover,

over, has three teeth, and the lip of the *flower* is finely toothed. The *leaves* too, in our ſpecimens, are ſhorter, and conſequently of a broader proportion. In other reſpects the plants agree.

5. H. *coccineum*. Scarlet Garland-flower.—Leaves lanceolate, ſmooth. Spike elongated, cylindrical. Bracteas convoluted, many-flowered. Stamen very long.—Native of the woods of Upper Nepal, where it is known by the name of *Gunculo Swa*. Dr. Buchanan gathered our ſpecimen at Suembu, June 8, 1802.—The *root* is perennial, fleſhy, lobed, and proliferous, as in the reſt of the ſpecies. *Stem* erect, leafy, ſix feet high. *Leaves* twelve or eighteen inches long, lanceolate, pointed, ſmooth on both ſides, with long, ſheathing, carinated ſtalks. *Spike* terminal, erect, long, but not ſurmounting the leaves, cylindrical, many-flowered; its common ſtalk hexagonal and downy. *Bracteas* generally three together in whorls, except a few of the upper and lower ones, an inch long, horizontally ſpreading, elliptical, obtuſe, convoluted, rather hairy and ſomewhat coloured. *Flowers* three or four to each bractea, large, ſcarlet. Outer ſegments of their limb lax and twiſted, two of the inner lanceolate and blunt, the third, or lip, very broad but ſhort, roundiſh, two-lobed, ſupported by a claw. *Stamen* much exceeding the corolla, rigid, and prominent.—Dr. Buchanan obſerved what he conceived to be a variety of this fine ſpecies, chiefly differing in its more denſe imbricated ſpike, and orange-coloured inner ſegments of the flowers. Its flower-ſtalk indeed was ſmooth, and calyx terminating in two teeth. We have ſeen no ſpecimen of this, but are inclined to preſume it may be a diſtinct ſpecies. S.

HEDYCOME, in the *Ancient Muſic*, a dancing air for the flute

HEDYCREA, in *Botany*, is derived from ἡδὺς, *ſweet*, and κρέας, *fleſh*, becauſe the pulp of its fruit is ſweet.—Schreb. 160. Mart. Mill. Dict. v. 2. (Licania; Aublet Guian. v. 1. 119. Juſſ. 340. Lamarck Illuſtr. t. 122.) Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Pomaceæ*, Linn. *Roſaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, hemiſpherical, with five acute, ſpreading teeth. *Cor.* none. *Stam.* Filaments five, inſerted into a ring ſurrounding the mouth of the calyx, oppoſite to, and ſhorter than the teeth; anthers roundiſh. *Piſt.* Germen ſuperior, roundiſh, woolly; ſtyle longer than the calyx, briſtly, woolly; ſtigma obtuſe. *Peric.* Drupa oval, ſoft, internally fibrous, of one cell. *Seed.* Nut ovate, covered with fibres, of one cell, with a hard ſhell.

Eſſ. Ch. Calyx inferior, hemiſpherical, five-toothed. Petals none. Drupa with an oval nut, encompaſſed with fibres.

1. *H. incana*. Mart. Mill. Dict. v. 2. (Licania incana; Aublet. Guian. t. 45.)—This is the only ſpecies known. It is a native of Guiana, and flowers in Auguſt; its fruit, which is called *Caligni* by the natives, ripens in October.—This *tree* riſes to the height of four or five feet, having an aſh-coloured *bark*. *Wood* hard and whitiſh, with a ſmell like rancid oil. *Leaves* alternate, ſomewhat ſeſſile, ovate, pointed, entire; green above; white beneath. *Stipulas* oblong, narrow, acute. *Flowers* ſeſſile, with two bracteas at their baſe, in axillary and terminal *ſpikes*. *Drupa* white, marked with red dots, eatable.

HEDYOSMUM, a name adopted by Swartz, from ἡδύοσμος of Dioſcorides, ſo called by the Greeks from ἡδὺ, *ſweet*, and ὀσμὴ, *ſmell*, becauſe the plant was of a ſweet ſavour. The ancient plant appears to have been Mint. Swartz. Ind. Occ. v. 2. 957. Schreb. 650. Willd. Sp. Pl. v. 4. 476. Mart. Mill. Dict. v. 2.—Claſs and order, *Monœcia Polyandria*. Nat. Ord. *Amentaceæ*, Linn. et Juſſ.

Gen. Ch. Male, *Cal.* Catkin without ſcales, covered all over with ſtamens; perianth none. *Cor.* none. *Stam.* Filaments none; anthers numerous, heaped together in rows, erect, oblong, pointed at the top, converging at the baſe into an oblong catkin, inſerted into a linear receptacle.—Female, *Cal.* Perianth of one leaf, covering the germen, three-toothed at the top; teeth minute, erect. *Cor.* none. *Piſt.* Germen oblong, triangular; ſtyle very ſhort, three-ſided; ſtigma ſimple, obtuſe. *Peric.* Drupa roundiſh, with three ſlight angles, ſmall, ſuperior. *Seed* ſolitary, hard, three-cornered, ſhining.

Eſſ. Ch. Male, Catkin naked. Calyx none. Corolla none. Anthers imbricated.—Female, Calyx three-toothed. Corolla none. Drupa triangular, ſingle-ſeeded.

Obſ. Swartz has remarked that the female flowers of *H. arboreſcens* are found copiouſly in Auguſt, but the males he ſought for in vain, and hence ſuſpects that the plant is diœcious.

1. *H. nutans*. Swartz. Ind. Occ. v. 2. 959.—"Stem ſhrubby, branches ſcattered, leaves lanceolate, pointed."—A native of the woods on the higheſt mountains of Jamaica, flowering throughout the year. The whole plant has a grateful ſmell, and a warm aromatic taſte. It is about five feet high. *Branches* ſquare, ſmooth. *Leaves* oppoſite, on ſhort footſtalks, ſerrated.

2. *H. arboreſcens*. Swartz. Ind. Occ. v. 2. 961.—"Stem arboreſcent. Branches ſtiff, erect. Leaves ovato-lanceolate."—Grows on the high mountains in the ſouth part of Jamaica. The freſh plant has an aromatic taſte and ſmell.

HEDYOTIS, a name given by Linnæus, and, as he informs us in his *Philoſophia Botanica*, derived from ἡδὺς, *ſweet* or *pleaſant*, and οὖς, ὠτὸς, *an ear*. But its application is founded in miſtake. Linnæus believed his *Hedyotis Auricularia* to be the fragrant herb *Auricularia*, more juſtly referred in Dale's *Pharmacologia*, 160, though with ſome prepoſterous European ſynonyms, to the genus *Mentha*, and ſaid to be very efficacious in deafneſs. This is, in fact, the *Mentha Auricularia*, Linn. Mant. 81. Willd. Sp. Pl. v. 3. 74, and by its habit and flavour appears really to be a Mint, with ſpiked flowers. The genus to which the name *Hedyotis* remains, and of which we are now to treat, cannot contend with it in ſweetneſs, nor, we preſume, in the marvellous virtue of curing deafneſs, being one of an inſipid and generally inactive tribe, except as diuretics. To this genus the original one of *Oldenlandia* muſt be united, for reaſons more particularly mentioned below.—Linn. Gen. 49. Schreb. 66. Willd. Sp. Pl. v. 1. 564. Mart. Mill. Dict. v. 2. Juſſ. 198. Lamarck. Dict. v. 3. 78. Illuſtr. t. 62. Gærtn. t. 30. (Oldenlandia; Linn. Gen. 61. Plum. Gen. 42. t. 36. Schreb. 83. Willd. Sp. Pl. v. 1. 674. Mart. Mill. Dict. v. 3. Juſſ. 198. Lamarck. Dict. v. 4. 531. Illuſtr. t. 61. Gærtn. t. 30. Dryandr. in Ait. Hort. Kew. ed 2. v. 1. 265, and in Roxb. Corom. v. 1. 2.)—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, ſuperior, permanent, in four deep, acute ſegments, broad at their baſe. *Cor* of one petal, funnel-ſhaped, longer than the calyx; tube various in length; limb in four ſpreading, nearly equal, ſegments. *Stam.* Filaments four, awl-ſhaped, inſerted into the tube, alternate with the ſegments; anthers roundiſh. *Piſt.* Germen roundiſh, inferior; ſtyle thread-ſhaped, as long as the ſtamens, cloven; ſtigmas two, thickiſh. *Peric.* Capſule twin-globular, of two cells, opening within the crown-like calyx, by a tranſverſe cleft. *Seeds* few, angular.

Eſſ. Ch. Corolla of one funnel-ſhaped petal, four-cleft. Capſule inferior, of two cells, with ſeveral ſeeds.

Obſ. There has long been great ambiguity between the genera of *Hedyotis* and *Oldenlandia*, but Linnæus having, in the tenth and all following editions of the *Syſtema Naturæ* (or *Syſt. Vegetabilium*), attributed to the latter a corolla of four petals, that mark has been preſumed authentic. But it ſeems to have been adopted from Plumier, who, as being of the Tournefortian ſchool, might on this point at leaſt be expected to have obſerved faithfully; yet an examination of the ſpecies from which he took his generic character and figure, *Oldenlandia corymboſa*, proves him in the wrong. It is in vain that we look for any real difference of fruit, even in the excellent Gærtner, who, though he keeps them diſtinct, properly deſcribes the corolla of each as monopetalous. Schreber adviſes their union in his *Gen. Pl.* 820, and Lamarck, though he had previouſly deſcribed and figured them as diſtinct, finally, in the letter-preſs to his plates, ſinks *Oldenlandia* in *Hedyotis*.

But though this meaſure, which we ſhall adopt, is correct with reſpect to the original *Oldenlandiæ*, ſome ſpecies have been forced into that genus of late, unobſerved by any body, which do not really belong to it. Theſe are *O. digyna* and *pentandra* of Retzius and Willdenow, which have five petals, five ſtamens, and a five-cleft calyx, with perhaps two ſtyles, and conſtitute a very good genus, with which the name of *Oldenlandia* ought now to remain. Whether *O. depreſſa* of Willdenow be in the ſame predicament, we cannot decide, having ſeen no authentic ſpecimen; but we have an Eaſt Indian plant which nearly agrees with this deſcription, and is of the ſame genus with the two ſpecies juſt named. We now proceed to arrange the ſpecies of *Hedyotis*, thus augmented with what have been conceived *Oldenlandiæ*, as well as with ſome hitherto non-deſcript, according to their natural affinities.

1. H. *fruticoſa*. Linn. Sp. Pl. 147. (Valerianella foliis nervoſis acutis, floſculis in caulium ſummo quaſi umbellatis; Herm. Zeyl. 227. t. 107.)—Leaves ovato-lanceolate. Umbels aggregate, corymboſe, ſtalked, terminal and axillary.—Native of Ceylon, where it is called *Waeranya*. The *ſtem* is ſhrubby, knotty, round, much branched. *Branches* oppoſite, quadrangular when young, leafy and finely downy. *Leaves* oppoſite, ſtalked, from one to three inches long, more or leſs ovate, pointed, entire, roughiſh, ſtrongly ribbed; paler beneath. *Footſtalks* ſhort, thick and downy, connected by a pair of ſhort broad *ſtipulas*, which are each crowned with three or four long linear hairy teeth. *Flower-ſtalks* about the ends of the branches, axillary and terminal, ſhorter than the leaves, angular, downy, each bearing ſeveral denſe downy *umbels*, and a pair or two of narrow oblong *bracteas*. The *germen* and *calyx* are downy; the latter recurved. *Corolla* many times longer than the calyx, apparently reddiſh or blueiſh, denſely bearded with white briſtles on its inſide, its ſegments long and revolute. Burmann's figure gives a wrong idea of the ſtipulas, and is not otherwiſe very characteriſtic. We have formerly received from the Eaſt Indies, for *H. fruticoſa*, what turns out to be *Knoxia corymboſa* of Willdenow, v. 1. 582. Lamarck having never, as he ſuppoſed, ſeen this firſt ſpecies of *Hedyotis*, has, if we miſtake not, deſcribed it over again by the name of *paniculata*.

2. H. *Auricularia*. Linn. Sp. Pl. 147. (Valerianella paluſtris, foliis nervoſis oblongis, floſculis ad caulium nodos, inter foliorum ſinus, collectis; Burm. Zeyl. 227. t. 108. f. 1. Muriguti; Rheede Mal. v. 10. 63. t. 32.)—Leaves elliptic-lanceolate, even, ſmoothiſh. Stem downy. Flowers denſely whorled.—Native of Ceylon and other parts of the Eaſt Indies, in ſandy ground. *Root* ſimple, pleaſantly ſcented, ſaid to be perennial. *Stems* ſeveral, proſtrate, but little branched, about a foot long, leafy, round, finely downy. *Leaves* an inch and half or two inches long, elliptic-lanceolate, ſometimes ovate, acute, entire, flat and even though ribbed; ſmooth and rather ſhining above; paler and often roughiſh beneath. *Footſtalks* half an inch long, nearly ſmooth, connected with a pair of finely downy ſheathing *ſtipulas*, crowned with ſeveral long, narrow, briſtle-like points. *Flowers* white, numerous, in denſe ſeſſile axillary tufts, being as truly whorled as in moſt plants with only oppoſite leaves. Their *calyx* and *germen* are nearly or quite ſmooth.

This ſpecies is confounded, in the *Materia Medica* and *Flora Zeylanica* of Linnæus, with *Mentha Auricularia*, as we have already ſaid. Yet, according to Rheede, it is not altogether uſeleſs in medicine, the bruiſed leaves, mixed with butter, ſerving to bring abſceſſes to maturity.

It does not appear that Lamarck's *H. nervoſa* is more than a variety of this, though he deſcribes the leaves as agreeing nearly with the following, than which nothing can be more unqueſtionably diſtinct from *H. Auricularia*.

3. H. *capitata*. Lamarck. Dict. v. 3. 80.—Leaves lanceolate, pointed, ſtrongly ribbed, hairy. Branches rough with deflexed hairs. Flowers in axillary, ſtalked, ſolitary tufts.—Native of Tranquebar. Remarkable for the reflexed ſhaggy hairs of the *branches*, which, in the dried plant at leaſt, are of a tawny or golden hue. The *leaves* are much narrower, and more pointed than in the preceding, hairy, deeply furrowed along the ſide nerves, or, in a manner, plaited. *Footſtalks* and *ſtipulas* very hairy. *Flowers* very ſmall, in little, round, hairy, axillary, ſtalked, ſolitary, alternate tufts or heads, and not by any means whorled. This character leaves us no doubt as to Lamarck's plant being the ſame with ours, though his ſpecimens ſeem to have been leſs hairy. Had he illuſtrated the genus by a figure of this, inſtead of copying Burmann's bad plate of the firſt ſpecies, which appears to have led him aſtray reſpecting that plant, he would have rendered a ſervice to botany.

4. H. *hiſpida*. Retz. Obſ. faſc. 4. 23. Willd. n. 4.—Leaves linear-lanceolate, briſtly on both ſides. Flowers whorled.—Native of China, near Canton. *Stems* ſix inches long, nearly ſimple, decumbent, ſquare, hiſpid. *Leaves* ſtalked, pointed, entire, hiſpid on both ſides. *Footſtalks* extremely hiſpid, united into a ſhort ſheath with the *ſtipulas*, which are torn into narrow ſegments. *Flowers* nearly ſeſſile, whorled. *Calyx* hiſpid. The deſcription of the parts of fructification agree with the generic character. We have no ſpecimen.

5. H. *verticillata*. (Oldenlandia verticillata; Linn. Mant. 40. Crateogonum minus, ſeu verum; Rumph. Amb. v. 6. 25.)—Leaves linear-lanceolate, ſmooth on both ſides. Flowers whorled. Calyx and angles of the ſtem minutely briſtly.—Native of dry, open hills in Amboyna and Java. *Root* creeping. *Stems* ſeveral, about a foot long, weak or decumbent, leafy, quadrangular, the angles rough, with minute, crowded, prominent, rigid, ſhort briſtles, as are alſo the very ſharp ſegments of the *calyx*. *Leaves* numerous, croſſing each other in pairs, ſpreading, above an inch long, acute, narrow, entire, ſomewhat revolute, ſmooth on both ſides, very pale at the back. *Footſtalks* very ſhort. *Teeth* of the ſtipulas long and capillary. *Whorls* denſe, the upper ones of but few flowers. *Corolla* white.—Rumphius's *Crateogonum majus*, v. 6. t. 10, confounded with the above in Linnæus's quotation, appears to be a *Spermacoce*, by the deſcription of the fruit.

6. H. *trinervis*. (Oldenlandia trinervia; Retz. Obſ. faſc. 4. 23. Willd. n. 3.)—Leaves ovate, three-ribbed, ſomewhat fringed. Flowers axillary, ſolitary or in pairs. Fruit hairy. Calyx minute.—Native of the Eaſt Indies. Koenig gathered it in ſhady ſloping ſituations, where the

ſoil is ſandy and wet, eſpecially under *Pandanus* trees. Dr. Rottler ſent what we deem the ſame, from rice-fields at Tranquebar, by the name of *O. orbiculata*. The *root* is ſlender and fibrous, apparently annual. *Stems* ſeveral, proſtrate, three or four inches long, branched, leafy, angular, ſlightly hairy. *Leaves* oppoſite, on ſhort hairy ſtalks, ovate, obtuſe, entire, ſmooth on both ſides, but more or leſs fringed at the edges, marked with two ſide-ribs in their lower part. *Stipulas* ſmall, fringed. *Flowers* one, or at moſt two, from the boſom of each leaf, on ſhort ſtalks. *Fruit* very hairy, pale. *Calyx-teeth* very ſmall.

7. H. *uniflora*. Lam. Illuſtr. 271. (Oldenlandia uniflora; Linn. Sp. Pl. 174. O. calycibus fructuum maximis coloratis; Gron. Virg. ed. 1. 138. ed. 2. 21. Alſine aquatica major repens, foliis acuminatis, virginiana; Pluk. Phyt. t. 74. f. 5.)—Leaves ovate, acute, rough-edged. Flowers axillary, ſolitary or in pairs. Fruit hairy, ſhorter than the calyx.—Native of Virginia, and, according to Browne, of Jamaica. The *ſtems* are much longer, and more branched, than in the laſt. *Leaves* more acute, longer, yet not an inch in length, ſcarcely three-ribbed, ſmooth, except that their edges and midrib are rough with minute briſtly hairs. *Germen* hairy, ſhorter than either the flower-ſtalk or ſegments of the *calyx*, the latter being unuſually large, ovate, acute, green, but little expanded, ſmooth, ſlightly fringed.

8. H. *hirſuta*. (Oldenlandia hirſuta; Linn. Suppl. 127.)—Leaves ovate, ſomewhat heart-ſhaped, ſtalked, hairy. Umbels axillary, ſolitary, ſtalked, of few flowers. Fruit hairy.—Gathered in Java by Thunberg. *Root* creeping. *Stems* proſtrate, nearly ſimple, hairy, three or four inches long. *Leaves* ſtalked, broad-ovate, or rather heart-ſhaped, acute, beſprinkled with ſoft hairs. *Stipulas* membranous, fringed. *Umbels* few, axillary, ſolitary, hairy, of very few flowers, their ſtalk not half the length of the leaf. *Fruit* turgid, hairy, longer than the lanceolate acute ſegments of the *calyx*. This herb, except being ſlightly hairy, bears a conſiderable reſemblance to the ſtem and leaves of our pretty *Lyſimachia nemorum*. It is nearly related to the two laſt, though all three are abundantly diſtinct.—H. *hirſuta* Lamarck. Illuſtr. 270. is not this, but, as we preſume, our H. *auricularia*.

9. H. *debilis*. (Oldenlandia debilis; Forſt. Prodr. 10.)—"Leaves ovate, ſeſſile. Umbels axillary, ſtalked, of few flowers."—Gathered by Forſter in the iſland of Tongatabu, in the South Seas. We have no ſpecimen, nor any further information concerning this ſpecies.

10. H. *fœtida*. (Oldenlandia fœtida; Forſt. Prodr. 10.)—Leaves elliptical, thin, ſmooth. Panicle three-forked, terminal, ſpreading. Corolla ſmooth. Stipulas with a ſimple point, naked.—Gathered by Forſter in Tongatabu and Otaheite. The *ſtem* is rather ſhrubby. Whole *plant* ſmooth, turning black in drying. Young *branches* ſquare. *Leaves* ſtalked, oppoſite, an inch or inch and half long, elliptical, entire, flat, thin and ſmooth. *Stipulas* forming a ring within the footſtalks, permanent, ſhort, each tipped with a ſhort thick point, but not fringed. *Panicle* terminal, ſpreading, of three principal branches, each ſubdivided repeatedly in a three-fold manner, the central branch always ſhorteſt, affording a true idea of a trichotomous panicle. *Bracteas* ſmall, oppoſite, acute, in pairs under each ſubdiviſion. *Germen* and *fruit* ſhort or depreſſed; *calyx* ſtill ſhorter, recurved. *Corolla* much longer than the calyx, its tube cylindrical and ſmooth. The *ſtigma* in the only flower we can examine is capitate, but ſeems ſlightly two-lobed.—The habit of the plant is greatly at variance with all the foregoing.

11. H. *coriacea*.—Leaves elliptical, coriaceous, ſmooth. Panicle three-forked, terminal, denſe. Corolla externally downy. Stipulas with a ſimple point, naked.—Gathered in the Sandwich iſlands by Mr. Menzies, to whom we are indebted for a ſpecimen. It agrees in aſpect, ſhrubby habit, ſtipulas, and black hue when dried, with the laſt; but the *leaves* are larger, and remarkably coriaceous; *panicle* more denſe; *flowers* much larger, their tube club-ſhaped, near half an inch long, externally downy, the ſegments of the limb ſtrongly deflexed, with long, taper, recurved points. The *calyx*, *ſtalks*, and *germen* are downy. This ſpecies and the laſt appear more akin to the *Bouvardia*, Saliſ. Parad. t. 88. Dryandr. in Ait. Hort. Kew. ed. 2. v. 1. 245, than to the genuine ſpecies of *Hedyotis*, but we have not their fruit to decide this queſtion; and the following one, agreeing with them in ſtipulas and habit, ſeems without violence to connect them with the reſt.

12. H. *racemoſa*. Willd. n. 2. Lamarck. Dict. v. 3. 80. Illuſtr. 270. t. 62. f. 2. (Oldenlandia paniculata; Linn. Sp. Pl. 1667. Burm. Ind. 58. t. 15. f. 1. Tsjeru-talu-dama; Rheede Mal. v. 10. 49. t. 25?)—Leaves elliptic-oblong, thin, ſmooth. Flower-ſtalks partly umbellate, panicled, terminal. Stipulas pointed, ſomewhat toothed.—Native of ſandy ground in the Eaſt Indies. *Stem* rather woody, various in height, much branched and forked repeatedly; the *branches* quadrangular, leafy, ſmooth. *Leaves* elliptic-oblong, or ovate, ſtalked, ſmooth, or very finely downy, thin and even like thoſe of H. *fœtida*, with which they agree in ſize and ſhape. The *ſtipulas* alſo are like thoſe of the two foregoing, but beſides the central point of each, there are ſometimes a few ſmaller teeth. *Flowers* in ſeveral naked, panicled, terminal, or partly axillary, umbels or cluſters, ſmall, bluiſh, their corolla with a tube of moderate length, ſmooth. The *Hortus Malabaricus* deſcribes the ſeeds as only two in each capſule, which, if right, proves that ſynonym to be erroneous, our plant having, as it ought, numerous ſmall ſeeds; yet the figure and deſcription agree with it in every other point. Lamarck's deſcription alſo anſwers to our plant, but not at all to the figure of Plukenet, to which he refers in a parentheſis, t. 454. f. 2, and which is evidently the *Knoxia corymboſa* of Willdenow, mentioned under our firſt ſpecies; a genus with two ſeeds only to each flower.

13. H. *pumila*. Linn. Suppl. 119.—Leaves ovate, acute, rough-edged. Flower-ſtalks ſimple, axillary, alternate. Fruit oval. Gathered by Koenig in dry, barren places, or on walls, at Tranquebar. *Root* fibrous, annual. *Herb* ſomewhat like *Anagallis arvenſis*, ſcarcely a ſpan high, branched from the baſe, ſmooth in its general appearance, but the edges of the *leaves* and *calyx* are found rough when magnified. *Stipulas* membranous, pointed and fringed. *Flower-ſtalks* rather ſhorter than the leaves, erect, capillary, naked, ſmooth, ſingle-flowered. *Corolla* whitiſh, ſmall. *Capſule* elliptical, ſhining, beſprinkled with a few white, cloſe-preſſed hairs, its length exceeding that of the *calyx*, which is pointed and ſlightly ſpreading.

14. H. *diffuſa*. Willd. n. 7.—Leaves lanceolate, acute, rough-edged. Flower-ſtalks ſimple, axillary, alternate. Fruit nearly globoſe. Stem procumbent.—Native of the Eaſt Indies. *Stem* round, procumbent, diffuſe, very long, with oppoſite branches. *Leaves* nearly an inch in length, ſtalked, lanceolate, narrow, acute, ſmooth, roughiſh at the edge. *Flowers* axillary, ſolitary, ſtalked, the length of the leaf-ſtalks. *Corolla* funnel-ſhaped. *Capſule* nearly globoſe, crowned with the calyx. We know this only by Willdenow's deſcription.

15. H. *biflora*. Lamarck. Illuſtr. 272. (Oldenlandia biflora; Linn. Sp. Pl. 174. Antirrhinum humile anguſtifolium, floſculo gemello, ex alis foliorum producto; Burm. Zeyl. 22. t. 11.)—Leaves lanceolate, acute, rough-edged. Flower-ſtalks axillary, alternate, two-flowered.—Native of the

the Eaſt Indies. *Root* long, fibrous, apparently annual. *Stem* branched from the bottom, a ſpan high, leafy, angular, often rough-edged. *Leaves* an inch long or more, ſomewhat ſtalked, lanceolate, narrow, acute, ſmooth except about the edges, pale beneath. *Stipulas* membranous, fringed with a few ſlender teeth. *Flower-ſtalks* rather ſpreading, capillary, ſmooth, pale, ſhorter than the leaves, ſolitary, divided not half way down, each bearing two ſmall *flowers*, whoſe corolla, according to Burmann's account, is reddiſh and two-lipped, yet nothing can be more certain than that the calyx and fruit are thoſe of an *Hedyotis*, cloſely agreeing with thoſe of H. *pumila*, except the capſule being more round and leſs oval.—The diviſion of the flower-ſtalks in this ſpecies is not ſo conſtant as could be wiſhed. We have on the ſame ſpecimen ſome as above deſcribed, with others quite ſimple and ſingle-flowered; and the latter are either ſolitary or in pairs, or even three together, from the ſame leaf. Such is a ſpecimen which Linnæus, in his herbarium, confounded with his own *Oldenlandia umbellata*, hereafter deſcribed; but he does not ſeem to have adverted to this ſpecimen in any of his works, nor is the ſpecific character taken from it.

16. H. *graminifolia*. Linn. Suppl. 119. Vahl. Symb. faſc. 2. 27. (H. herbacea; Forſk. Arab. ſel. 105. Oldenlandia ſtricta; Linn. Mant. 200. Alſine ſpergulæ foliis, capitulis brevioribus duris; Pluk. Mant. 9. t. 332. f. 2.)—Leaves linear-lanceolate, acute, roughiſh. Stem weak. Panicle cloven, racemoſe. Stipulas pointleſs, entire, membranous.—Native of Malabar, where, according to Plukenet, it is called *Arraveenampoondo*; we have it alſo from Tranquebar. The figure in Plukenet is very bad, but we know of no other. Linnæus deſcribed this plant twice over by mere inattention. It is ſufficiently diſtinguiſhable by its weak ſpreading *ſtems*, and narrow *leaves* about an inch and half long, but eſpecially by its infloreſcence, which conſiſts of panicled cluſters, forked at their baſe. The *corolla* is purpliſh, exactly funnel-ſhaped. *Stigmas* capitate, diſtant. *Capſule* elliptic-oblong, ſmooth. Segments of the *calyx* ſhort, triangular, erect. The habit of this ſpecies is like ſomething between an *Aſperula* and a *Stellaria*.

17. H. *ſerpylloides*. Lamarck. Illuſtr. 271.—"Leaves ovate. Stipulas fringed. Flowers in denſe, ſeſſile, terminal cluſters."—Gathered in Guadaloupe by M. Richard. The *ſtems* are diffuſe, five or ſix inches long.—Such is Lamarck's ſhort account, in the letter-preſs of his *Illuſtrations*, which is all the information we have concerning this ſpecies, but the infloreſcence appears to mark it as ſufficiently diſtinct.

18. H. *capenſis*. Lamarck. Illuſtr. 271. (Oldenlandia capenſis; Linn. Suppl. 127. Thunb. Prodr. 29.)—Leaves linear-lanceolate, acute, revolute, rough. Stems decumbent, rough-edged. Flower-ſtalks ſimple, axillary, alternate. Calyx fringed, nearly as long as the ſhort angular fruit.—Gathered by Thunberg at the Cape of Good Hope, and by Commerſon in the iſle of Bourbon. The *ſtems* are about a ſpan long, branched, ſquare, with rough angles. *Leaves* ſomewhat ſtalked, hardly an inch long, revolute and often recurved, their upper ſide, and their midrib beneath, more or leſs rough with minute briſtles, like a *Galium*. *Stipulas* membranous, pointed and ſomewhat fringed. *Flower-ſtalks* always ſhorter than the leaves, ſometimes very much ſo, thickiſh, ſpreading, angular. Tube of the *corolla* cylindrical, narrow, ſcarcely ſo long as the *calyx*; limb ſhort and obtuſe. Segments of the *calyx* ſpreading or recurved, triangular, keeled, fringed with briſtles, about equal in length to the ſhort roundiſh *fruit*, which is ſmooth, marked with four ribs running down from the keels of the calyx. The *flowers* are white. We preſume this muſt be diſtinct from the *diffuſa*, n. 14, as Willdenow expreſſes his having ſeen both; otherwiſe their deſcriptions might ſeem to be hardly ſufficiently clear of each other.

19. H. *tenuifolia*. (Oldenlandia tenuifolia; Forſt. Prodr. 11, but not of Burmann.)—Leaves linear-lanceolate, revolute, ſmooth, as well as the ſtem. Flower-ſtalks ſimple, axillary, alternate. Calyx ſmooth, recurved, keeled, as long as the fruit.—Gathered by Forſter in the iſle of Tanna, but we cannot aſſent to the ſynonym he has applied to it of Burmann, though, as the latter really belongs to *H. herbacea*, the name may remain with Forſter's plant, as we have left it. This is a larger ſpecies than the laſt, with very long trailing branched *ſtems*, and every part is nearly or quite ſmooth. The *leaves* are an inch long, very acute, narrow and revolute. *Flower-ſtalks* ſcarcely half that length, ſpreading, thick and firm. *Fruit* ſmooth, roundiſh, depreſſed, ſlightly ribbed from the decurrent keels of the broad and ſtrong ſegments of the *calyx*, which are about its length, recurved, ſmooth-edged, or now and then perhaps very ſlightly toothed.

20. H. *herbacea*. Linn. Sp. Pl. 147. Meerb. Ic. t. 2. (Oldenlandia tenuifolia; Burm. Ind. 37. t. 14. f. 1. Parpadagam; Rheed. Mal. v. 10. 69. t. 35.—β Schanganampullu; ibid. 45. t. 23.)—Leaves linear-lanceolate, ſmooth. Stem very much branched, forked. Flower-ſtalks in pairs, ſimple. Fruit globoſe, with four furrows. Calyx erect, minute.—Native of various parts of the Eaſt Indies, in ſandy ground. The *root* appears to be annual, though ſometimes ſtrong and almoſt woody, tapering, branched, fibrous, with a ſimple crown. *Stem* ſolitary, 11 or 12 inches high, very much branched from the very bottom, repeatedly forked, buſhy, leafy, quadrangular, ſmooth, with rather ſwelling joints, which are often bent or zigzag. *Leaves* about an inch long, lanceolate, ſometimes nearly linear, acute, entire, flat, ſmooth in every part, paler beneath, ſomewhat ſtalked. *Stipulas* extremely ſhort, entire and beardleſs. *Flower-ſtalks* in pairs from the forks of the ſtem, ſpreading, capillary, ſmooth, ſimple and ſingle-flowered; ſhorter than the full-ſized leaves; longer than the ſmaller upper ones. *Flowers* very diminutive, their *corolla* white, long and ſlender. *Fruit* pale brown, ſmooth, nearly globoſe, with four ſlight furrows running down from the ſegments of the *calyx*. The latter are ſmall, green, diſtant, erect, acute, their points on a level with the prominent valves of the capſule, by which this differs from all the foregoing.—β is but a ſlight, rather more buſhy, variety. The name *herbacea*, not very diſcriminative when given, is far leſs ſo as the genus now ſtands, but it would not be eaſy to find one more expreſſive, if we were allowed to change it.

21. H. *ſtricta*.—Leaves linear, revolute, ſmooth, upright. Stem erect, ſtraight, ſlightly branched. Flower-ſtalks ſolitary or in pairs. Fruit globoſe. Calyx erect, minute.—Gathered at Sierra Leone by Dr. Afzelius. This is a very ſlender, annual, ſmooth, upright ſpecies, about a foot high, akin to the laſt, except that its *leaves* are revolute and much narrower, with ſome appearance of ſerratures towards their points. *Stipulas* very ſhort, but toothed. *Flower-ſtalks* one or two from between the diminutive upper leaves, widely ſpreading, capillary, ſimple. *Flowers* white, extremely ſmall and ſlender. *Fruit* like the laſt, but ſmaller, and ſcarcely furrowed, the ſummits of its valves extending even beyond the *calyx*, whoſe teeth are very ſmall, green and triangular.

22. H. *virgata*. Willd. n. 10.—"Leaves linear. Stem erect. Panicle forked, ſtraight. Flower-ſtalks lateral, in

pairs."—Native of Guinea. *Root* woody, perennial. *Stems* ſeveral, ſtraight, round, ſmooth, panicled in their upper part, with forked branches. *Leaves* linear, very narrow. *Flowers* in pairs at the ſides of the branches, without leaves; their *ſtalks* unequal. *Corolla* ſlender, funnel-ſhaped. *Capſule* globoſe.—Such is Willdenow's deſcription of this ſpecies, with which we are unacquainted. It appears to be nearly related to the laſt, but the perennial root, numerous ſtems, and unequal flower-ſtalks, without leaves, are expreſſive of a real difference.

23. H. *corymboſa*. Lamarck. Illuſtr. 272. (Oldenlandia corymboſa; ibid. t. 61. Linn. Sp. Pl. 174. O. humilis hyſſopifolia; Plum. Ic. 205. t. 212. f. 1. Ehret Pict. t. 2. f. 1. and t. 4.)—Leaves linear-lanceolate. Flower-ſtalks axillary, alternate, ſomewhat corymboſe, bearing ſeveral flowers. Fruit broader than long, rather compreſſed.—Native of the Weſt Indies; we have it alſo from the iſle of Banda, gathered by the late Mr. Chriſtopher Smith. Linnæus cultivated it in the Upſal garden, and Miller at Chelſea. The *root* is ſaid to be annual, but in our Banda ſpecimen it is woody. The *ſtem* is very much branched from the very bottom, ſpreading, and partly decumbent; leafy, ſquare, ſmooth, except in ſome degree at the angles, but never between them. *Leaves* about an inch long, lanceolate, narrow, acute, ſcarcely ever quite ſmooth, ſometimes conſiderably rough on their upper ſide, pale beneath; their baſe tapering into a ſhortiſh dilated footſtalk, united on each ſide with the pale, membranous, dilated *ſtipula*, which is fringed with a few long ſlender teeth. *Flower-ſtalks* numerous, alternate, ſolitary, axillary, longer than the leaves, ſlender, ſometimes roughiſh, ſpreading, bearing three, four, or five flowers, whoſe partial ſtalks are corymboſe, not umbellate, as they never ſpring exactly from one common point. There is a minute, membranous, acute *bractea* at the baſe of each. *Flowers* ſmall, white, their *corolla* ſhort and wide in compariſon with ſeveral of the laſt deſcribed. *Fruit* very abrupt and broad at the ſummit, ſo as to be almoſt hemiſpherical, a little compreſſed, with a ſtrong furrow at each ſide, ſmooth. Segments of the *calyx* acute, a little recurved, reaching much beyond the valves. In natural affinity this ſpecies comes nearer to *biflora* perhaps than to *herbacea*, though its habit reſembles the latter.

24. H. *coarctata*.—Leaves linear. Flower-ſtalks axillary, ſolitary or aggregate, ſomewhat corymboſe, rough all over like the ſtem. Fruit contracted at the mouth.—Native of the Eaſt Indies. *Root* tapering, annual. *Stems* branched from the baſe, a foot or two in height, ſpreading, round, or very ſlightly angular, rough all over with minute prominent points, as are alſo the *flower-ſtalks*, and ſometimes the upper ſurface of the *leaves*. The latter are narrower than in H. *corymboſa*, and in ſome meaſure revolute. *Stipulas* with about three long briſtly central points. *Flower-ſtalks* either ſolitary, or two or three together at each pair of leaves, bearing one, two, or three *flowers* like thoſe of the laſt. The *fruit*, however, is eſſentially different, more globular, very much contracted at the mouth, the *calyx-teeth* triangular, moſtly erect, reaching but little beyond the valves.

25. H. *umbellata*. Lamarck. Illuſtr. 272. (Oldenlandia umbellata; Linn. Sp. Pl. 174. Fl. Zeyl. n. 67. Roxb. Coromand. v. 1, 2. t. 3. Lyſimachiæ affinis, ſatureiæ folio maderaſpatenſis, capſulis in ſummitate ferè umbellatis; Pluk. t. 119. f. 4.)—Leaves linear-lanceolate, roughiſh like the ſtem. Flower-ſtalks terminal, umbellate or corymboſe. Capſule half naked.—Native of the Eaſt Indies, in light ſandy ground near the ſea, flowering in the latter part of the wet ſeaſon, and ripening ſeed in January. *Roxburgh.* *Root* biennial, rarely triennial, very long, ſomewhat woody, with an orange-coloured bark. *Stems* numerous, a ſpan high, much branched from the very bottom, ſpreading or diffuſe; when cultivated more erect, and about a foot high; leafy, round, all over rough with prominent points like the laſt deſcribed. *Leaves* oppoſite, ſometimes three or four together, not an inch long, narrow, acute, roughiſh. *Stipulas* pale, with a few, long, narrow, membranous ſegments. *Flower-ſtalks* terminal, cluſtered, partly umbellate, partly cymoſe, all ſhort and rough, with linear *bracteas*. Segments of the *calyx* nearly erect, triangular, keeled, ſtrongly fringed, inſerted about the middle of the ripe fruit, whoſe valves project conſiderably, though not ſo far as the points of the calyx, while the ſhort lower half is ſtrongly ribbed by the decurrent keels. Theſe diſtinctive characters of the calyx and fruit are not ſhewn by Dr. Roxburgh's Indian artiſt. The *corolla* is pale purpliſh, funnel-ſhaped, about twice as long as the calyx, with a ſpreading border.—This is the moſt valuable ſpecies of the whole genus, being the Chay root, or Eaſt Indian madder, much cultivated on the coaſt of Coromandel, though the wild roots are better, when they can be got. It is uſed for giving a red colour to cotton, either by dyeing, printing, or painting. Alkaline ſubſtances, added to either a watery infuſion or ſpirituous tincture of the root, produce this colour. Very long details of various proceſſes uſed by the natives of the country are given by Dr. Roxburgh, which it is probable might be much ſhortened, and perhaps improved, by an European dyer or chemiſt. As the roots will keep good for three or four years, experiments might eaſily be made in this country, where indeed the art of giving fine red colours to cotton has of late been much advanced, but whether by means of this plant or by ſome improved management of the common madder, or other ſubſtances, it is not eaſy to determine.

The above full hiſtory of the genus *Hedyotis* would be in complete without mention of ſome ſpecies that have been erroneouſly referred to it, or to *Oldenlandia*. Of theſe we have in the introductory part of this article, mentioned *O. digyna* and *pentandra*, as conſtituting a very diſtinct genus, which we would ſtill call *Oldenlandia*, and of which we have a third ſpecies, poſſibly *O. depreſſa* of Willdenow; but the *Nela-Tsjira*, Rheede Mal. v. 10. 61. t. 31, quoted by him as a ſynonym, appears very doubtful. This ſynonym accords tolerably well with *Hedyotis maritima*, Linn. Suppl. 1:9, a plant we have ſtruck out of our liſt of ſpecies, as having a ſuperior germen, and belonging, we believe, to Juſſieu's order of *Lyſimachiæ*, certainly by no means to the genus in queſtion.—*Oldenlandia repens* of Linnæus we have long ſince referred to its proper place, as a diſtinct genus; ſee Dentella.—*Hedyotis rupeſtris*, adopted by Willdenow from Swartz, a very ſingular Weſt Indian plant, is now referred by the latter to *Buchnera*.—*H. longiflora* of Lamarck is, as he himſelf ſuſpected, *Rondeletia piloſa* of Swartz, being one of the tetrandrous ſpecies of the latter genus. S.

HEDYPNOIS, from ἡδὺς, *ſweet*, und πνεῖν, *to ſmell*, is recorded by Pliny as a name ſometimes given to the wild Endive or Succory. More recent writers have varied in its application. Some conſider it as a ſynonym of the *Aphace* of Dalechampius, which is the Linnæan *Crepis tectorum*; and hence perhaps Hudſon was led to chooſe it for a genus eſtabliſhed by himſelf, which includes, though erroneouſly, this *Crepis*. Hudſon's genus, as far as it ſeemed to the author of the *Flora Britannica* and *Engliſh Botany* a good one, is adopted in theſe works by the ſame name; but having been called by Scopoli *Apargia*, it ſo ſtands in the works of Schreber and Willdenow, who will no doubt be followed in this meaſure. The *Hedypnois* of theſe authors is, on the other hand, that of Tournefort, or *Hyoſeris Hedypnois* of Linnæus, which is alſo the *Hedypnois* of Juſſieu, though he includes under it *Zacyntha* of Schreber; and of Gærtner, though the latter, by a ſtrange error, quotes under it ſynonyms of Linnæus and Plukenet that belong to *Hyoſeris radiata*. The long unſettled and wandering name of *Hedypnois* may therefore now be conſidered as fixed, though, as to the propriety of its application in any of the above caſes, we can offer nothing very ſatisfactory. All that can be ſaid for the plants that have borne it is, perhaps, that they have not ſo bad a ſmell as ſome of their relatives, and therefore may, by compariſon, be termed *ſweet;* or having little or no ſcent, notwithſtanding the fœtid tribe to which they belong, their name may be juſtified on the principle of Martial, who ſays on a ſimilar occaſion, "*benè olet qui non olet.*"—Schreb. 532. Willd. Sp. Pl. v. 3. 1616. Juſſ. 169. Tourn. t. 271. Gærtn. t. 160.—Claſs and order, *Syngeneſia Polygamia-æqualis*. Nat. Ord. *Compoſitæ ſemifloſculoſæ*, Linn. *Cichoraceæ*, Juſſ.

Gen. Ch. *Common Calyx* cylindrical, permanent, of about ten linear, erect, acute, equal leaves, accompanied at their baſe by fewer and narrower, ſhort, cloſe-preſſed ſcales. *Cor.* compound, ſomewhat imbricated, uniform; the florets numerous, all perfect, monopetalous, ligulate, linear, abrupt, with five teeth. *Stam.* Filaments five, capillary, very ſhort; anthers united into a hollow cylinder. *Piſt.* Germen oblong; ſtyle thread-ſhaped, the length of the ſtamens; ſtigmas two, reflexed. *Peric.* none, except the common calyx hardened, cloſed, ſomewhat globoſe, its leaves entirely covering the marginal ſeeds. *Seeds* ſolitary, oblong, ſlightly incurved, ſtriated, roughiſh, about the length of the calyx; the outer row crowned with a little membranous partial calyx, which is nearly upright, cup-ſhaped, obſcurely five-ſided, minutely toothed, without any proper ſeed-down; the inner ones crowned with an obſolete little partial calyx, which is very ſhort, conſiſting of numerous briſtles, encloſing a ſeed-crown of five, nearly upright, awned ſcales. *Recept.* naked.

Eſſ. Ch. Receptacle naked. Calyx with ſcales at the baſe. Seed-crown of the diſk double; the outermoſt obſolete, of many briſtles; the inner of five chaffy ſcales: of the radius ſingle, membranous, and toothed.

1. H. *monſpelienſis*. Willd. n. 1. (Hyoſeris Hedypnois; Linn. Sp. Pl. 1138. Gouan. Fl. Monſp. 353. Hieracium facie hedypnois; Lob. Ic. 239. H. falcatum alterum; Ger. em. 299.)—Stem branched, diffuſe. Leaves oblong, ſtrongly toothed, ſeſſile, contracted towards the baſe.—Native of the ſouth of Europe. *Root* annual, ſmall. *Stem* branched from the baſe, 12 or 18 inches high, ſtraggling, round, leafy, ſmooth. *Leaves* alternate, ſeſſile, and in ſome meaſure claſping the ſtem, a little briſtly, eſpecially their ribs and edges, three or four inches long; the upper ones narrow, taper, ſmall and entire. *Flowers* ſolitary at the ends of the branches, ſmalliſh, yellow; when young drooping. *Fruit* erect. The *ſeeds* are conſpicuous for the long taper ſcales which crown the inner ones, while thoſe of the circumference bear each a little browniſh fringed cup.—The herb is ſaid to be neither bitter nor milky. We have never ſeen it alive.

2. H. *mauritanica*. Willd. n. 2.—Stem upright, branched. Leaves oblong, ſlightly toothed, ſomewhat heart-ſhaped and claſping at their baſe.—Suppoſed to be a native of Barbary. Willdenow deſcribed it from ſome botanic garden, where it was called by the name of *Hyoſeris mauritanica*. We have from Gibraltar a plant gathered there by the Abbè Durand, flowering in May, which anſwers to the deſcription, but is ſo very near the firſt ſpecies, that we can find ſcarcely any difference. The *leaves* however are certainly very minutely and ſparingly toothed, and their baſes more heart-ſhaped than in the former. The keels of the *calyx-leaves*, when in fruit, are ſpinous, but we have them full as much or more ſo in various ſpecimens of *H. monſpelienſis*.

3. H. *rhagadioloides*. Willd. n. 3 (Hyoſeris rhagadioloides; Linn. Sp. Pl. 1139. H. cretica; Cavan. Ic. v. 1. 32. t. 43.)—Stem branched, diffuſe. Leaves oblong, toothed, tapering at the baſe, ſeſſile. Calyx of the fruit hairy.—Native of the ſouth of Europe; very common about Madrid, as Loefling and Cavanilles remarked, flowering in May and June. This is more rough or hairy than the foregoing, eſpecially the *calyx*, which is all over very briſtly and hairy; the flowering branches are alſo rough, and conſiderably more ſwelling than in any other ſpecies. The ſize of the teeth of the *leaves* is very variable. *Seed-down* ſmaller and ſhorter than in either of the former.

4. H. *cretica*. Willd. n 4. (Hyoſeris cretica; Linn. Sp. Pl. 1139. Scop. Del. Inſub. v. 1. 36. t. 16.)—Stem branched, diffuſe. Leaves oblong, toothed, claſping the ſtem. Calyx of the fruit ſmooth; briſtly at the top. Seed-down of the radius ſomewhat compound.—Native of Crete, where Tournefort ſeems firſt to have obſerved it. The *leaves* are very deeply toothed, ſo as to become almoſt pinnatifid, and moſtly very rough. *Stem* decumbent. Flowering *branches* elongated and ſlender, nearly or quite ſmooth. Crown of the outer row of *ſeeds* much more leafy or divided, as well as longer, than in any of the above, and not that ſimple ciliated cup uſual in the genus. How far this may be conſtant we know not. The ſpecies are all very much alike, and many of the marks by which they have been, or might be ſuppoſed likely to be, diſtinguiſhed, prove fallacious. We have had no opportunity of ſtudying and comparing them alive. The following is known to us by Willdenow's account only.

5. H. *pendula*. Willd. n. 5.—"Stem erect, panicled. Leaves oblong, hiſpid, deeply toothed. Calyx of the fruit ſmooth; briſtly at the top."—Native country unknown. Willdenow received a dried ſpecimen from Dr. Balbis, by the name of *Hyoſeris pendula*, which does not occur either in his Italian ſelection of plants found near Turin, nor in the catalogue of the garden there, printed in 1801. *Root* annual. *Stem* a foot and a half high, clothed, like the whole of the herb, with forked briſtles; panicled at the top. Lower *leaves* obovate, toothed and ſomewhat runcinate; the upper ones oblong, deeply toothed, claſping the ſtem. *Flower-ſtalks* ſwelling. *Flowers* pendulous before they open, as in the laſt.

HEDYSARUM, from ἡδὺς, *ſweet*, the name of a plant in Dioſcorides, which, he tells us, thoſe who make ointments call Πελεκῖνος, or hatchet-plant, becauſe the ſeed reſembles a two-edged hatchet. This was probably ſome ſpecies of *Trigonella*, (Fenugreek,) or ſomething nearly allied thereto. He deſcribes it as "having minute leaves like thoſe of lentils, *Cicer arietinum*, and pods like little horns, in which is an orange-coloured ſeed, ſhaped as above deſcribed, with a bitter taſte;" all which, except the ſhape of the ſeed itſelf, agrees well with ſeveral *Trigonellæ*, whoſe peculiar ſcent would eaſily procure them the appellation of ἡδύσαρον. Dioſcorides attributes to his plant ſtomachic and reſtorative virtues, for which the ſeed of Fenugreek is, to this day, introduced into the curry-powders of that ancient people the Hindoos. Whatever the Greek plant might be, the name of *Hedyſarum* is now univerſally applied by botaniſts to a genus, with which its ancient hiſtory has no further agreement, than in the ſole point in which the above fails, the ſhape of the ſeed, or rather fruit, whoſe reſemblance to a two-edged hatchet is ſtill but obſcure, and confined to a few ſpecies only.—Linn. Gen. 382. Schreb. 505. Willd. Sp. Pl. v. 3. 1171. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 3. 63. Sm. Fl. Brit. 778. Juſſ. 362. Tourn. t. 225. Lamarck. Illuſtr. t. 628. Gærtn. t. 155. (Onobrychis; Tourn. t. 211. Alhagi; Tourn. t. 489.) —Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, divided half way down into five awl-ſhaped, erect, permanent ſegments. *Cor.* papilionaceous, ſtriated: ſtandard long, ovate-oblong, emarginate, the ſides bent downwards, and rather compreſſed; wings oblong, ſtraight, narrower than the other petals; keel ſtraight, compreſſed, broader towards the end, abrupt, ſo as almoſt to form a right angle, divided from the baſe to the angle, otherwiſe united into one petal. *Stam.* Filaments in two ſets, one compoſed of nine, the other ſolitary, all bent together upwards, at a right angle; anthers roundiſh, compreſſed. *Piſt.* Germen ſlender, compreſſed, linear; ſtyle awl-ſhaped, bent with the ſtamens; ſtigma perfectly ſimple. *Peric.* Legume of one or more roundiſh, compreſſed, ſingle-ſeeded joints, not burſting. *Seed* kidney-ſhaped, ſolitary.

Eſſ. Ch. Calyx five-cleft. Corolla with a tranſverſely obtuſe keel. Legume of ſingle-ſeeded cloſed joints.

This is a vaſt genus. The 14th edition of the *Syſtema Vegetabilium* contains 67 ſpecies; Willdenow has 117, though ſeveral of the Linnæan ones are removed to Swartz's *Styloſanthes*, and more to the *Hallia* of Thunberg. See HALLIA.—They are divided by their leaves into four pretty natural ſections. Firſt, ſuch as have ſimple leaves, of which there are properly but 16 of the above 117, for *H. veſpertilionis* has, when in perfection, ternate ones; ſecondly, two with conjugate leaves; thirdly, 64 with ternate leaves; and laſtly 35, whoſe foliage is pinnate.—The ſtructure of the legume, or its joints, is often very remarkable. They are ſometimes rough, ſometimes curiouſly reticulated, ribbed, or creſted, and the briſtles which border or cover ſome of them are hooked, ſo as to cling to the coats of animals. Theſe joints, whether ſolitary, as in *H. Onobrychis*, the common ſaintfoin, or attached to one another ſo as to reſemble a necklace, fall to the ground entire; nor do they let the ſeed go, till the young ſprouting plant forces its way through the decaying coats of the pericarp. In *H. criſtatum*, and ſome few others, the ribs or ſkeleton of the very curious ſeed-veſſel is often found inſeparable from the crown of the root in the full-grown plant.—Some recent botanical writers have given the name of *lomentum* to this kind of pod, which, ſtrictly ſpeaking, cannot be ſaid to conſiſt of two valves, as it does not burſt. But the diſtinction ſeems to us not very material, nor the name correct. *Lomentum* is either a kind of colour, or the meal or flour of beans uſed by the ancients, apparently in a ſort of waſh or lotion, to ſmooth the ſkin. Hence perhaps Linnæus called an order of large mealy-ſeeded plants, akin to pulſe, *lomentaceæ*; but that will not juſtify the application of this name to their ſeed-veſſels, for which we can find no authority, either in Linnæus or elſewhere. See Martyn's Language of Botany, and Milne's Botanical Dictionary, the learned authors of which, no ſervile copyiſts, have found it difficult to explain even the term *lomentaceæ*.

1. Of the ſimple-leaved ſpecies of *Hedyſarum*, the following are examples.

H. *Alhagi*. (Algul, or Agul; Rauwolf. It. 173. t. 94.) Leaves ſimple, lanceolate, obtuſe. Stem ſhrubby, ſpinous. —Native of Armenia, Georgia, Perſia, Syria, Meſopotamia, and ſome parts of Tartary; alſo of the iſlands of Syros and Tenos in the Archipelago, according to Tournefort, who has given a full account of this ſhrub, in his Voyage, v. 1. 123, and who eſtabliſhed it as a genus, diſtinct from *Hedyſarum*, on account of its ſimple alternate leaves. The *root* is woody. *Stems* about a yard high, branched from the bottom, pale, ſmooth, hard, pliable. *Leaves* not unlike thoſe of knot-graſs, (*Polygonum aviculare*,) ſeven or eight lines long, pale green and ſmooth. *Thorns* numerous, firm, ſharp, both axillary and terminal. Two or three elegant *flowers*, variegated with pink and purple, are ſituated on each of the terminal thorns. The *legume* is an inch long, curved, formed of ſeveral necklace-like joints, that eaſily ſeparate from each other when ripe. This plant produces the manna uſed in Perſia, very different from that of the flowering aſh, which is the common kind. The drug is principally collected about Tauris, and is known by the name of *Trungibin* or *Terenjabin*. The Arabian writers believed that it fell from the clouds upon this ſhrub, but it is a natural exudation from the leaves and branches, which takes place only in very hot weather. At firſt the manna reſembles drops of honey, but ſoon thickens into little ſolid grains, as big as coriander ſeeds at moſt. It is collected with more or leſs care, and is valued in proportion to its purity, which is evinced by the diſtinctneſs of the granulations. The coarſer ſort, formed into little balls like loaves, is of a reddiſh brown, full of dirt and leaves. Tournefort ſays the general doſe of either kind is from 25 to 30 drams, which, if there be no miſtake, ſhews it to be leſs active than our officinal manna, and we hope it is leſs nauſeous.

The reſt of this ſection conſiſts almoſt entirely of tropical plants, among which *H. ſtrobiliferum*, rudely figured in Linn. Fl. Zeyl. t. 3, is one of the moſt ſtriking, on account of the abundance of large pale downy bracteas, contraſted with the beech-like leaves. This fine ſhrub, a native of the Eaſt Indies, was firſt raiſed in England by A. B. Lambert, eſq., in his ſtove at Boyton, where it bloſſomed copiouſly about 1789.

2. The twin-leaved ſpecies are *H. diphyllum*, (Nélam-mári; Rheede Malab. v. 9. t. 82.), native of the Eaſt Indies; a ſmall herbaceous annual of no beauty; and *H. conjugatum* of Willdenow, reckoned by Linnæus a variety of the former; ſee *Burm. Zeyl. t. 50. f.* 1.

3. Of thoſe with ternate leaves, *H. veſpertilionis* ought to ſtand firſt; ſee Jacq. Ic. Rar. t. 566. This is a native of Cochinchina, very remarkable for its ſhallow, broad, ſingularly ſtriped, terminal leaflets, and has been often raiſed in our ſtoves. The flowers are white and inconſpicuous.

H. pulchellum, figured in Burm. Zeyl. t. 52, much reſembles *ſtrobiliferum* at firſt ſight, having long cluſters, with twin orbicular bracteas at each little tuft of bloſſoms. The Eaſt and Weſt Indies, North America, Japan, and ſome other parts of the globe, produce various ſpecies of this ſection. One of the moſt intereſting vegetables in the world ranges among them, the celebrated moving plant, *H. gyrans*, Linn. Suppl. 332. Jacq. Ic. Rar. t. 565, which is found on the ſhores of the Ganges in Bengal. This is biennial, though of a ſhrubby habit, bearing long ſpikes of pale particoloured flowers. Its great ſingularity conſiſts in the leaves, of which the central or terminal leaflet is large, elliptic-oblong, dependent, two or three inches in length, with a central glaucous ſtripe. The lateral leaflets are very ſmall, obovate, narrow, ſtanding a little below the former upon the common footſtalk. Theſe have a peculiar and ſpontaneous motion, both moving together from a pendent to an erect poſture, or the reverſe, with tolerable rapidity; or one of them will move, regularly by ſtarts, while the other is ſtationary. This motion does not take place in all the leaves of one plant or branch at a time, but is quite devoid of all uniformity, regularity, ſympathy, or conſent. It is likewiſe independent of all external ſtimulation, except that it requires a warm, cloſe, and quiet atmoſphere, being impeded by wind, or by a current of cool air, though the abſence or preſence of light is equally indifferent as to its performance. Young plants exhibit this phenomenon beſt. We have never ſeen it in ſo much perfection as by candlelight in a very warm cloſe apartment. The younger Linnæus in his full and animated account of this wonderful plant, to which nothing parallel is known, juſtly obſerves that " it loves ſhade, and rainy weather, and performs its movements very well during the whole night."

4. The laſt ſection comprehends ſome beautiful ſpecies; as *H. pictum*, Jacq. Ic. Rar. t. 567, a ſplendid native of Guinea. Each leaf has about four pair, with an odd one, of linear leaflets, ſix inches or more in length, narrow, moſt beautifully painted with a ſinuous, white, longitudinal ſtripe. The ſpikes are terminal, above a foot long, conſiſting of innumerable pale purple flowers, with a pair of white ſpots at the baſe of the ſtandard.

The Siberian *H. argenteum*, meanly delineated in Gmel. Sib. v. 4. t. 13, is a very ſhowy herbaceous plant, on account of its ſilvery leaves, and large white ſattiny flowers.

H. *alpinum*, and *obſcurum*, Curt. Mag. t. 282, are two handſome alpine ſpecies, with crimſon flowers. To theſe is akin *H. coronarium*, common in gardens by the name of French Honeyſuckle; and *H. roſeum*, Sims in Curt. Mag. t. 996, raiſed by the excellent Mr. Loddiges from ſeed obtained from Mount Caucaſus.

The only Britiſh ſpecies of *Hedyſarum* is one of thoſe, belonging to this ſection, which have the legume ſimple, or conſiſting of a ſolitary joint; *H. Onobrychis*, or ſaintfoin. Jacq. Auſtr. t. 352. Engl. Bot. t. 96. A native of chalky hillocks and downs, in various parts of England, flowering in June and July, when it greatly adorns thoſe arid open ſpots, which it prefers to a more rank or moiſt ſoil. The name *Onobrychis* expreſſes its being a favourite food of aſſes. It is no leſs acceptable to their more noble congener the horſe, and to horned cattle, being now very commonly cultivated for fodder in places favourable to its growth, which fortunately are ſuch as do not ſo well ſuit corn or graſs. Profeſſor Martyn has proved that ſaintfoin was firſt known amongſt us about the middle of the 17th century, and that the ſeed, with the name, came from France and Flanders.

HEE GRASS, in *Rural Economy*, a name in ſome caſes provincially employed to ſignify the ſtumps or ſharp ſtubs of ſuch graſs as has been mown.

HEEDER, a term provincially employed in ſome caſes to ſignify a male ſheep; the female being denominated a *Sheeder*. See SHEEDER.

HEEL, in *Anatomy*, the hind part of a foot.

In winter, the heels are liable to a kind of chilblains called *kibes*, which ſometimes tend to a mortification.

The bone of the heel is called *calcaneum*.

HEEL *of a horſe*, is the loweſt hind part of the foot, comprehended between the quarters and oppoſite to the toe.

The heel ſhould be high and large, and one ſide not riſe higher on the paſtern than the other. The diſtempers incident to this part are ſcabbineſs and ſcratches.

Some narrow-heeled horſes have high heels, but ſo weak and tender, that by preſſing the two ſides of the heel one againſt another they will ſenſibly yield. See HOOF.

HEELS, *to open the*, is to pare the foot and cut the heel low, almoſt cloſe to the fruſh; taking it down within a finger's breadth of the coronet or top of the hoof, ſo as to ſeparate the quarters, and by that means weaken and take away the ſubſtance of the foot, and make it cloſe and become narrow at the heels.

HEEL *of a horſeman*. This being the part which is armed with a ſpur, the word is uſed for the ſpur itſelf; as, this horſe underſtands the heels well.

To ride a horſe from one HEEL *to another*, is to make him go ſideways, ſometimes towards one heel, and ſometimes another.

HEEL, in *Architecture*, a moulding, the ſame as the cimareverſa. See CYMATIUM.

HEEL *of a rafter*, the foot of the rafter, is cut to coincide with the top of the wall plate, when the rafter is put into its poſition in the inclined ſide of the roof.

HEEL, in *Sea Language*, is a name often given to the after-end of a ſhip's keel; and alſo to the lower-end of the ſternpoſt to which it is firmly jointed.

If a ſhip lean on one ſide, whether aground or afloat, they ſay ſhe heels a-ſtarboard or afloat, or ſhe heels offward or to the ſhore; that is, ſhe inclines more to one ſide than to the other.

HEEL *of a maſt*, is that part of the foot thereof which is pared away ſlanting, that the maſt may be ſtayed afterward on it.

HEEL *of a top maſt*, is the lower end, ſuſtained on the treſſel-trees by means of an iron bar, called the *fidd*.

HEELER, or *Bloody Heel Cock*, is a fighting cock which ſtrikes or wounds much with his ſpurs.

The maſters know ſuch a cock, even while a chicken, by the ſtriking his two heels together in his going.

HEEM, JOHN DAVID DE, in *Biography*, an excellent painter of flowers and other articles of ſtill life, who was born at Utrecht in 1600. His father, David de Heem, firſt inſtructed him in the art, and guided his taſte in the objects of his purſuit; and he had the pleaſure of ſeeing his ſon riſe to a degree of eminence, far ſurpaſſing that which he was himſelf able to obtain.

John de Heem painted, with very great ſucceſs, compoſitions of conſiderable difficulty; made up of carpets, vaſes, fruits, flowers, &c.; which he wrought in a free rich ſtyle, with a flowing pencil, and full colour; with great correctneſs of imitation; not minute, but free characteriſtic exactneſs. His colouring is exceedingly tranſparent and brilliant, and his works were deemed ſo meritorious, that in his life time they were ſold at very conſiderable prices; and of courſe fell only into the hands of men of large fortunes; they are therefore very ſcarce to be met with. He died in 1674, at the age of 74, leaving a ſon, *Cornelius de Heem*, whom he inſtructed in the ſame line of art as he himſelf practiſed; but who never aroſe to the ſame degree of excellence with his father, though he was a very good painter, and his works are ſometimes ſold as of his father's production.

HEEMSKERK, JAMES VAN, a celebrated naval commander, was a native of Amſterdam, and devoted from his youth to the ſea. In 1596, he failed with others, in order to diſcover a north-weſt paſſage to China, but the hardſhips they had to endure were ſuch as to oblige them to abandon their enterpriſe. Heemſkerk was afterwards employed in the navy of Holland; he was ſent, in 1607, as vice-admiral, with twenty-ſix ſhips of war, to cruiſe againſt the Spaniards, an engagement enſued, in which Heemſkerk had his leg carried off, an accident which, in a few minutes, put an end to his life, but he died exhorting his men to perform their duty. Their efforts were crowned with ſucceſs, the Spaniſh admiral was killed, his ſon made priſoner, and many of their ſhips burnt or ſunk. The body of Heemſkerk was brought home, buried at Amſterdam at the public expence, and a monument was erected to his memory. Moreri.

HEERAPOUR, in *Geography*, a town of Hindooſtan, in Gurry Mundella; 14 miles S.S.W. of *Mundella*.—Alſo, a town of Hindooſtan, in Malwa; 40 miles E. of Chatterpour.—Alſo, a town of Hindooſtan, in Guzerat; 30 miles N. E. of Surat.

HEERE, Lucas de, in *Biography*, a painter of very conſiderable reputation in his time; which, however, was not that of the beſt period of the art. He was born at Ghent in 1584. His father was the beſt ſtatuary of his time, and his mother, whoſe maiden name was Anne Smythers, had the reputation of an extraordinary paintreſs; ſo that Lucas ſet forth with conſiderable advantages. Having, under the inſtruction of his parents, learned the firſt principles of deſign, and to handle the pencil with eaſe and freedom, he was placed as a diſciple with Francis Floris, under whoſe tuition he made conſiderable progreſs, and Pilkington ſays, he became in ſome reſpects equal to his maſter, and in compoſition and invention his ſuperior; but this appears to be inflated encomium, and ariſes from De Heere being afterwards more employed by exalted perſons than Floris was.

When he quitted Floris he went to France, where the queen's mother employed him for ſome years in drawing deſigns for tapeſtry. It is ſaid, that while he was at Fontainbleau, he ſtudied much from the antique ſtatues; but whatever his ſtudies of that kind were, he might as well have ſaved the time he beſtowed upon them, as he never was able to adopt, or apply any of thoſe principles on which they are wrought to his ſubſequent works, which are in general tame and laboured imitations of nature as he found her; and not very correct either, being dry and ſomewhat Gothic in their ſtyle.

At his return to Ghent he painted ſeveral portraits very ſucceſsfully; and is ſaid to have had ſo tenacious a memory with regard to forms, that if he ſaw a perſon once, he would paint his likeneſs as ſtrong as if he had the model before his eyes. He alſo was employed at Ghent on ſeveral altar pieces. In the church of St. Peter's, he painted the Lord's Supper. In St. John's, the Reſurrection of Chriſt; and on the doors which covered the picture, Chriſt and the two diſciples of Emmaus.

De Heere came to England about 1557 or 8, and had the honour of painting queen Elizabeth; which picture is now in the royal collection at Kenſington palace. According to Walpole, the queen is repreſented in a rich dreſs with the emblems of royalty; and the goddeſſes Juno, Pallas, and Minerva, ſeem flying from before her. Juno drops her ſceptre, Venus her roſes, Cupid, alſo preſent, flings away his uſeleſs bow and arrows and clings to his mother; and on the old frame are ſome Latin verſes explanatory of this idle flattery; probably of the painter's own compoſing, who dabbled in both the ſiſter arts of painting and poeſy. Beſides this, he painted a great many portraits here, which are to be ſeen in the houſes of the nobility, and ſeveral of which Vertue has engraved. Lady Jane Grey, lord Darnley, huſband of Mary queen of Scotland, Frances, ducheſs of Suffolk, &c. and at Longleate, there is a large picture of a gentleman, his wife and family, conſiſting of eight other perſons. Soon after he came to England, he painted a naked man with different coloured clothes lying beſides him, and a pair of ſheers in his hand, as a ſatire on our fickleneſs in faſhion; it is illuſtrative of a verſe by Andrew de Borde, who in his Introduction to Knowledge, has prefixed to the firſt chapter a naked man with theſe lines:

"I am an Engliſhman, and naked I ſtand here,
Muſing in mind what raiment I ſhall wear."

De Heere, before he died, which happened in 1584, in the 50th year of his age, returned to Ghent; but his laſt works are unknown. It was his cuſtom always to mark his pictures with the dates of their production; and with his own initials combined in one form.

HEERENBERG, in *Geography*, a town of Holland, in the county of Zutphen; 15 miles S. E. of Arnheim.

HEERENVEN, a town of Holland, in the ſtate of Frieſland, called, on account of its extent and neatneſs, the "Hague of Frieſland;" 15 miles S.S E. of Leewarden.

HEERINGEN, a town of Germany, in the county of Schwartzburg Rudolſtadt, on the Helm; ſix miles S.E. of Nordhauſen. N. lat. 51° 27'. E. long. 10° 59'.

HEERLEN, a town of France, in the department of the Lower Meuſe; and chief place of a canton, in the diſtrict of Maeſtricht. The place contains 3218, and the canton 7231 inhabitants, on a territory of 90 kiliometres, in five communes.

HEERMUND. See Hindmend.

HEERS, Henry de, in *Biography*, a phyſician, was of a noble family of Tongers, an ancient town in the biſhopric of Liege, where it is believed he was born about the year 1570. He diſtinguiſhed himſelf while young, by his attainments in philoſophy and the mathematics; and ſpending ſome time in each of the countries of Europe, through which he travelled, namely, Germany, Italy, Spain, France, and England, he learnt their reſpective languages, to which he added a knowledge of the Latin, Greek, and Hebrew tongues. In the courſe of his travels he took the degree of M. D., and finally ſettled in the practice of his profeſſion at Liege, about the year 1605. He was phyſician to the princes Erneſt and Ferdinand of Bavaria during upwards of thirty years; and is ſaid to have died about the year 1636. De Heers, or Ab Heers, as he calls himſelf in his Latin works, was a man of no leſs acuteneſs of penetration and ſolidity of judgment, than of profound and extenſive erudition; and he perſiſted in ardent ſtudy to the end of his life. He left the following works; "Spadacrene, hoc eſt, Fons Spadanus, ejus ſingularia, bibendi modus, medicamina bibentibus neceſſaria," Leodij, 1614. This work underwent ten or more ſubſequent editions.—"Deplementum ſupplementi de Spadanis fontibus, ſive, Vindiciæ pro ſua Spadacrene," Leodij, 1624. This was an anſwer to John Baptiſt Van Helmont, whom he treats rather ſeverely.—"Obſervationes Medicæ oppidò raræ in Spa et Leodij animadverſæ, cum aliquot medicamentis ſelectis," Leodij, 1631;—republiſhed at Leipſic, in 1635; and at Lyons in 1685. The author paſſed a few weeks annually at Spa. Eloy. Dict. Hiſt.

HEES, in *Geography*, a town of Holland; 17 miles S S.E. of Bois le Duc.

HEGAD, one of the Sooloo iſlands. N. lat. 6 7'. E. long 121.

HEGAW, or Hegow, a part of Germany, in the circle of Swabia, which borders on the Boden ſee, or lake of Conſtance.

HEGEMONE, in *Mythology*, one of the *Graces*; which ſee.

HEGESIPPUS, in *Biography*, who flouriſhed in the ſecond century, was by birth a Jew, and educated in the religion of his fathers. He afterwards was converted to the Chriſtian faith, became a biſhop at Rome about the year 177, where he died in the reign of the emperor Commodus, about the year 180. He was author of an eccleſiaſtical hiſtory from the death of Chriſt to the time in which he lived, which, according to Euſebius, contained a faithful relation of the apoſtolic preaching, written in a very ſimple ſtyle. The principal value of the exiſting fragments ariſes from the teſtimony which may be deduced, from ſcriptural paſſages quoted in them, in favour of the genuineneſs of the books of the New Teſtament. Moreri. Lardner.

HEGIRA, in *Chronology*, a celebrated epocha, uſed by the Arabs and Mahometans for the computation of time.

The word is Arabic, formed of הגרות, *hagirath*, *flight*, or *departure*, of הגר, *to fly*, *to quit one's country*, *family*, *friends*, &c. It is written after the Arabic word *Hejerà*, the Arabic letters of which it is compoſed being *H*, *j*, *r*, *à*, or *ah*, and the ſupplied vowels are to be pronounced ſhort.

The event which gave occaſion to this epocha, was Mahomet's flight from Mecca to Medina. The magiſtrates of that city, fearing his impoſtures might raiſe a ſedition, reſolved to expel him: this, they accordingly effected in the year of our Lord 622, and of the Julian period 5335, on the evening of the 15th or 16th of July.

To render this epocha more creditable, the Mahometans affect to uſe the word hegira in a peculiar ſenſe, for an act of religion, whereby a man forſakes his country, and gives way to the violence of perſecutors and enemies of the faith; they add, that the Koreſhites, or Koreiſh, being then the ſtrongeſt party in the city, obliged their prophet to fly, having previouſly conſpired to kill him; as not being able to endure his aboliſhing of idolatry. Their conſpiracy, as it is pretended by Mahomet himſelf, was revealed to him by the angel Gabriel, who had now ordered him to retire to Medina. This flight was not the firſt of Mahomet's, but it was the moſt famous. It happened in the thirteenth year from his aſſuming the character of prophet and apoſtle, and promulgating his new religion.

The Orientals do not agree with us as to the time of the hegira. Among the Mahometans, Amaſi fixes it to the year of Chriſt 630, and from the death of Moſes 2347; and Ben Caſſem, to the year of the world 5800; according to the Greek computation, among the Chriſtians, Said Ebn Batrik refers the hegira to the year of Chriſt 614, and of the creation 6114. But there is another hegira, and the earlier too, though of leſs eminence. Theſe two hegiras the Mahometans, in their language, call *hegiratan*.

This event, which took place at the time and in the manner above ſtated, though little memorable in itſelf, and deriving no celebrity from the circumſtances attending it, was, 18 years after, diſtinguiſhed by Omar, the ſecond caliph, as the criſis of their new religion, and eſtabliſhed as an epoch, to which the dates of all the tranſactions of the faithful ſhould have reference in future time. This eſtabliſhment was made in imitation of the Chriſtians, who, in thoſe times, reckoned their years from the perſecution of Diocleſian. Previouſly to this, the people had been accuſtomed to compute from the commencement of a particular war, the day of a remarkable battle, or other occaſional event of importance to their little communities. In order to remedy this confuſion, the caliph enjoined the obſervance of a determinate era, in which the ſtrongeſt prejudices of the people ſhould be made to concur with the ſovereign authority. The date of the hegira was thenceforth expreſſed in all the public acts and letters. Omar did not think it expedient to attempt at any innovation as to the time of beginning the year, againſt which the ideas of the people would have revolted; and, therefore, although the eſcape of Mahomet from the indignation of his fellow-citizens was effected, according to their records, on the firſt day of the third month, or rabee prior, (on the 12th day of which he reached Medina,) yet the hegira takes its date from a period two months antecedent to this flight, *viz.* from the firſt day of Moharram, being the day on which immemorial cuſtom had eſtabliſhed the celebration of the feſtival of the new year. The Arabian and Syrian Chriſtians, and the Mahometan aſtronomers in general, appear to have fixed this day on Thurſday, the 15th of the Syro-Macedonian month Tamooz, anſwering to our July; but ſome among the latter, and moſt of their hiſtorical writers, refer it to the next day, Friday the 16th, and this latter date has, in modern times, obtained almoſt univerſal acceptance. A religious preference, which Friday claims above the reſt of the week, ſeems to have given effect to the arguments in its favour. The difference of opinion on this ſubject has ariſen, in the firſt place, from the uncertainty unavoidably attending a date, to be aſcertained at a diſtant period of time, from the phaſe of the moon, which is retarded or advanced by ſo complicated a variety of circumſtances; and the ambiguity appears, in the ſecond place, to have been promoted by the cuſtom of the Arabs, beginning their day at ſun-ſet; comformably with which idea, the time when the moon became viſible at Mecca, being the evening of Thurſday the 15th, according to our mode of computation, was to them the commencement of Friday, which Friday (beginning a few hours later) we term the 16th of July. At that period the cycle of the ſun was 15; the cycle of the moon, or golden number, 15; the Roman indiction, 10; and the dominical letter, C. For the mode of computing the beginning and duration of the year, we refer to the article *Arabic*, &c. YEAR.

In the year of Chriſt 622, the hegira commenced on the 16th of July, with the Arabian month Moharram; and conſidered as an ordinary, or ſimple year, it conſiſted of 354 days, but as a year of exceſs, an intercalary day is added to the laſt month Dulhajee, and it contains 355 days. The year of the Mahometans, indeed, conſiſts of twelve lunar months, each containing 29 days, 12 hours, and 792 ſcruples, or parts in 1080 (1080 ſcruples making an hour); ſo that the year contains 354 days, 8 hours, and 864 ſcruples. In order to reduce this year to an integral number of days, a cycle of 30 was choſen as the moſt convenient period, becauſe 30 times 8 hours and 864 ſcruples amount exactly to 11 days; and in this cycle there are 19 years of 354 days, and 11 of 355; the intercalary day is added at the end of the 2d, 5th, 7th, 10th, 13th, 16th, 18th, 21ſt, 24th, 26th, and 29th years of the cycle. The commencement of each year of the hegira will never fall on the ſame day of the month, according to our calendar, but will anticipate about 11 days. In order to reduce theſe years to the Julian calendar, *i. e.* to find what Julian year a given year of the hegira correſponds to, reduce the given year of the hegira into days, by multiplying by 354, divide the product by 365, and to the quotient add 622. *E. G.* To find the Julian year correſponding to 1225 of the hegira; $\frac{1225 \times 354}{365} + 622 = 1810$. Mr. Marſden (Phil. Tranſ. vol. lxxviii. part 2.) has given a very valuable table, exhibiting the correſpondence of the years of the hegira with thoſe of the Chriſtian era, and the month and day of their reſpective commencement; in which he has improved upon thoſe of Greaves in his "Epochæ Celebriores," Ulug Beighi, publiſhed in 1650, and thoſe in the "Chronologia Reformata" of Riccioli, 1659, and the "Ephemerides," Mat. Fred. Beekii, 1695. The firſt year of the hegira began, as we have already mentioned, A. D. 622, July 16th. The 1201ſt of the hegira, which is the 1ſt of the cycle, began A. D. 1786, Oct. 24, ſo that the table may be eaſily formed, or extended to any length, either backward or forward. Until the beginning of the laſt century, this table diſtinguiſhes only every 10th year; but the intervals may be calculated with caſe and preciſion by means of the obſervations that relate to the cycle; or by deducting 11 days from every year which has elapſed ſince the commencement of the cycle. Thus, the 2d year of the hegira commences 623, July the 5th; the 32d year commenced 652, Auguſt 13th, &c. The table is here ſubjoined.

Table exhibiting the Correſpondence of the Years of the Hegira with thoſe of the Chriſtian Era.

An. Heg.	An. Do.		Day.	An. Heg.	An. Do.		Day.	An. Heg.	An. Do.		Day.	An. Heg.	An. Do.		Day.
1	622	16 July	F.	501	1107	22 Aug.	Th.	1001	1592	28 Sept.	Th.	1149	1736	1 May	Sa.
11	632	29 Mar.	Su.	511	1117	5 May	Sa.	1011	1602	11 June	F.	1150	1737	20 Apr.	W.
21	641	10 Dec.	M.	521	1127	17 Jan.	M.	1021	1612	23 Feb.	Su.	1151	1738	10 Apr.	M.
31	651	24 Aug.	W.	531	1136	29 Sept.	Tu.	1031	1621	6 Nov.	Tu.	1152	1739	30 Mar.	F.
41	661	7 May	F.	541	1146	13 June	Th.	1041	1631	20 July	W.	1153	1740	18 Mar.	Tu.
51	671	18 Jan.	Sa.	551	1156	25 Feb.	Sa.	1051	1641	2 Apr.	F.	1154	1741	8 Mar.	Su.
61	680	1 Oct.	M.	561	1165	7 Nov.	Su.	1061	1650	15 Dec.	Su.	1155	1742	25 Feb.	Th.
71	690	15 June	W.	571	1175	22 July	Tu.	1071	1660	27 Aug.	M.	1156	1743	15 Feb.	Tu.
81	700	26 Feb.	Th.	581	1185	4 Apr.	Th.	1081	1670	11 May	W.	1157	1744	4 Feb.	Sa.
91	709	9 Nov.	Sa.	591	1194	16 Dec.	F.	1091	1680	23 Jan.	F.	1158	1745	23 Jan.	W.
101	719	24 July	M.	601	1204	29 Aug.	Su.	1101	1689	5 Oct.	Sa.	1159	1746	13 Jan.	M.
111	729	5 Apr.	Tu.	611	1214	13 May	Tu.	1111	1699	19 June	M.	1160	1747	2 Jan.	F.
121	738	18 Dec.	Th.	621	1224	24 Jan.	W.					1161	1747	22 Dec.	Tu.
131	748	31 Aug.	Sa.	631	1233	7 Oct.	F.	1112	1700	7 June	F.	1162	1748	11 Dec.	Su.
141	758	14 May	Su.	641	1243	21 June	Su.	1113	1701	28 May	W.	1163	1749	30 Nov.	Th.
151	768	26 Jan.	Tu.	651	1253	3 Mar.	M.	1114	1702	17 May	Su.	1164	1750	19 Nov.	M.
161	777	9 Oct.	Th.	661	1262	15 Nov.	W.	1115	1703	6 May	Th.	1165	1751	9 Nov.	Sa.
171	787	22 June	F.	671	1272	29 July	F.	1116	1704	25 Apr.	Tu.	1166	1752	8 Nov.	W.
181	797	5 Mar.	Su.	681	1282	11 Apr.	Sa.	1117	1705	14 Apr.	Sa.	1167	1753	29 Oct.	M.
191	806	17 Nov.	Tu.	691	1291	24 Dec.	M.	1118	1706	4 Apr.	Th.	1168	1754	18 Oct.	F.
201	816	30 July	W.	701	1301	6 Sept.	W.	1119	1707	24 Mar.	M.	1169	1755	7 Oct.	Tu.
211	826	13 Apr.	F.	711	1311	20 May	Th.	1120	1708	12 Mar.	F.	1170	1756	26 Sept.	Su.
221	835	26 Dec.	Su.	721	1321	31 Jan.	Sa.	1121	1709	2 Mar.	W.	1171	1757	15 Sept.	Th.
231	845	7 Sept.	M.	731	1330	15 Oct.	M.	1122	1710	19 Feb.	Su.	1172	1758	4 Sept.	M.
241	855	22 May	W.	741	1340	27 June	Tu.	1123	1711	8 Feb.	Th.	1173	1759	25 Aug.	Sa.
251	865	2 Feb.	F.	751	1350	11 Mar.	Th.	1124	1712	29 Jan.	Tu.	1174	1760	13 Aug.	W.
261	874	16 Oct.	Sa.	761	1359	23 Nov.	Sa.	1125	1713	17 Jan.	Sa.	1175	1761	2 Aug.	Su.
271	884	29 June	M.	771	1369	5 Aug.	Su.	1126	1714	7 Jan.	Th.	1176	1762	23 July	F.
281	894	13 Mar.	W.	781	1379	19 Apr.	Tu.	1127	1714	27 Dec.	M.	1177	1763	12 July	Tu.
291	903	24 Nov.	Th.	791	1388	31 Dec.	Th.	1128	1715	16 Dec.	F.	1178	1764	1 July	Su.
301	913	7 Aug.	Sa.	801	1398	13 Sept.	F.	1129	1716	5 Dec.	W.	1179	1765	20 June	Th.
311	923	21 Apr.	M.	811	1408	27 May	Su.	1130	1717	24 Nov.	Su.	1180	1766	9 June	M.
321	933	1 Jan.	Tu.	821	1418	8 Feb.	Tu.	1131	1718	13 Nov.	Th.	1181	1767	30 May	Sa.
331	942	15 Sept.	Th.	831	1427	22 Oct.	W.	1132	1719	3 Nov.	Tu.	1182	1768	18 May	W.
341	952	29 May	Sa.	841	1437	5 July	F.	1133	1720	22 Oct.	Sa.	1183	1769	7 May	Su.
351	962	9 Feb.	Su.	851	1447	19 Mar.	Su.	1134	1721	11 Oct.	W.	1184	1770	27 Apr.	F.
361	971	24 Oct.	Tu.	861	1456	3 Nov.	M.	1135	1722	1 Oct.	M.	1185	1771	16 Apr.	Tu.
371	981	7 July	Th.	871	1466	13 Aug.	W.	1136	1723	20 Sept.	F.	1186	1772	5 Apr.	Su.
381	991	20 Mar.	F.	881	1476	26 Apr.	F.	1137	1724	9 Sept.	W.	1187	1773	25 Mar.	Th.
391	1000	1 Dec.	Su.	891	1486	7 Jan.	Sa.	1138	1725	29 Aug.	Su.	1188	1774	14 Mar.	M.
401	1010	15 Aug.	Tu.	901	1495	21 Sept.	M.	1139	1726	18 Aug.	Th.	1189	1775	4 Mar.	Sa.
411	1020	27 Apr.	W.	911	1505	4 June	W.	1140	1727	8 Aug.	Tu.	1190	1776	21 Feb.	W.
421	1030	9 Jan.	F.	921	1515	15 Feb.	Th.	1141	1728	27 July	Sa.	1191	1777	9 Feb.	M.
431	1039	23 Sept.	Su.	931	1524	29 Oct.	Sa.	1142	1729	16 July	W.	1192	1778	30 Jan.	F.
441	1049	5 June	M.	941	1534	13 July	M.	1143	1730	6 July	M.	1193	1779	19 Jan.	Tu.
451	1059	17 Feb.	W.	951	1544	25 Mar.	Tu.	1144	1731	25 June	F.	1194	1780	8 Jan.	Sa.
461	1068	31 Oct.	F.	961	1553	7 Dec.	Th.	1145	1732	13 June	Tu.	1195	1780	28 Dec.	Th.
471	1078	14 July	Sa.	971	1563	21 Aug.	Sa.	1146	1733	3 June	Su.	1196	1781	17 Dec.	M.
481	1088	27 Mar.	M.	981	1573	3 May	Su.	1147	1734	23 May	Th.	1197	1482	17 Dec.	Sa.
491	1097	9 Dec.	W.	991	1583	15 Jan.	Tu.	1148	1735	13 May	Tu.	1198	1783	26 Nov.	W.

Table exhibiting the Correſpondence of the Years of the Hegira with thoſe of the Chriſtian Era.

A Heg.	An. Do.		Day.	An. Heg.	An. Do.		Day.	An. Heg.	An. Do.		Day.	An. Heg.	An. Do.		Day.
1199	1784	14 Nov.	Su.	1255	1839	16 Mar.	Su.	1311	1893	14 July	Sa.	1367	1947	13 Nov.	Sa.
1200	1785	4 Nov.	F.	1256	1840	4 Mar.	Th.	1312	1894	4 July	Th.	1368	1948	1 Nov.	W.
1201	1786	24 Oct.	Tu.	1257	1841	22 Feb.	Tu.	1313	1895	23 June	M.	1369	1949	22 Oct.	M.
1202	1787	13 Oct.	Sa.	1258	1842	11 Feb.	Sa.	1314	1896	11 June	F.	1370	1950	11 Oct.	F.
1203	1788	2 Oct.	Th.	1259	1843	31 Jan.	W.	1315	1897	1 June	W.	1371	1951	30 Sept.	Tu.
1204	1789	21 Sept.	M.	1260	1844	21 Jan.	M.	1316	1898	21 May	Su.	1372	1952	19 Sept.	Su.
1205	1790	10 Sept.	F.	1261	1845	9 Jan.	F.	1317	1899	11 May	F.	1373	1953	8 Sept.	Th.
1206	1791	31 Aug.	W.	1262	1845	29 Dec.	Tu.	1318	1900	29 Apr.	Tu.	1374	1954	28 Aug.	M.
1207	1792	19 Aug.	Su.	1263	1846	19 Dec.	Su.	1319	1901	18 Apr.	Sa.	1375	1955	18 Aug.	Sa.
1208	1793	9 Aug.	F.	1264	1847	8 Dec.	Th.	1320	1902	8 Apr.	Th.	1376	1956	6 Aug.	W.
1209	1794	29 July	Tu.	1265	1848	26 Nov.	M.	1321	1903	28 Mar.	M.	1377	1957	27 July	M.
1210	1795	18 July	Sa.	1266	1849	16 Nov.	Sa.	1322	1904	16 Mar.	F.	1378	1958	16 July	F.
1211	1796	7 July	Th.	1267	1850	5 Nov.	W.	1323	1905	6 Mar.	W.	1379	1959	5 July	Tu.
1212	1797	26 June	M.	1268	1851	26 Oct.	M.	1324	1906	23 Feb.	Su.	1380	1960	24 June	Su.
1213	1798	15 June	F.	1269	1852	14 Oct.	F.	1325	1907	12 Feb.	Th.	1381	1961	13 June	Th.
1214	1799	5 June	W.	1270	1853	3 Oct.	Tu.	1326	1908	2 Feb.	Tu.	1382	1962	2 June	M.
1215	1800	24 May	Su.	1271	1854	23 Sept.	Su.	1327	1909	21 Jan.	Sa.	1383	1963	23 May	Sa.
1216	1801	14 May	F.	1272	1855	12 Sept.	Th.	1328	1910	11 Jan.	Th.	1384	1964	11 May	W.
1217	1802	3 May	Tu.	1273	1856	31 Aug.	M.	1329	1910	31 Dec.	M.	1385	1965	30 Apr.	Su.
1218	1803	22 Apr.	M.	1274	1857	21 Aug.	Sa.	1330	1911	20 Dec.	F.	1386	1966	20 Apr.	F.
1219	1804	11 Apr.	Th.	1275	1858	10 Aug.	W.	1331	1912	9 Dec.	W.	1387	1967	9 Apr.	Tu.
1220	1805	31 Mar.	M.	1276	1859	31 July	M.	1332	1913	28 Nov.	Su.	1388	1968	29 Mar.	Su.
1221	1806	20 Mar.	F.	1277	1860	19 July	F.	1333	1914	17 Nov.	Th.	1389	1969	18 Mar.	Th.
1222	1807	10 Mar.	W.	1278	1861	8 July	Tu.	1334	1915	7 Nov.	Tu.	1390	1970	7 Mar.	M.
1223	1808	27 Feb.	Su.	1279	1862	28 June	Su.	1335	1916	26 Oct.	Sa.	1391	1971	25 Feb.	Sa.
1224	1809	15 Feb.	Th.	1280	1863	17 June	Th.	1336	1917	16 Oct.	Th.	1392	1972	14 Feb.	W.
1225	1810	5 Feb.	Tu.	1281	1864	5 June	M.	1337	1918	5 Oct.	M.	1393	1973	2 Feb.	Su.
1226	1811	25 Jan.	Sa.	1282	1865	26 May	Sa.	1338	1919	24 Sept.	F.	1394	1974	23 Jan.	F.
1227	1812	15 Jan.	Th.	1283	1866	15 May	W.	1339	1920	13 Sept.	W.	1395	1975	12 Jan.	Tu.
1228	1813	3 Jan.	M.	1284	1867	4 May	Su.	1340	1921	2 Sept.	Su.	1396	1976	2 Jan.	Su.
1229	1813	23 Dec.	F.	1285	1868	23 Apr.	F.	1341	1922	22 Aug.	Th.	1397	1976	21 Dec.	Th.
1230	1814	13 Dec.	W.	1286	1869	12 Apr.	Tu.	1342	1923	12 Aug.	Tu.	1398	1977	10 Dec.	M.
1231	1815	2 Dec.	Su.	1287	1870	2 Apr.	Su.	1343	1924	31 July	Sa.	1399	1978	30 Nov.	Sa.
1232	1816	20 Nov.	Th.	1888	1871	22 Mar.	Th.	1344	1925	20 July	W.	1400	1979	19 Nov.	W.
1233	1817	10 Nov.	Tu.	1289	1872	10 Mar.	M.	1345	1926	10 July	M.	1401	1980	7 Nov.	Su.
1234	1818	30 Oct.	Sa.	1290	1873	28 Feb.	Sa.	1346	1927	29 June	F.	1402	1981	28 Oct.	F.
1235	1819	19 Oct.	W.	1291	1874	17 Feb.	W.	1347	1928	18 June	W.	1403	1982	17 Oct.	Tu.
1236	1820	8 Oct.	M.	1292	1875	6 Feb.	Su.	1348	1929	7 June	Su.	1404	1983	6 Oct.	Sa.
1237	1821	27 Sept.	F.	1293	1876	27 Jan.	F.	1349	1930	27 May	Th.	1405	1984	25 Sept.	Th.
1238	1822	17 Sept.	W.	1294	1877	15 Jan.	Tu.	1350	1931	17 May	Tu.	1406	1985	14 Sept.	M.
1239	1823	6 Sept.	Su.	1295	1878	4 Jan.	Sa.	1351	1932	5 May	Sa.	1407	1986	4 Sept.	Sa.
1240	1824	25 Aug.	Th.	1296	1878	25 Dec.	Th.	1352	1933	24 Apr.	W.	1408	1987	24 Aug.	W.
1241	1825	15 Aug.	Tu.	1297	1879	14 Dec.	M.	1353	1934	14 Apr.	M.	1409	1988	12 Aug.	Su.
1242	1826	4 Aug.	Sa.	1298	1880	3 Dec.	Sa.	1354	1935	3 Apr.	F.	1410	1989	2 Aug.	F.
1243	1827	24 July	W.	1299	1881	22 Nov.	W.	1355	1936	22 Mar.	Tu.	1411	1990	22 July	Tu.
1244	1828	13 July	M.	1300	1882	11 Nov.	Su.	1356	1937	12 Mar.	Su.	1412	1991	11 July	Sa.
1245	1829	2 July	F.	1301	1883	1 Nov.	F.	1357	1938	1 Mar.	Th.	1413	1992	30 June	Th.
1246	1830	22 June	W.	1302	1884	20 Oct.	Tu.	1358	1939	19 Feb.	Tu.	1414	1993	19 June	M.
1247	1831	11 June	Su.	1303	1885	9 Oct.	Sa.	1359	1940	8 Feb.	Sa.	1415	1994	8 June	F.
1248	1832	30 May	Th.	1304	1886	29 Sept.	Th.	1360	1941	27 Jan.	W.	1416	1995	29 May	W.
1249	1833	20 May	Tu.	1305	1887	18 Sept.	M.	1361	1942	17 Jan.	M.	1417	1996	17 May	Su.
1250	1834	9 May	Sa.	1306	1888	7 Sept.	Sa.	1362	1943	6 Jan.	F.	1418	1997	7 May	F.
1251	1835	28 Apr.	W.	1307	1889	27 Aug.	W.	1363	1943	26 Dec.	Tu.	1419	1998	26 Apr.	Tu.
1252	1836	27 Apr.	M.	1308	1890	16 Aug.	Su.	1364	1944	15 Dec.	Su.	1420	1999	15 Apr.	Sa.
1253	1837	6 Apr.	F.	1309	1891	6 Aug.	F.	1365	1945	4 Dec.	Th.	1421	2000	4 Apr.	Th.
1254	1838	26 Mar.	Tu.	1310	1892	25 July	Tu.	1366	1946	24 Nov.	Tu.				

HEIDEGGER, John James, in *Biography*, a ſucceſsful adventurer, who arrived in England the beginning of the laſt century, and who, by his addreſs and talents, became, with the gay and faſhionable, an important perſonage in every day's converſation and news-paper. He was the ſon of a clergyman, and a native of Zurich in Switzerland, where he married, but left his country in conſequence of an intrigue. (Anecdotes of Hogarth by Nichols.) Having had an opportunity of viſiting the principal cities of Europe, he acquired a taſte for elegant and refined pleaſures, which united to a ſtrong inclination for voluptuouſneſs, by degrees qualified him for the management of public amuſements. In 1708, when he was near 50 years old, he came to England on a negotiation from the Swiſs at Zurich; but failing in his embaſſy, he entered as a private ſoldier in the guards for protection. By his ſprightly, engaging converſation, and inſinuating addreſs, he ſoon acquired the good graces of our young people of faſhion; from whom he obtained the appellation of "the Swiſs Count." He is twice mentioned under this title in the "Tatler," Nos. 12. and 18; and in Mr. Duncomb's "Collection of Letters of ſeveral eminent Perſons deceaſed," there is a humorous dedication of Mr. Hughes's "Viſion of Chaucer" to "the Swiſs Count." He had the addreſs to procure a ſubſcription, with which, in 1709, he was enabled to furniſh out the opera of "Thomyris," which was written in Engliſh, and performed at the queen's theatre in the Haymarket. The muſic, however, was Italian, conſiſting of airs ſelected from the operas of Bononcini, Scarlattti, Steffani, Gaſparini, and Albinoni. Moſt of the ſongs in "Thomyris" were excellent for the time, particularly thoſe by Bononcini.

Valentini, Margarita, and Mrs. Tofts ſung in it; and Heidegger, by this performance alone, was a gainer of 500 guineas.

He is ſaid, by Motteux, to have ſelected the airs for Thomyris; he appears as a dramatic writer in the dedication to Antiochus; and likewiſe in that of the opera of "Amadige," or Amadis of Gaul, which he dedicates to the earl of Burlington in 1715, and which he ſays, "more immediately claimed his lordſhip's protection, as it was compoſed in his own family, meaning by Handel, who reſided in Burlington houſe, as his lordſhip's maeſtro di cappella.

The judicious remarks which he made on ſeveral defects in the conduct of our operas in general, and the hints which he threw out for improving the entertainments of the royal theatre, ſoon eſtabliſhed his character as a good critic. Appeals were made to his judgment; and ſome very magnificent and elegant decorations, which were introdued upon the ſtage in conſequence of his advice, gave ſuch ſatisfaction to George II., who was fond of operas, that upon being informed to whoſe genius he was indebted for theſe improvements, his majeſty was pleaſed from that time to countenance him, and he ſoon obtained the chief management of the opera-houſe in the Haymarket. He then ſet about improving another ſpecies of diverſion, not leſs agreeable to the king, which was maſquerades, and over theſe he always preſided at the king's theatre. He was likewiſe appointed maſter of the revels. The nobility now careſſed him ſo much, and had ſuch an opinion of his taſte, that all ſplendid and elegant entertainments given by them upon particular occaſions, and all private aſſemblies by ſubſcription, were ſubmitted to his direction.

From the emoluments of theſe ſeveral employments, he gained a regular and conſiderable income, amounting, it is ſaid, in ſome years, to 5000*l.*, which he ſpent with much liberality; particularly in the maintenance of perhaps a ſomewhat too luxurious table; ſo that it be may ſaid, that he raiſed an income, but never a fortune.

His peccadillos, however, if they may be called by ſo mild a name, were completely "covered" by his "charity."

After a ſucceſsful maſquerade, he has been known to give away ſeveral hundred pounds at a time. "You know poor objects of diſtreſs better than I do," he would frequently ſay to the father of the gentleman who furniſhes this anecdote: "be ſo kind as to give away this money for me." This well-known liberality, perhaps, contributed much to his carrying on that diverſion with ſo little oppoſition as he experienced.

Pope (Dunciad, i. 289) calls the bird which attended on the goddeſs—"a monſter of a fowl," ſomething betwixt a Heidegger and "owl," and explains Heidegger to mean "a ſtrange bird from Switzerland, and not (as ſome have ſuppoſed) the name of an eminent perſon, who was a man of parts, and as was ſaid of Petronius, "arbiter elegantiarum."

That he was a good judge of muſic appears by the airs which he ſelected for ſeveral of the firſt paſticcio operas: but this is all that is known of his mental abilities: unleſs we add, what we have good authority for ſaying in honour to his memory, that he walked from Charing-croſs to Temple-bar, and back again; and when he came home wrote down every ſign on each ſide of the Strand.

As to his perſon, though he was tall and well made, it was not very pleaſing, from an unuſual hardneſs of features.

There is a mezzotinto of Heidegger by J. Faber 1742, (another copy dated 1749) from a painting by Vanloo, a ſtriking likeneſs, now (1784) in the poſſeſſion of Peter Crawford, eſq. His face is alſo introduced in more than one of Hogarth's prints.

But he was the firſt to laugh at his own uglineſs; and he once laid a wager with the earl of Cheſterfield, that, within a given time, his lordſhip would not be able to produce ſo hideous a face in all London. After ſtrict ſearch, a woman was found, whoſe features were at firſt ſight thought ſtronger than Heidegger's; but upon ſetting her head-dreſs upon himſelf, he was univerſally allowed to have won the wager. Jolly, a well-known taylor, carrying his bill to a noble duke; his grace, for evaſion, ſaid, "Dam your ugly face, I will never pay you till you bring me an uglier fellow than yourſelf!" Jolly bowed and retired, wrote a letter, and ſent it by a ſervant to Heidegger; ſaying his grace wiſhed to ſee him the next morning on particular buſineſs." Heidegger attended, and Jolly was there to meet him; and in conſequence, as ſoon as Heidegger's viſit was over, Jolly received the caſh.

The late facetious duke of Montague (the memorable author of the bottle conjuror at the theatre in the Haymarket) gave an entertainment at the Devil-tavern, Temple-bar, to ſeveral of the nobility and gentry, ſelecting the moſt convivial, and a few hard-drinkers, who were all in the plot. Heidegger was invited, and in a few hours after dinner, was made ſo dead drunk that he was carried out of the room, and laid inſenſible upon a bed. A profound ſleep enſued; when the late Mr. Salmon's daughter was introduced, who took a mould from his face in plaſter of Paris. From this a maſk was made, and a few days before the next maſquerade (at which the king promiſed to be preſent, with the counteſs of Yarmouth) the duke made application to Heidegger's valet de chambre, to know what ſuit of cloaths he was likely to wear; and then procuring a ſimilar dreſs, and a perſon of the ſame ſtature, he gave him his inſtructions.

On the evening of the maſquerade, as ſoon as his majeſty was ſeated (who was always known by the conductor of the entertainment, and the officers of the court, though concealed by his dreſs from the company), Heidegger as uſual ordered the muſic to play "God ſave the King;" but his back was no ſooner turned, than the falſe Heidegger ordered them to ſtrike up "Over the Water to Charley." The whole company were inſtantly thunderſtruck, and all the courtiers, not in the plot, were thrown into a ſtupid conſternation. Heidegger flew to the muſic-gallery, ſwore, ſtamped, and raved; accuſed the muſicians of drunkenneſs, or of being ſet on by ſome ſecret enemy to ruin him. The king and the counteſs laughed ſo immoderately, that they hazarded a diſcovery. While Heidegger ſtaid in the gallery "God ſave the King" was the tune; but when, after ſetting matters to rights, he retired to one of the dancing-rooms, to obſerve if decorum was kept by the company, the counterfeit ſtepping forward, and placing himſelf upon the floor of the theatre, juſt in front of the muſic-gallery, called out in a moſt audible voice, imitating Heidegger, damned them for blockheads, had he not juſt told them to play "Over the Water to Charley?" A pauſe enſued; the muſicians who knew his character, in their turn, thought him either drunk or mad; but as he continued his vociferation, "Charley" was played again. At this repetition of the ſuppoſed affront, ſome of the officers of the guards, who always attended upon theſe occaſions, were for aſcending the gallery, and kicking the muſicians out; but the late duke of Cumberland, who could hardly contain himſelf, interpoſed. The company were thrown into great confuſion. "Shame! Shame!" reſounded from all parts; and Heidegger once more flew in a violent rage to that part of the theatre facing the gallery. Here the duke of Montagu, artfully addreſſing himſelf to him, told him, "the king was in a violent paſſion; that his beſt way was to go inſtantly and make an apology, for certainly the muſicians were mad, and afterwards to diſcharge them." Almoſt at the ſame inſtant he ordered the falſe Heidegger to do the ſame. The ſcene now became truly comic in the circle before the king. Heidegger had no ſooner made an humble apology for the inſolence of his muſicians, but the falſe Heidegger advanced, and in a plaintive tone, cried out; indeed, ſire, it was not my fault, "but that devil in my likeneſs." Poor Heidegger turned round, ſtared, ſtaggered, grew pale, and could not utter a word. The duke then humanely whiſpered in his ear the ſum of his plot, and the counterfeit was ordered to take off his maſk. Here ended the frolic; but Heidegger ſwore he would never attend any public amuſement, if that witch the wax-work woman did not break the mould, and melt down the maſk before his face.

To this occurrence the following imperfect ſtanzas, tranſcribed from the hand-writing of Pope, are ſuppoſed to relate. They were found on the back of a page containing ſome part of his tranſlation, either of the "Iliad" or "Odyſſey," in the Britiſh Muſeum.

Then he went to the ſide-board, and called for much liquor,
And glaſs after glaſs he drank quicker and quicker;
So that Heidegger quoth,
Nay, ſaith on his oath,
Of two hogſheads of Burgundy, Satan drank both.
Then Heidegger all like the Devil appear'd,
And ſtraight the whole table of diſhes he clear'd:
Then a friar, then a nun,
And then he put on
A face all the company took for his own.
Even thine, O falſe Heidegger! who wert ſo wicked
To let in the Devil——

Being once at a ſupper with a large company, when a queſtion was debated, which nationaliſt of Europe had the greateſt ingenuity; to the ſurpriſe of all preſent, he claimed that character for the Swiſs, and appealed to himſelf for the truth of it. "I was born a Swiſs," ſaid he, "and came to England without a farthing, where I have found means to gain 5000*l.* a year, and to ſpend it. Now I defy the moſt able Engliſhman to go to Switzerland, and either to gain that income or to ſpend it there."

He always ſeemed ſenſible of Handel's worth and ſuperior abilities, favouring and accommodating him in all his undertakings with the uſe of his theatre, in preference to his opponents and enemies.

He died Sept. 4th, 1750, at the advanced age of 90 years, at his houſe at Richmond, in Surrey, where he was buried.

HEIDELBERG, in *Geography*, a city of Germany, in the circle of the Lower Rhine, formerly capital of the palatinate, but ceded, in 1803, among the indemnities, to the elector of Baden. It is ſituated on the S. ſide of the Neckar, and was ſurrounded with walls in the 12th century. It has often been burnt and plundered; in 1799 it was taken by the French. The univerſity of Heidelberg was founded in 1386, and has been under the direction of 20 profeſſors, of whom four are Calviniſts. When this city was taken by the Bavarians in 1622, its library was transferred to the Vatican. Although it is now ſmall, it contains three churches for Roman Catholics and Proteſtants of different perſuaſions, ſeveral convents, an anatomical theatre, a military hoſpital, more than 20 fountains, and ſix gates. It has been noted for its wines, and for its capacious tun; it is commercial, and has manufactures of ſtuffs, ſilk ſtockings, &c. Its inhabitants are chiefly Lutherans, with a free toleration; 42 miles S. of Frankfort on the Maine. N. lat. 49° 24'. E. long. 8° 43'.

HEIDELBURG, a handſome town of America, in Dauphine county, Pennſylvania, containing about 100 houſes, and two German churches for Lutherans and Calviniſts, and 1990 inhabitants; 74 miles N.W. by W. of Philadelphia.—Alſo, two townſhips in the ſame ſtate, one in York county, the other in that of Northampton, containing 1238 inhabitants.—Alſo, a Moravian ſettlement in Pennſylvania, begun in 1743; ſeven miles from Litiz, in Warwick townſhip, Lancaſter county.

HEIDELSHEIM, a town of Germany, in the palatinate of the Rhine, ſituated on the Salzbach; 17 miles S. of Heidelberg.

HEIFF, El, an iſland in the river Nile, near the great Cataract, anciently called "Pylæ;" on which are ſome remains of a temple of Iſis, and other antiquities.

HEIGHT, the third dimenſion of a body, conſidered with regard to its elevation above the ground.

To find the height of a hill, ſee the article of LEVELLING, towards the end.

HEIGHT, in *Aſtronomy*, *Geography*, &c. See ALTITUDE and ELEVATION.

HEIGHT, in the *Manege*, &c. the ſtature of a horſe, &c.

It is reputed an imperfection in a horſe, when ſet too high on his legs, *i. e.* when the legs are too long in proportion to the body.

Some jockeys have determined a meaſure for them thus: take a ſtring, and meaſure from the horſe's withers to his elbow; and what length that is, the ſame ſhould he have betwixt the elbow and the lower part of the heels. Some meaſure their colts after this manner at a year old, being of opinion that the legs of a colt at this age are as long as they ever will be.

The duke of Newcaſtle, and ſir W. Hope, allow this to hold generally, but not univerſally.

Height *of Land*, in *Geography*, a range of mountains, extending from S.W. to N.E. and ſeparating the diſtrict of Maine from Lower Canada, giving riſe to many rivers which fall into St. Lawrence river and into the Atlantic, and between which and St. Francis river are produced beech, maple, birch, hemlock, and fir, ſome few white pines, but no oak.

Heights, in the *Military Art*, are the eminences round a fortified place, whereon the armies uſually poſt themſelves. The enemy had ſeized all the heights, appeared on the heights, &c.

HEILA, in *Geography*, a town of Pruſſian Pomerelia, at the mouth of the Viſtula, on a headland which projects into the Baltic; 24 miles N.N.E. of Dantzic. N. lat. 54° 47′. E. long. 18° 6′.

HEILBRONN, a town of Germany, on the Neckar, in a country celebrated for its vineyards. This town is well built, and contains three churches, two convents, a ſeminary, a library, and public baths. It was formerly an imperial town, but in 1802 granted as an indemnity to the duke (now king) of Wirtemberg; 26 miles S.E. of Heidelberg. N. lat. 49° 8′. E. long. 9° 18′.

HEILIGENHEIL, a town of Pruſſia, in the province of Natangen, on a ſmall river, which, ſoon after paſſing this town, runs into the Friſche Haff. It was anciently a ſeat of idolatry, in which the Pruſſians worſhipped their deity, Curetro, under a large oak. Of late it has been famous for fine beer and white bread. N. lat. 54° 26′. E. long. 19° 53′.

HEILIGENSTADT, a town of Germany, and capital of Eichsfeld, 42 miles N.W. of Erfurt. N. lat. 51° 23′. E. long. 10° 28′.—Alſo, a town in the biſhopric of Bamberg; 10 miles E. of Bamberg.

HEILIGENTHAL, a town of Pruſſia, in the province of Ermeland; 20 miles W.S.W. of Heilſberg.

HEILIGINHAFEN, a ſea-port town of the duchy of Holſtein, near the Baltic, oppoſite to the iſland of Femern: the harbour is at ſome diſtance, E. of the town. N. lat. 54° 27′. E. long. 10° 48′.

HEILSBERG, or Heilsperg, a town of Pruſſia, in the province of Ermeland, where Charles XII. of Sweden fixed his head-quarters in 1703; 36 miles S. of Konigſberg. N. lat. 54° 3′. E. long. 20° 55′.

HEILSBRONN, a town of Germany, in the principality of Anſpach, on the Schwabach, where is a medicinal ſpring; eight miles E.N.E. of Anſpach. N. lat. 49° 20.′ E. long. 10° 47′.

HEILTZ-le-Maurupt, a town of France, in the department of the Marne, and chief place of a canton, in the diſtrict of Vitry-ſur-Marne; 18 miles S.E. of Chalons-ſur-Marne. The place contains 940, and the canton 10,852 inhabitants, on a territory of 280 kiliometres, in 25 communes.

HEIN, Peter, in *Biography*, a celebrated Dutch admiral, born, towards the cloſe of the 16th century, of parents of obſcure rank, was, in 1623, a vice-admiral in the Eaſt Indies, and three years afterwards he had the chief command of the fleet, with which he defeated the Spaniards off the coaſt of Brazil, and took ſeveral veſſels with a rich booty. In 1628 he was appointed to the command of a fleet of 31 ſhips, fitted out by the Dutch Eaſt India company for the purpoſe of intercepting the Spaniſh Plate fleet. The project ſucceeded, and the Dutch admiral captured the whole of the ſhips, which proved to be of immenſe value. In the following year he engaged with a fleet from Dunkirk, of which he took three veſſels, but fell himſelf in the action. He was interred with great ſolemnity at Delft, where a ſplendid monument was erected to his memory. Moreri.

HEINASE, among *Sportſmen*, a roe-buck of the fourth year.

HEINAVESI, in *Geography*, a town of Sweden, in the government of Kuopio; 37 miles S.E. of Kuopio.

HEINECIUS, John Goltlieb, in *Biography*, was born at Eiſenberg in 1681. He was early devoted to the ſtudy of theology, and was for a time a preacher at Goſlar, when he applied himſelf moſt diligently to the ſcience of juriſprudence. In 1703 he was appointed profeſſor of philoſophy at Halle, and ſoon after obtained the degree of doctor of laws. In 1720 he was promoted to be public profeſſor of law, with the title of counſellor of ſtate, but in 1724 he removed to Franeker, where he was made profeſſor of the ſame ſcience. After this he was public profeſſor at Frankfort, and in 1733 he removed again to Halle, where he died in 1741, leaving behind him very many works as memorials of his great learning; among theſe may be mentioned "Syntagma Antiquitatum Juriſprudentiam illuſtrantium, ſecundum Ordinem Inſtitutionum Juſtiniani digeſtum:" "Elementa Juris Naturæ et Gentium:" this laſt was tranſlated into Engliſh by Dr. Turnbull. Heinecius was a man of great diligence as well as erudition; and his works, on account of the excellence of the ſtyle, and the extenſive knowledge of antiquities diſplayed in them, were well and generally received.

Heinecius, John Michael, brother to the preceding, took his degree of maſter of arts at Jena in 1696. He ſtudied the Oriental languages at Frankfort on the Mayne, under the celebrated Ludolph, in whoſe houſe he reſided, and by whoſe advice he went afterwards to Gieſſen, to attend the lectures of ſome other celebrated profeſſors. In 1699 he accepted an invitation of becoming deacon of the church of St. Peter and St. Paul at Goſlar, where he obtained great reputation by his learned works. After nine years reſidence at Goſlar, he was appointed paſtor of St. Ulrich's church at Halle. Here he died in 1722. His numerous works are written partly in Latin, and partly in the German language, of which we may notice his "Account of the Antiquities of Goſlar and the neighbouring Places:" and his view of the ancient and modern Greek church. Gen. Biog.

HEINICHEN, George, a young Saxon compoſer, who, travelling through Italy in 1728, ſet two operas for the Venetian theatre, which were very favourably received, at a time when Haſſe and Vinci had refined the taſte of that city.

Heinichen, John David, a German muſician of great eminence, in the ſervice of the electoral king of Poland. Being appointed maeſtro di cappella at that court, after he had made the tour of Italy, he drew up a treatiſe on thorough-baſe or accompaniment with ſo much intelligence, clearneſs, and ſcience, that Marpurg ſtyles him the Rameau of Germany. He taught Quantz compoſition; and compoſed for the Italian opera at Dreſden, when Seneſino was the principal ſinger there, between whom there was a quarrel, in conſequence of which, Seneſino engaged with Handel to ſing at the Royal Academy in London. Heinichen died in 1729, the ſame year that the quarrel happened between Handel and Seneſino in London.

HEINOLAX, in *Geography*, a town of Sweden, in the province of Tavaſtland; 55 miles E. of Tavaſthus.

HEINSBERG, a town of France, in the department of the Roer, and chief place of a canton, in the diſtrict of Aix-la-Chapelle; 10 miles S. of Ruremond. The place contains 1333, and the canton 18,331 inhabitants, in 32 communes. N. lat. 51° 2'. E. long. 6° 1'.

HEINSIUS, Daniel, in *Biography*, was born at Ghent in 1580. On account of the troubles in the Low Countries, his father, who was attached to the principles of the reformation, took his family firſt to England, and then to Holland, where he ſettled at the Hague. Here and at Zealand Daniel received his education. At a very early age he diſplayed conſiderable talents ; he began to make Latin verſes before he underſtood the rules of proſody, and when he was ten years old, he compoſed an elegy of much merit on the death of a play-fellow. At the age of fourteen he was ſent to ſtudy the law at Francker, but he preferred Greek literature, and made a rapid progreſs in it. He next removed to Leyden, where he had the advantage of Scaliger's inſtructions and friendſhip. At the age of twenty he began to read public lectures at Leyden on the claſſics. He was afterwards appointed profeſſor of politics and hiſtory, and made ſecretary and librarian to the univerſity. In 1619 he was ſecretary to the ſtates of Holland at the ſynod of Dort. He had conferred upon him the title of counſellor to Guſtavus Adolphus, and that of knight of St. Mark at Venice. He was offered conſiderable preferment by pope Urban VIII. if he would ſettle at Rome, but he preferred remaining at Leyden, where he died in 1655. As a critic and commentator he publiſhed notes on Silius Italicus, and the New Teſtament. He gave new editions of Horace, Seneca's tragedies, Heſiod, Maximus Tyrius, Theocritus, Theophraſtus, and others. As an original author his Latin poems are moſt eſteemed, and gave him the reputation of being one of the beſt compoſers of Latin verſe among his contemporaries. Theſe have gone through many editions. He pronounced on various occaſions Latin orations, which were collected and publiſhed at Leyden. Moreri.

Heinsius, Nicholas, ſon of the preceding, was born at Leyden in 1620, and having the advantage of his father's inſtructions, he was, at the age of ſeventeen, connected with ſome of the principal ſcholars of his time. When he was in his twenty-firſt year he came over to England, for the purpoſe of collating ſome MSS. in the univerſity libraries. He ſpent many years in his travels on the continent, ſearching into the libraries of the principal cities, and making ſuch collections as he thought might be moſt uſeful to him. He publiſhed ſome Latin poems which attracted the notice of Chriſtina, queen of Sweden, whom he viſited, and who honoured him with a very favourable reception. Upon his return he ſet out on a new journey through France and Italy, for the purpoſe of purchaſing MSS. and medals for Chriſtina. After this he was nominated by the United Provinces to the poſt of reſident at the court of Sweden, with a ſalary. In 1655 he returned to Holland, on occaſion of the death of his father, and received the appointment of ſecretary to the city of Amſterdam. An unfortunate law-ſuit obliged him to reſign this office, and he was again appointed reſident at Sweden, and in 1669 he was made envoy-extraordinary to Muſcovy. In 1675 he retired to Utrecht, and thence he went to Vienna where he ſpent the remainder of his life. He died in 1681, and was interred in his father's tomb at Leyden. His poems paſſed through many editions, but his beſt work conſiſts of his "Elegies," and a panegyric on queen Chriſtina. Like his father he edited new impreſſions of ſeveral of the claſſics, and after his death were publiſhed his notes upon Valerius Flaccus, Silius Italicus, Petronius, Phœdrus, Q. Curtius, Tibullus, and Tacitus, An edition of Virgil, with his notes, was publiſhed at Amſterdam in 1746. Burmann wrote his life, and publiſhed his Latin letters, which are highly praiſed for purtiy of ſtyle.

HEIR, formed of the Latin *hæres*, of the verb *hærere*, *to ſtick*, *remain faſt*, *be near*, *follow immediately*, &c. in the *Civil Law*, denotes the perſon who ſucceeds to the whole eſtate and effects of another, whether by right of blood or of teſtament. See Descent.

The inſtitution of an heir is a circumſtance neceſſary to the validity of a teſtament.

There are two principal kinds of heirs, the *apparent* and *preſumptive*.

Heir *Apparent*, is he on whom the ſucceſſion is ſo ſettled, that he cannot be ſet aſide without altering the laws of ſucceſſion : or, whoſe right of inheritance is indefeaſible, provided he outlives the anceſtor ; as the eldeſt ſon or his iſſue, who muſt by the courſe of the common law be heir to the father, whenever he happens to die.

Heir *Preſumptive*, is one who, if the anceſtor ſhould die immediately, would, in the preſent circumſtances of things, be his heir ; but whoſe right of inheritance may be defeated by the contingency of ſome nearer heir being born ; as a brother or nephew, whoſe preſumptive ſucceſſion may be deſtroyed by the birth of a child ; or a daughter, whoſe preſent hopes may be cut off by the birth of a ſon. Nay, even, if the eſtate hath deſcended, by the death of the owner, to ſuch brother or nephew, or daughter ; in the former caſes the eſtate ſhall be taken away by the birth of a poſthumous ſon. Bro. *tit. Deſc.* 58.

Heir, in *Common Law*, is he who ſucceeds, by right of blood, to any man's lands, or tenements in fee.

For nothing paſſes in common law, *jure hæreditatis*, by right of inheritance, but fee.

By common law, therefore, a man cannot be heir to goods or chattels : for *hæres dicitur ab hæreditate*, it is the inheritance denominates the heir.

Every heir having lands by deſcent, is bound by the acts of his anceſtors, if he be named ; it being a maxim, that *qui ſentit commodum, ſentire debet et onus.* But though ever ſo much land come to him from ſuch anceſtors by gift in tail, or conveyance of the father, and not by deſcent, he is no way chargeable ; and the caſe is the ſame in all other eſtates, except fee-ſimple.

Eſtates are tranſmitted from the anceſtor to the heir, according to certain rules or canons of inheritance, for which ſee Descent, *Collateral.*

Thoſe that are incapable of being heirs are baſtards, aliens, and perſons attainted for treaſon or felony, (ſee Attainder) ; but idiots and lunatics, perſons excommunicated, or that are attainted in a *premunire*, outlaws in debt, &c. are capable of being heirs.

The heir is favoured by common law ; for not only land, but rent not due and in arrear at the death of the anceſtor, ſhall go to the heir ; ſo corn ſown by a tenant for years, where his term expires before his corn is ripe, and every thing faſtened to the freehold, timber-trees, deeds belonging to the inheritance, deer, conies, pigeons, fiſh, &c. go to the heir. If an heir hath made over lands fallen to him by deſcent, execution ſhall be had againſt him to the value of the land, &c. if it be not ſold *bona fide* before the action brought, in which caſe there is a ſaving by the ſtat. 3 & 4 Will. & Mary, cap. 14. and it ſhall be tried by a jury, whether the heir hath ſuch lands, and what is their value, in order to make the heir anſwerable. A creditor may ſue either the heir, executor, or adminiſtrator, each of whom is chargeable ; but when an heir, on being ſued, pays his anceſtor's debts, he ſhall be reimburſed by the executors of ſuch anceſtors, if he has aſſets in his hands. The heir can force the adminiſtrator to pay debts out of the perſonal eſtate, in order to preſerve the inheritance free ; and where an executor

cutor has aſſets, he is compellable in equity to redeem a mortgage and diſcharge debts.

Moveables, or chattels immoveable, are given by teſtament, to whom the teſtator thinketh fit; otherwiſe they lie at the diſpoſition of the ordinary, to be diſtributed as he in conſcience likes beſt.

Heir *Laſt*. See Last *Heir*.

Heir-*loom*, formed of *heir* and the Saxon *loom*, denoting *limb* or *member*, in our *Law-books*, ſignifies ſuch goods and perſonal chattels as are not inventoried after the owner's deceaſe, but go by ſpecial cuſtom to the heir along with the inheritance, and not to the executor of the laſt proprietor.

"Conſuetudo hundredi de Stretford, in com. Oxon eſt quod hæredes tenementorum infra hundredum prediċt. exiſten. poſt mortem anteceſſorum ſuorum habebunt, &c. principalium, Anglice an heir-loome, *viz.* de quodam genere catallorum, utenſilium, &c. optimum plauſtrum, optimam carucam, optimam ciphum, &c." Coke on Littleton, 388.

Heir-looms are generally ſuch things as cannot be taken away without damaging or diſmembering the freehold; otherwiſe, the general rule is, that no chattel intereſt whatſoever ſhall go to the heir, notwithſtanding it is expreſsly limited to him and his heirs, but ſhall be veſted in the executor. (Co. Litt. 388.) But deer in a real authorized park, fiſhes in a pond, doves in a dove-houſe, &c. though in themſelves perſonal chattels, yet are ſo annexed to, and ſo neceſſary to the well-being of the inheritance, that they ſhall accompany the land wherever it veſts, by either deſcent or purchaſe. (Co. Litt. 8.) Thus, the ancient jewels of the crown are held to be heir-looms; becauſe they are neceſſary to maintain the ſtate, and ſupport the dignity of the ſovereign for the time being. Charters likewiſe, and deeds, court-rolls, and other evidences of the court, together with the cheſts in which they are contained, ſhall paſs together with the land to the heir, in the nature of heir-looms, and ſhall not go to the executor. (Bro. *abr. tit. Chattels*, 18.) By ſpecial cuſtom alſo, in ſome places, carriages, utenſils, and other houſhold implements, may be heir-looms (Co. Litt. 18. 185.); but ſuch cuſtom muſt be ſtrictly proved. On the other hand, by almoſt general cuſtom, whatever is ſtrongly affixed to the freehold or inheritance, and cannot be ſevered from thence without violence or damage, is become a member of the inheritance, and ſhall thereupon paſs to the heir; as chimney-pieces, pumps, old fixed or dormant tables, benches, and the like. (12 Mod. 520.) Other perſonal chattels, that deſcend to the heir in the nature of heir-looms, are a monument or tombſtone in a church, or the coat-armour of his anceſtor there hung up, with the banners and other enſigns of honour ſuited to his degree. (12 Rep. 105. Co. Litt. 18.) Pews in the church are ſomewhat of the ſame nature, which may deſcend by cuſtom immemorial from the anceſtor to the heir (3 Inſt. 202. 12 Rep. 105.) Heir-looms, though they be mere chattels, cannot be deviſed away from the heir by will; but ſuch a deviſe is void, even by a tenant in fee-ſimple. (Co. Litt. 185.) For though the owner might, during his life, have ſold or diſpoſed of them, as he might of the timber of the eſtate, ſince, as the inheritance was his own, he might mangle or diſmember it as he pleaſed; yet they being at his death inſtantly veſted in the heir, the deviſe (which is ſubſequent, and not to take effect till *after* his death) ſhall be poſtponed to the cuſtom, whereby they have already deſcended. Blackſt. Com. book ii.

HEIRAN, in *Geography*, a town of Arabia, in the province of Yemen; 36 miles S. of Abu Ariſch.

HEIRESS, *Stealing of an.* See Forcible *Abduction*.

HEIRS, in *Rural Economy*, a term occaſionally applied to the young trees in coppice-woods.

HEISHER Islands, in *Geography*, two ſmall iſlands of Scotland; 15 miles N. of North Uiſt iſland. N. lat. 57° 46′. W. long. 7° 51′.

HEISS, John, in *Biography*, reſident for the elector palatine at the court of France, is known, and mentioned here, for a hiſtory of the German empire, firſt publiſhed at Paris in 1684, in two vols. 4to. A new edition of it was printed by M. Vogel in 1731 in three volumes. Heiſs died at Paris in 1688. His work has been charged with the want of fidelity, but it is often referred to. Moreri.

HEISTER, Laurence, a celebrated phyſician, ſurgeon, and anatomiſt, who has alſo rendered himſelf conſpicuous among botaniſts by his objections to the ſyſtem and principles of Linnæus, at a time when they were making the greateſt progreſs in the general eſtimation, was born at Frankfort on the Maine, in 1683. He was educated in ſeveral German univerſities, and in the year 1706 ſpent ſome time in the ſtudy of anatomy and ſurgery at Amſterdam under Ruyſch, then ſo famous for his diſſections and anatomical preparations. In the following year he went to ſerve as a ſurgeon in the Dutch camp in Brabant; devoting the ſubſequent winter to further improvement, under Boerhaave and his eminent colleagues, who at that time attracted ſtudents from all parts to the univerſity of Leyden, where Heiſter took his degree. Returning afterwards to the camp, he was, in 1709, appointed phyſician-general to the Dutch military hoſpital. The experience he thus acquired, turned to account by his great application and acuteneſs, raiſed him to a diſtinguiſhed rank in the theory and practice of ſurgery, eſpecially as he had a genius for mechanics, and was by that means enabled to bring about great improvements in the inſtrumental branch of his art. In 1710 he became profeſſor of anatomy and ſurgery at Altorf in the little canton of Uri, and rendered himſelf celebrated by his lectures and writings. Ten years afterwards a more advantageous ſituation offered itſelf to him at Helmſtad, where he became phyſician, with the title of Aulic counſellor, as uſual, to the duke of Brunſwick, as well as profeſſor of medicine, and afterwards of ſurgery and botany, in that univerſity. Here he continued till his death, which happened in 1758, at the age of 75. The czar Peter invited him to Ruſſia, but he was too comfortably ſituated in Germany, where the favour of ſeveral ſovereigns already ſhone upon him at an early period, to accept the invitation.

Heiſter continued, from time to time, to publiſh a number of books relating to anatomy and ſurgery, to ſeveral of which he ſupplied figures drawn by his own hand. Among theſe, his moſt diſtinguiſhed work is the *Compendium Anatomicum*, an octavo volume, firſt printed in 1717, which became quite a claſſical book, ſuperſeding all that had been previouſly in uſe in the ſchools. It went through numerous editions, with ſucceſſive additions and improvements, and was tranſlated into moſt of the modern languages. In the preface he labours to expoſe the defects of the principal author who had hitherto been in popular uſe, Verheyen; cenſuring him, not unjuſtly, for his omiſſion of ſome of the principal diſcoveries of divers eminent Engliſh and Italian anatomiſts, and others. Indeed his criticiſms of this author are ſo well ſupported by references, and authoriſed by fact, that we cannot wonder at his having entirely driven him off the ſtage. Heiſter's *Compendium* is very excellent for its conciſeneſs and clearneſs, both as an anatomical and phyſiological ſchool-book. Nor did his "Inſtitutions of Surgery," publiſhed in German in 1718, procure him leſs decided authority in that line. The book was tranſlated into Latin, and moſt of the modern languages of Europe, and went through numerous editions. He wrote alſo ſome works on the theory and practice of medicine, in which his opinions are formed on the mechanical principles of the Boerhaavian ſchool, chemiſtry being ſcarcely more conſidered in the phyſiological ſpeculations of that day, than the agency of the vital principle, both which have made ſo great a figure ſince. A valuable practical work of Heiſter's, a collection of medical, ſurgical, and anatomical obſervations, in quarto, is well known in this country by an Engliſh tranſlation.

Heiſter ſeems early to have had a taſte for botany, and to have collected plants, as Haller obſerves, in his various journeys. This taſte enabled him to fill the botanical chair at Helmſtad with credit and ſatisfaction, and he paid great attention to the garden there, which he much enriched, and of which he publiſhed a catalogue in 1734, in 8vo., arranged alphabetically. At the end of this little volume he eſtabliſhes 16 new genera, moſtly named after botaniſts, or elſe without any ſound principles of nomenclature. Still leſs are their definitions well choſen. Heiſter loſt ſight of the only clue to ſolid botanical characters, the fructification, looſely regarding the whole plant, and chooſing his diſcriminative marks from the moſt vague and trifling ſources. Thus, he makes *Amaranthus tricolor* a genus, chiefly on account of its coloured leaves, and he names this new genus *Pſittacus,* becauſe its hues reſemble a parrot; not conſidering that the name is already eſtabliſhed in zoology, and that any perſon might as well make a genus of a white roſe, and call it a *Horſe,* becauſe *ſome* horſes are white. His *Stiſſeria* indeed is a good genus, the *Stapelia* of Linnæus and others, but without any character, and he may be content with neglect in this inſtance, if he eſcapes criticiſm in the reſt. His firſt botanical publication, *De Collectione Simplicium,* was the inaugural diſſertation of one of his pupils named Rabe, printed in 1722. This, by Haller's account, is ſtill more unworthy of a philoſopher. If he had written nothing elſe, his botanical labours ſhould have been conſigned to oblivion, in conſideration of his merits in a more important practical ſcience; but his ſubſequent works rank him as an original writer, even on the ſubject of vegetables. If we differ from him, we reſpect him as a man who thought for himſelf, and who perhaps might have thought better, had he been favoured with leiſure to look deeper, and not been warped by preconceived ideas. In 1732 he publiſhed a diſſertation on the "Uſe of the Leaves" in founding genera of plants, preferring thoſe parts for a natural arrangement, on account of the obſcurity and difficulty attending thoſe of the flower. Our ideas on this ſubject will be found under the article CONRAD GESNER, and are ſufficiently familiar to all who have, at this day, ſtudied botany at all.

In Auguſt, 1741, our author came forth as the profeſſed adverſary of Linnæus, in the inaugural diſſertation of one of his pupils named Goeckel, entitled *Meditationes et Animadverſiones in novum Syſtema Botanicum ſexuale Linnæi.* This very pupil ſeems, by a note in p. 50, to have been choſen for the purpoſe, becauſe his maternal grandfather, named Lochner, had written a ſplendid book on the *Ananas,* or Pineapple, and Linnæus, if he choſe to alter the barbarous name, ought, it ſeems, to have called the genus *Lochneria,* whereas he termed it *Bromelia!* Such a reaſon might as well have been kept out of ſight. But the arguments by which the learned profeſſor and his pupil attempt to prove the poſition they aſſume, that the "method of Linnæus is extremely difficult, very doubtful, and uncertain," are not more cogent. They declare that the ſtamens and piſtil of two ſpecies of *Aloe,* the *margaritifera* and another, appeared ſo compreſſed, conſtricted, and confuſed, that they could make out nothing of their ſhape or number; that they could ſee nothing of the ſtamens or piſtils of papilionaceous flowers, without ſeparating the petals, of which it appears they never thought till thoſe parts fell of themſelves. They found no leſs difficulty in the common Chickweed, *Alſine media* (*Stellaria media,* Fl. Brit. 473. Engl. Bot. t. 537), of which, when they attempted to examine the ſtamens, they could indeed perceive the anthers, but ſo entangled together, that they could ſcarcely diſcern any one ſtamen clearly and diſtinctly, much leſs count the whole! So much for their objections to the Linnæan ſyſtem of arrangement! and we have only to congratulate ourſelves that their countryman Hedwig was bleſt with more acuteneſs of bodily and mental viſion. Some objections, relative to the natural order to which the *Alſine* belongs, concerning the variableneſs or anomalies of number in that order are more to the purpoſe, but it is really aſtoniſhing that any man ſhould have ſufficiently examined nature and the works of Linnæus to find out this particular difficulty, and yet not have been ſtruck with the ſagacity and ingenuity with which he ſtruggled againſt it. A natural philoſopher, in the honeſt purſuit of truth, contending with thoſe intricacies of nature which the human intellect is competent but partially to unravel, is entitled to a ſhare of the reſpect ſo juſtly due to a good man ſtruggling with adverſity, and a well-turned mind will, in neither caſe, withhold its admiration or aſſiſtance. Heiſter is not much more candid in his criticiſms of the Linnæan nomenclature, for as he could not perceive the benefit of eſtabliſhing correct genera, on principles derived from the fructification, it is no wonder he was blind to the advantages of naming ſuch with ſymmetry and conſiſtency. If there be, as we muſt allow, ſome juſtice in his objection to a ſubſtitution of the Linnæan ſpecific definitions, often extending to 12 words, in place of the old more compendious pharmaceutical names, that objection has been ſubſequently removed by the invention of trivial or ſpecific names.—Another diſſertation of Heiſter's, publiſhed in Oct. 1741, *de Nominum Plantarum Mutatione utili ac noxia,* is a more diffuſe and elaborate attack on the nomenclature of the great Swediſh teacher, whom however he terms "a moſt diligent and moſt valuable botaniſt." Nor does it appear that he was inſtigated to theſe attacks by any perſonal enmity, nor by any more extraordinary flow of bile than was uſual among controverſialiſts, of that day at leaſt. The portrait of Heiſter, very well executed, which is prefixed to his *Compendium Anatomicum,* has an animated countenance, not entirely deſtitute of eagerneſs or irritability. Whatever he purſued, he purſued with ardour, and perhaps as he advanced in age, ſeated in profeſſional ſtate, he grew more pertinacious in his opinions. Hence his ſubſequent attacks on Linnæus are marked with more vehemence, but proportionably, as uſual, with leſs reaſon, and therefore we paſs them over here. In 1748, notwithſtanding his diſlike to the Linnæan principles, he publiſhed a *Syſtema Plantarum Generale ex fructificatione, cui annectuntur regulæ ejuſdem, de Nominibus Plantarum, a Celeb. Linnæi longè diverſæ.* This ſyſtem is allied to that of Boerhaave, and by no means remarkable for originality or ingenuity, nor, though it takes into conſideration many particulars of general habit or ſtructure, is it more natural than the profeſſedly artificial ſyſtem of Linnæus. Though he will not allow his antagoniſt (if we may ſo call a perſon who never anſwered or cenſured him) to contrive new names for new genera, or for original ideas, he himſelf changes old ones without ſcruple, and would call *Briza, Tremularia; Coix, Lacrymaria; Feſtuca, Feſtucaria; Meſembryanthemum, Ficula; Galanthus, Nivaria;* &c.

We ſhall conclude with mentioning a very ſplendid publication of Heiſter in folio, in 1753, in which he deſcribes the *Amaryllis*

Amaryllis orientalis of Linnæus, which flowered with him, perhaps for the firſt time in Europe, three years before. This he names *Brunſvigia*, after his patron and ſovereign, and diſplays its magnificence in three coloured plates. The ſame plant has ſince bloſſomed at Schoenbrun, and is figured by Jacquin, but though its bulbs are not rare, we have never heard of their flowering any where elſe. Haller. Bibl. Bot. Aikin's Gen. Biogr. Heiſter's works. S.

HEISTERIA, in *Botany*, ſo named by Jacquin, in honour of Dr. Laurence Heiſter; ſee that article. Another plant had received this name from the hand of Linnæus himſelf, in the *Hortus Cliffortianus*, notwithſtanding the unfavourable diſpoſition of Heiſter towards the ſexual ſyſtem, and the Linnæan improvements in general; but it was afterwards properly reduced to *Polygala*, and now ſtands as P. *Heiſteria*. The preſent is a more certain and very fine genus, of which its founder knew but one ſpecies, though we are poſſeſſed of two more.—Jacq. Amer. 126. Linn. Gen. 214. Schreb. 291. Willd. Sp. Pl. v. 2. 579. Mart. Mill. Dict. v. 2. Juſſ. 260. Lamarck. Dict. v. 3. 81. Illuſtr. t. 354.—Claſs and order, *Decandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Aurantia*, Juſſ.; but we preſume to think one is not nearer the truth than the other, and that Lamarck has rightly ſuggeſted the affinity of this genus to ſome of Juſſieu's *Terebintaceæ*, in which order we would place it.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, bell-ſhaped, five-cleft, acute, ſmall, permanent; in the fruit enlarged, coloured, with blunted points. *Cor.* Petals five, ovate, concave, acute, ſpreading. *Stam.* Filaments ten, flat, ovate, acute, erect, five of them ſhorter than the reſt; anthers roundiſh. *Piſt.* Germen roundiſh, depreſſed; ſtyle ſhort, erect; ſtigma blunt, four-cleft. *Peric.* Drupa oblong, Abrupt at the ſummit, ſtanding on the greatly enlarged and coloured calyx. *Seed.* Nut oval, obtuſe, with a kernel of the ſame ſhape.

Eſſ. Ch. Calyx in five ſegments, permanent, inferior. Petals five. Drupa ſtanding on the enlarged coloured calyx.

1. H. *coccinea*. Linn. Sp. Pl. 1663. Jacq. Amer. 126. t. 81. (Borbonia fructu oblongo nigro, calyce coccineo; Plum. Gen. 4.)—Leaves elliptic-oblong, rounded at the baſe, ſhining. Flowers axillary. Calyx of the fruit widely ſpreading, with ſhallow lobes.—Native of deep woods, near torrents, in the iſland of Martinico, flowering in February and March, and bearing fruit in June. Jacquin's own ſpecimen, the only one we have ever ſeen, is preſerved in ſir Joſeph Banks's herbarium, and has fruit, but now flowers. Lamarck repreſents the latter in his plate, which Jacquin does not, and therefore it ſhould ſeem that ſome ſpecimens have been acquired by the French, ſince the time of Plumier or Jacquin, though few plants are leſs known to botaniſts. Linnæus never ſaw the *Heiſteria* at all. We know not why he firſt wrote Plumier's ſynonym into his own copy of the *Species Plantarum*, and then eraſed it. There ſeems to be no doubt of this ſynonym, though Plumier confounded, under one genus with the preſent plant, the *Laurus Borbonia* of Linnæus, which is figured in his *Nov. Gen.* t. 2. at the bottom.—*Heiſteria coccinea* is deſcribed by Jacquin as an inelegant branching *tree*, about 20 feet high. The *leaves* are about ſix inches long, alternate, oblong, inclining to elliptical or ovate, with an oblique point, entire, rounded at the baſe, ſmooth, ſhining, having a midrib which ſends off ſeveral tranſverſe veins, interbranching towards the margin. *Footſtalks* ſhort and thick, without *ſtipulas*. *Flowers* axillary from ſome of the uppermoſt leaves, ſolitary, ſmall, white, their ſtalks ſcarcely ſo long as thoſe of the leaves, except when in fruit. *Calyx* of the flower ſmall and green; of the fruit greatly enlarged, ſpreading, ſcarlet, its border in five roundiſh, ſhort, and very blunt ſegments. *Fruit* ovate or cylindrical, blunt, about as long as the calyx, in the centre of which it ſtands. Jacquin ſays nothing of its colour, but if Plumier's ſynonym be right, the *drupa* is black. The French inhabitants of Martinico call it *Bois perdrix*, Partridge-tree, becauſe a kind of wild pidgeon, which they miſname a partridge, is very fond of the fruit.

2. H. *cauliflora*.—Leaves oblong, ſomewhat obovate, tapering at the baſe. Flowers from the ſtem and naked branches. Calyx of the fruit cloſed, deeply lobed.—Gathered in the Dutch ſettlements at Guiana by Mr. Alexander Anderſon, one of whoſe ſpecimens was given us by ſir Joſeph Banks in 1791. This is a lofty *tree*, bearing its flowers and fruit from the naked parts of the branches and ſtem. *Leaves* alternate, crowded about the tops of the branches, ſix inches or more in length, of a narrow obovate or oblong form, ſomewhat pointed, entire, ſlightly wavy, light green, ſmooth, but ſcarcely ſhining, reticulated with innumerable tranſverſe veins between the great ones, tapering down at the baſe into a ſhort thick *footſtalk*, without *ſtipulas*. Of the *flowers* we know nothing. The *fruit* is ſolitary, ſcattered, drooping, on a ſhort ſtalk, its *calyx* apparently coloured like the foregoing, but larger, with much deeper ſegments, which cloſe about the *drupa*, and whoſe edges are folded back.

3. H. *parvifolia*.—Leaves ovate, pointed, ſhining. Flowers axillary. Calyx of the fruit widely ſpreading, with deep ovate lobes.—Diſcovered at Sierra Leone by Dr. Afzelius, to whom we are obliged for ſpecimens in fruit. The *branches* are in ſome degree compreſſed and two-edged. *Leaves* alternate, ſcarcely two inches long, ovate, with a longiſh blunt point, entire; rounded at the baſe; the edge a little reflexed; ſmooth and ſhining, eſpecially above, with almoſt imperceptible veins. The *flowers* grow from little ſcaly axillary buds, and, from the ſcars that remain, ſeem to be three or four from each bud, one of them only remaining to form fruit. The latter is rather drooping, on a ſhort thick ſtalk. Its *calyx* red, ſpreading, about an inch in diameter, being about half the ſize of the laſt, very deeply divided into five ovate obtuſe lobes, the ſinuſes between which are reflexed. *Drupa* ovate, pale in the dry ſtate, rather ſhorter than the lobes. The dried leaves have a bitteriſh, rather acrid, flavour, confirming what is ſaid above of the natural affinity of the genus, and there is ſome analogy between the fleſhy-coloured calyx of *Heiſteria*, and the pulpy receptacle of the fruit of *Anacardium* and *Semecarpus*. We have no ſufficient opportunity of examining, but there ſeems reaſon to doubt whether the fruit be a real drupa, or only a capſule with a fleſhy coat of no great thickneſs. S.

HEITERNSHEIM, in *Geography*, a town of Germany, in a principality of the ſame name, in the circle of the Upper Rhine; 10 miles S. of Briſach.

HEITSBURY, HEYTESBURY, or *Heightſbury*, a borough-town and pariſh in the hundred of the ſame name, county of Wilts, England, is ſeated in a valley, near the S.W. extremity of Saliſbury plain. It is an ancient borough by preſcription, and ſends two members to parliament. The firſt return was 27 Henry VI. The right of election is in the burgage-holds, which are about fifty in number, and were till lately the property of the duke of Marlborough and ſir W. P. A. A'Court, bart. but the latter, having purchaſed the Marlborough intereſt, has the two ſeats in his own nomination. This town was ſome time the reſidence of the empreſs Maud, when ſhe contended with Stephen for the crown of England. In the reign of Edward III. it belonged to Bartholomew lord Burgherſh, and was afterwards

wards the abode of the barons Hungerford. Thomas, lord Hungerford, about the year 1400, built or greatly enlarged the church, which was collegiate before the year 1300. Walter, lord Hungerford, lord high treaſurer of England, founded an hoſpital for twelve poor men and one woman; and alſo built a houſe for a ſchoolmaſter, who was to be a prieſt, and not only teach grammar, but overlook the poor men. Margaret, the widow of lord Walter, obtained a licence from king Edward IV. to perfect this charity and ſettle a chaplain in it, to celebrate divine ſervice in the pariſh church, for the ſouls of herſelf and others. The church is collegiate, having four prebends in it, belonging to the cathedral church of Saliſbury. The building is ſpacious and ſtrong, in the form of a croſs, in the centre of which is a tower. The town, which conſiſts chiefly of one ſtreet, was almoſt entirely burnt down in the year 1766, ſince which it has been rebuilt to its former extent, and greatly improved in its appearance and reſpectability, principally owing to the introduction of the clothing manufactories, which are now carried on to a conſiderable extent. Here were formerly a weekly market and two fairs yearly; the firſt has been long diſcontinued; and there is only one of the latter, which is held on the 14th of May, for cattle, ſheep, &c. Heyteſbury is 92 miles diſtant from London; the population, returned in the year 1801, was 1072; the number of houſes 210. Sir W. P. A. A'Court has a ſeat cloſe to the town.

This town was the reſidence, if not the birth place, of a very worthy man, and valuable antiquary, William Cunnington, who laudably devoted his leiſure hours to the inveſtigation of the barrows, encampments, &c. which are very numerous on Saliſbury-plain, and in the neighbourhood of this town. The reſult of theſe reſearches has been laid before the public by ſir Richard Colt Hoare, bart. in a folio book, entitled "Ancient Wiltſhire." This very curious work furniſhes much valuable and intereſting information relating to the contents of barrows, and the cuſtoms of the early inhabitants of Britain. Under the articles Stonehenge, Tumuli, and Wiltshire, we ſhall have occaſion to revert to it again. In a valley between this town and Warminſter, in a meadow called Pitmead, was diſcovered, in the year 1786, the foundation, with teſſellated pavements, &c. of a Roman villa; and in 1800 other veſtiges of the Romans were found here. At the end of this valley is a lofty ridge of the plain, on which are the earth-works of two encampments. Theſe are of great extent; and, from their commanding ſituations, muſt have been almoſt impregnable. One of theſe, called Scratchbury caſtle, comprehends an area of forty-one acres of land: the other, named Battleſbury caſtle, has a treble intrenchment. Britton's Beauties of Wiltſhire.

HEL River, in Cornwall, falls into Falmouth bay at Little Dinnis, and from thence, about 5½ miles W. to Gweek, near Mawgan, is navigable for ſmall veſſels.

HELAOUA, a town of Nubia, and the laſt ſubject to the Ottoman Porte; it has a conſiderable garriſon, and pleaſant environs, which abound with coloquintida and ſenna.

HELCESAITES. See Elcesaites.

HELCOMA, an ulcer, or ulceration.
HELCOS, an ulcer, or ulceration.
HELCOSIS, an ulcer, or ulceration.

HELCYDRION, from ἑλκος, an *ulcer*, a ſmall ulcerated puſtule.

HELCYSMA, of ἕλκος, a word uſed by ſome of the old writers, to ſignify the ſcoriæ of ſilver, called alſo by ſome encauma. Dioſcorides ſays, this has the ſame virtues with the molybdæna, and that it was in his time uſed like that in plaſters.

HELCYSTER, of ἕλκω, *I draw*, in *Surgery*, a hook uſed to extract the fœtus in difficult parturition.

HELDAZOO, in *Geography*, a ſmall iſland of Scotland, near the S. coaſt of Shetland. N. lat. 60° 13′. W. long. 1° 43′.

HELDBURG, a town of Germany, in the principality of Coburg; 8 miles W. of Coburg.

HELDER, a fortreſs of North Holland, at the entrance of the Texel, erected for the defence of Mars-Diep; taken by the Engliſh under ſir Ralph Abercrombie, Aug. 28, 1799; 24 miles N. of Alcmaer. N. lat. 53° 2′. E. long. 42′ 34′.

HELDRUNGEN, a town of Germany, belonging to the principality of Querfurt, in a ſmall ſtream near the Unſtreitt: near it are two other towns, *viz.* "Feſtury-Heldrungen" and "Ober-Heldrungen;" 15 miles W. of Querfurt. N. lat. 51° 17′. E. long. 11° 20′.

HELEGUG, in *Ornithology*, a name by which the people in ſome parts of England call the *anas arctica Cluſii*, a web-footed fowl common on our ſhores. See Duck.

HELEL, in *Geography*, a town of Africa, in the country of Sugulmeſſa; 40 miles N.W. of Sugulmeſſa.

HELEN, in *Fabulous Hiſtory*, the daughter of Tyndarus, king of Sparta, and Leda, was married to Menelaus, the brother of Agamemnon, and ſtolen from him by Theſeus in the year 1213 B.C. but afterwards reſtored; ſhe was carried off a ſecond time by Paris and taken to Troy, B.C. 1198, which occaſioned the war of *Troy*; which ſee. After the death of Menelaus ſhe was baniſhed to Rhodes, and there hung upon a tree. Temples were erected to her honour.

HELENA, in *Aſtronomy*. See Castor and Pollux.

Helena, in *Biography*, mother of Conſtantine the Great, was probably the daughter of an innkeeper of Drepanum, in Bithynia. She attracted the notice of Conſtantine Chlorus in one of his journeys, and was afterwards married to him. It was made a condition by Maximian, when he adopted Conſtantius in 292, that he ſhould divorce Helena and take a wife of imperial blood, and from this time ſhe lived in obſcurity till the death of her huſband, and the ſucceſſion of her own ſon Conſtantine, who ever treated her with the reſpect and attachment due to a mother. Upon his converſion to Chriſtianity ſhe followed his example, and became zealous in the new faith. So great was her ſway at this time, that ſhe had the title of Auguſta conferred upon her, was regarded as the empreſs at court and in the armies, and ſhe had the entire diſpoſal of a large revenue. She had the art and influence to keep from all public employments the three half-brothers of Conſtantine, and when her grandſon Criſpus had fallen a ſacrifice to Fauſta his ſtep-mother, ſhe reſolved to avenge the crime, and diſcovered to the emperor the infidelity of that empreſs, which cauſed her deſtruction. In 326 ſhe paid a viſit to the holy places of Jeruſalem, which was the epoch of that memorable event in eccleſiaſtical hiſtory called the *invention* of the true croſs. (See Cross.) Having cauſed a temple of Venus, built over the ſuppoſed ſcite of the holy ſepulchre, to be demoliſhed, a cavern was diſcovered, in which were depoſited three croſſes, thought to be thoſe on which Chriſt and the two thieves were crucified. Such a treaſure being found out, it was not difficult, by means of feigned miracles, to aſcertain which of the three was that on which the Saviour ſuffered. Inſtantly, the ſacred relic was cut in two, one half being left with the biſhop of Jeruſalem, and the other ſhe tranſported to her ſon. Helena remained at Paleſtine, and built a church at Bethlehem, which ſhe conſecrated to the ſon of God, and another on the mount of Olives. She then made a progreſs through the chief churches of the Eaſt, ſignalizing in every place her piety and munificence. She died at the age of eighty, in the year 328, was interred in the imperial mauſoleum at Rome, and canonized as a ſaint. Her native place Drepanum was from this time denominated by Conſtantine Helenopolis. Gibbon.

Helena, *St.*, in *Geography*, an iſland of the Atlantic ocean, ſituated in S. lat. 15° 55′. W. long. 5° 49′, within the limit of the S.E. trade-wind, and diſtant 400 leagues from the coaſt of Africa, which is the neareſt continent. Its extreme length is 10½ miles, its breadth 6¾, its circumference about 28 miles, and its ſurface, in acres, 30,300. This iſland, at a diſtance, appears like an abrupt and rugged rock; a nearer approach brings in view the central eminences, diſtinguiſhed by a ſofter outline, clothed with verdure, and towering to the clouds; but on advancing ſtill nearer, the ſcene again changes, and the green ſummits are concealed from ſight by the intervening craggy and ſtupendous cliffs, that ſeem to overhang the ſea. On rounding Munden's point, the eye is ſuddenly relieved by a view of the town ſituated in a narrow valley, between two lofty mountains; and the interſperſion of trees among the white houſes has an effect highly pleaſing and pictureſque. This valley, known by the name of James's valley, is on the N.W. and leeward ſide of the iſland, in which ſituation there is good anchorage from 8 to 25 fathoms; and freſh-water is conveyed in leaden pipes to the wharf, from a ſpring at the diſtance of two miles, which affords a plentiful ſupply. The riſe and fall of the tide at new and full moon ſometimes exceed five feet; and in 1796 the variation of the compaſs was 15° 47′ 30″. After paſſing the draw bridge, the way to the town lies between a line of heavy guns and a double row of trees, of a lively green, and generally in full leaf; the trees being ſpecies of the banian of India. The town is entered by an arched gate-way, under a rampart or terrace, forming one ſide of a parade about 100 feet ſquare. On the left ſide are the government-houſe and main guard-room, the former being incloſed with a wall, reſembling embraſures, and called the caſtle. It contains the governor's habitation, and the offices of government. The church, fronting the gateway, is a neat and not inelegant edifice. The principal ſtreet commences between it and a palliſade, incloſing the company's garden. It conſiſts of 28 houſes, moſt of them neat and well conſtructed, and divides into two other ſtreets; one on the E. leading to that ſide of the country; the other proceeding to the upper part of the valley, where are ſituated the barracks, the new garden, and the hoſpital. In this ſtreet there are many ſhops, well ſtored with European and Indian commodities: but the houſes, in general, are inferior to thoſe in the loweſt part of the town, where the principal inhabitants reſide. The two hills, or ridges, between which the town is ſituated, are Rupert's on the E., and Ladder-hill on the W. The roads by which acceſs is gained to the interior, are formed on the ſides of theſe hills, and the aſcent is ſo eaſy and ſafe, that carts and oxen paſs along without danger or difficulty. On the firſt mile or two, the traveller obſerves little elſe beſides nakedneſs and ſterility, but his curioſity is ſoon gratified by the ſudden proſpect of verdure, woody heights, neat dwellings, and cultivated plantations.

The iſland is unequally divided by a lofty chain, or ridge of hills, running nearly E. and W. in a curved direction, and bending to the S. at each extremity. From this chain alternate ridges and valleys branch off in various directions, but chiefly N. and S. Diana's Peak, towards the E. end of this chain, is the higheſt point of the iſland, and riſes nearly 2700 feet above the level of the ſea. From the ſummit of this peak houſes and plantations, beneath the line of ſight, diverſify the proſpect, and the contraſt of verdant and naked mountains render the ſcene novel, pictureſque, and majeſtic. The ſummits and ſides of moſt of the interior heights are wooded with the cabbage-tree of the iſland, the red-wood, (a ſpecies of ebony,) ſtring-wood, dog-wood, and other indigenous trees and ſhrubs. And in leſs elevated ſituations the gum-wood was formerly found in great abundance, but few trees of this kind are now ſeen, except at Longwood, where they cover a ſurface of nearly 1500 acres. Clear and wholeſome ſprings iſſue from the ſides of almoſt every hill, but they form only inconſiderable rills. The governor's country reſidence, which lies about three miles from the town, is called the Plantation-houſe, and is a well-built, handſome edifice, erected in the years 1791 and 1792.

Thunder, lightning, and ſtorms, rarely diſturb the ſerenity of this mild atmoſphere. In James's town, the thermometer ſeldom riſes above 80°; but in the country the temperature is much more moderate. At the plantation-houſe the ſummer is not ſo hot as in England, 72° being the higheſt point at which the thermometer was obſerved in 1788. The winter alſo is much milder than ours, ranging between 55° and 56° of Fahrenheit. The rain is diſtributed through the different ſeaſons more in the manner of our temperate than of the tropical climates, every month having its ſhare; the ſtormy ſeaſons are July, Auguſt, and September, and February has more rainy days than either of the other months. Cloudy days are very numerous, exceeding thoſe that are bright, in the proportion of almoſt two to one; and this kind of weather is ſuited to paſture and trees, but not to the ripening of European fruit.

Iron ore is ſaid to be found in ſome parts of the iſland, and there are ſome appearances of gold and copper ore. Lime is plentiful and excellent. The ſoil inclines to clay, and loam abounds in ſaline particles, and deſcends to a great depth. The clouds, floating at a certain height in the atmoſphere, ſupply the higher parts of the iſland with moiſture, without imparting any to the low lands; ſo that after a long continuance of drought, the roots of graſs, &c. periſh. Hence, the luxuriance of vegetation increaſes in proportion to diſtance and height from the ſea; and upon the very ſummits of the interior hills oxen are ſeen up to their knees in graſs, and of courſe the upper lands are regarded as the prime paſtures of the iſland. Fruits, particularly vines, figs, oranges, and lemons, ripen beſt in the valleys near the ſea, which are well adapted alſo to the growth of plantains and bananas. From a garden, more interior, but finely watered and ſheltered, of no greater extent than three acres of ground, 24,000 dozen of apples of a large ſize were gathered in one ſeaſon, beſides peaches, guavas, grapes, and figs in abundance. The greater part of the iſland, however, is a barren reluctant waſte. A ſpecies of yam, introduced from Madagaſcar, is cultivated principally in the valleys; and the attention of the farmer has for ſeveral years paſt been particularly directed to the cultivation of potatoes. Cabbages, peaſe, beans, and other vegetables, are raiſed in abundance. The breed of cattle and ſheep on the iſland is originally Engliſh. The beef is of an excellent quality, but ſuch is the demand, that a bullock is ſeldom allowed to attain the age of four years. In ſome ſituations rabbits abound; pheaſants and partridges are numerous, and every garden is enlivened by the notes of the canary-bird. As to fiſh, it has been computed that 76 different ſpecies frequent the coaſt. Whales are frequently ſeen, and between the months of December and March turtle frequent the iſland. The ſhores and vicinity of the iſland abound in ſea-fowl, which breed in the cliffs and rocks around the coaſt.

Upon an average of five years, *viz.* from 1801 to 1805 incluſive, 165 ſhips touch annually at St. Helena, and in war time, the long detention for convoy experienced by large fleets occaſions ſuch an extra conſumption of ſtock and refreſhment, that the mere productions of the iſland itſelf could never be adequate to ſuch exigencies, if it were not amply ſupplied with ſalt meat from England, and of rice from Bengal. In the year 1805, the rates of proviſions were as follow: beef (alive), 6½*d.* per pound, mutton from 14 to 18*d.* do.; pork from 18 to 20*d.* do.; young fowls 9 to 12*s.* each; turkeys 30 to 40*s.* do.; geeſe 25 to 30*s.* do.; ducks 10 to 12*s.* do.; potatoes 8 to 10*s.* per buſhel: milk 4 to 6*d.* per quart; eggs 5*s.* per dozen; mackarel 8*d.* per dozen; turtle and coal-fiſh 8*d.* per pound; conger, conger-eels, carallacs, ſilver-fiſh, and old wives 3*d.* per pound; ſtumps and ſoldiers 2*d.* each; long-legs 6*d.* do.; &c.

Soon after the firſt ſettlement of St. Helena, indigo, cotton, ſugar-canes, and vines were introduced. Rum, ſugar, wine, and brandy were brought to ſome degree of perfection, and at a more recent period, crops of barley and other grain were raiſed at Long-wood, but afterwards were not found to anſwer. The intrinſic value of St. Helena, conſiſting in its local ſituation, as a place of refreſhment and rendezvous for the homeward-bound ſhips from India, the attention of the Court of Directors has been confined to the objects which moſt conduced to that important purpoſe. Accordingly, every acre inſtead of being devoted to the cultivation of corn, has been applied to raiſing live ſtock, roots, and culinary vegetables. Its waters, vegetables, and climate, ſeem happily adapted to the recovery of ſcorbutic patients; and many ſuch have been reſtored in the hoſpital to perfect health, vigour, and activity.

By the regiſtered returns of the year 1805, the population of the iſland is ſtated at 504 white inhabitants, 1560 blacks, of whom 329 were free; making a total of 2064, excluſive of the garriſon and civil eſtabliſhment of the company. Five thouſand one hundred and eight acres are in the hands of individuals, beſides goat-ranges, which are the out-ſkirts of the iſland, affording the chief ſupply of freſh meat both to the inhabitants and to the hoſpital. Lands, in general, are ſuppoſed to yield a nett profit of between ſeven and eight per cent. The price of labour is high; a carpenter cannot be hired under 6 or 7*s.* a day; the wages of a maſon vary from 4 to 5*s.*; and thoſe of a labourer from 2*s.* to 2*s.* 6*d.*; or to a black man, engaged by the year, from 10 to 20*l.* The value of ſlaves has varied; the ſum of 150*l.* has been paid for a good huſbandman, but a man of bad character may be purchaſed for 30*l.* However, it is hoped, that this kind of traffic is *for ever* aboliſhed.

This iſland compriſes only one pariſh; but for the more regular performance of the county and pariſh officers' duties, it is divided into three diſtricts: *viz.* the eaſt, the weſt, and the ſouth, or Sandy-bay diviſion. There are two churches, one in the town and another in the country. Strangers, whilſt they remain on the iſland, are accommodated in private houſes, at the rate of one guinea per day; for which an excellent table, good wines, and comfortable lodgings are provided.

By repeated charters from the crown of Great Britain, the poſſeſſion of St. Helena is aſſigned in perpetual property to the Eaſt India company as lords proprietors, with powers of ſovereignty and legiſlation. The ſupreme and executive authority within the iſland is veſted in the governor, and a council, compoſed of the lieutenant-governor and ſenior civil ſervant. To this number is occaſionally added a fourth member, oftentimes a fifth, as the Court of Directors judge proper. At preſent the council conſiſts of four. Theſe are the immediate repreſentatives of the lords proprietors, and the ſuperintending agents of all their concerns at the iſland. They are alſo juſtices of the peace and commiſſioners of oyer and terminer and gaol delivery, and they exerciſe the juriſdiction of the eccleſiaſtical court, in granting letters of adminiſtration, proving of wills, &c. The governor is excluſively entruſted with the powers of the ſecret committee of the court of directors when the council is not aſſembled. The authority of the whole board concentrates in him; and, by charter from the crown, when there is occaſion, he may exerciſe the powers of captain-general. The civil eſtabliſhment conſiſts of an accountant, pay-maſter, ſtore-keeper, and the ſecretary to government, with their aſſiſtants, ſome of whom are the heads of inferior departments, and promotions take place by ſeniority. The military force of the iſland is compoſed of a corps of artillery, commanded by a lieutenant-colonel; a regiment of infantry, and five companies of white and black militia, who are at preſent upon the footing of volunteers. The governor is allowed a town and country reſidence, and a liberal table, at the expence of the company, with ſervants, horſes, &c. The lieutenant-governor has likewiſe the privilege of a town and country-houſe, ſome land, ſervants, and a few horſes. The other member or members of council are each allowed a town reſidence; and, by the orders of the court of directors, dated 1796, the remaining company's houſes were allotted to the two principal ſervants next to council, the engineer, chaplain, and head-ſurgeon.

As to the natural hiſtory of the iſland, it ſeems to have had a volcanic origin, as volcanic productions abound on its ſurface, emulating thoſe of Sicily and Italy. St. Helena is gifted with conſiderable attractions and advantages, both local and natural. The temperature and ſalubrity of the climate are not exceeded in any part of the world; the variations of heat and cold are moderate, and generally fluctuate near the point moſt congenial to animal exiſtence; it is fanned by a conſtant and agreeable wind, ſurrounded by plenty and variety of fiſh, and refreſhed by numerous ſprings of excellent water; the ſecluſion of its inhabitants is relieved by the frequent arrival of viſitants; and this intercourſe checks and corrects their uniformity of life, and tends to improve both the manners and the mind. The climate ſeems to be particularly adapted to the conſtitutions of Europeans, of whom many have reſided here for a long ſeries of years without ſuffering any malady. The only endemic diſorders to which the natives are ſubject are of the catarrhal kind; theſe, as they belong to the inflammatory kind, may in ſome meaſure account, notwithſtanding their general robuſt health, for the few inſtances among the iſlanders of longevity. The anchorage in the road is ſafe and ſheltered; the ſurf, indeed, is occaſionally high and dangerous; but the ocean beyond it is never ruffled by thoſe hurricanes which in other climates occaſion ſo much diſtreſs. The approach from the S.E. is ſmooth and commodious; and in departing for Europe, the ſhip glides away before a gentle and a ſteady breeze.

This iſland was diſcovered by John de Nova, a Portugueſe officer, on the 21ſt of May, 1501, (the anniverſary of Helena, mother to the emperor Conſtantine), three years and ſix months after De Gama had firſt doubled the ſouthern promontory of Africa. At that time the iſland was only inhabited by ſea-fowl, and occaſionally by ſeals, ſea-lions, and turtles. The interior of the iſland was one entire foreſt, and even ſome of the precipices that over-hang the ſea were covered with gumwood-trees. The other indigenous productions beſides the trees and ſhrubs, together with plenty of fine water, a mild climate, productive ſoil, and commodious anchorage, ſituated in the immediate track of ſhips ſailing from India to Europe, rendered St. Helena of infinite importance in the eſtimation of its diſcoverers. The firſt human occupiers of the iſland were Fernandez Lopez, a Portugueſe nobleman, and his companions, found at Goa by Albuberque, and by him baniſhed, who, in the year 1513, landed on this iſland, with a few negro ſlaves. Lopez ſought comfort in this ſolitude. Hogs, goats, and poultry were landed for his ſuſtenance; partridges, pheaſants, guinea-fowls, peacocks, and other wild fowl, were let looſe; roots and vegetables of various ſorts were alſo introduced; and figs, oranges, lemons, and peach-trees were planted. Every thing proſpered under his attention and culture. The Portugueſe were anxious to keep ſecret their diſcovery of this iſland, and ſucceeded in their wiſhes and endeavours for this purpoſe until the 8th of June 1588, when it was deſcried by captain Cavendiſh in his return from a circumnavigating voyage. He diſcovered a convenient anchorage, oppoſite to Chapel Valley, in twelve fathom water; and afterwards he particularly deſcribed the ſtate of the iſland. The next perſon from England, who viſited this iſland, was captain Lancaſter, who after a diſaſtrous voyage to India, reached St. Helena on the 3d of April, 1593. After the incorporation of the India company in the year 16_0, captain Lancaſter in a trading voyage, undertaken by order of this company, found the importance of this iſland, and after repairing his damages and refreſhing himſelf and his exhauſted men upon it, he arrived ſafe in England September 11, 1603. At this period St. Helena was likewiſe known to the Dutch and Spaniards, who made uſe of it as a convenient place of refreſhment. The Portugueſe, it is ſaid, were driven out of the iſland by the Dutch, who ſucceeded the former in the poſſeſſion of it, and retained it till the year 1651, when, eſtabliſhing a colony at the Cape of Good Hope, they abandoned St. Helena. On this event the Eaſt India company ſettled on it in the ſame year; and ten years after obtained the continued poſſeſſion of it by a charter from king Charles II. After this charter they took pains in ſtocking and improving it; and after the year 1666, the iſland received a conſiderable ſupply of inhabitants in conſequence of the dreadful fire in London. The Dutch, indeed, recovered it again in 1665, but in leſs than twelve months, the Engliſh regained their poſſeſſion. No fortifications ſeem to have been built upon it either by the Portugueſe or Dutch. The firſt fort appears to have been a triangular redoubt, erected in 1665, called Fort James, in compliment to the duke of York, afterwards king James II. The appellation of James's valley is derived from the old fort, and that of Chapel Valley from the Portugueſe chapel, the ruins of which were viſible when the iſland was firſt ſettled by the Engliſh. The Dutch recovered it again, but it was retaken by ſir Richard Munden, and upon his arrival in England, the poſſeſſion or government of it were again aſſigned by the king to the Eaſt India company, and a charter was granted December 16, 1673, conſtituting them lords proprietors of the iſland, with the rights and powers of ſovereignty. In their poſſeſſion it has ſince continued, and has been found of great importance and utility as a place of refreſhment or rendezvous in its connection with the India navigation and trade. Brooke's Hiſt. of the Iſland of St. Helena, 1808.

Helena, *St.* an iſland of America, 30 miles in circumference, on the coaſt of South Carolina, which, with the main land on the N. forms St. Helena ſound, and gives name to a pariſh in Beaufort diſtrict, conſiſting of a cluſter of iſlands.—Alſo, a town on the coaſt of Florida, built by the Spaniards, and burnt by ſir Francis Drake in 1585. —Alſo, a town of the iſland of Scio.—Alſo, a town of South America, in the province of Quito; eight miles W. of Guayaquil.

HELENI, a town of Abyſſinia; 30 miles S.S.E. of Siré.

HELENIA, in *Botany*, Gærtn. t. 169. See Helenium.

HELENIUM, is an American genus, ſo named by Linnæus after he had referred the original *Helenium* to *Inula*. Ελενιον of Dioſcorides was thus called, as profeſſor Martyn informs us, in honour of Helen, the wife of Menelaus, who, as Heſychius ſays, cultivated a plant that deſtroyed ſerpents: according to others it ſprung from her tears. *Inula Helenium*, elecampane, is undoubtedly the ancient plant; and becauſe the genus we are about to deſcribe, in many reſpects cloſely reſembles the plant of Dioſcorides, Linnæus adopted this name for it. He firſt called it *Helenia* in the *Hortus Cliffortianus*, which termination Gærtner has retained. But in all the reſt of Linnæus's works the genus is found under the more claſſical title of *Helenium*.—Linn. Gen. 429. Schreb. 560. Willd. Sp. Pl. v. 3. 2120. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 3. 227. Juſſ. 189. Lamarck. Dict. v. 3. 81. Illuſtr. t. 688. Gærtn. t. 169. —Claſs and order, *Syngeneſia Polygamia-Superflua*. Nat. Ord. *Compoſitæ Diſcoideæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common calyx* ſimple, of one leaf, ſpreading, divided into about 20 ſegments which are gradually attenuated. *Cor.* compound, radiated; *florets* of the diſk perfect, numerous, tubular, ſhorter than the calyx, four or five-toothed; thoſe of the radius female, equal in number to the ſegments of the calyx, ligulate, broader outwards, three-cleft at the top, longer than the calyx. *Stam.* (in the tubular florets) Filaments five, capillary, very ſhort; anthers cylindrical, tubular. *Piſt.* (in the tubular florets) Germen oblong; ſtyle thread-ſhaped, as long as the ſtamens; ſtigma cloven: the female or ligulate florets differ in having the ſtyle very ſhort. *Peric.* none, except the unchanged calyx. *Seeds* in the florets, both of the diſk and radius, ſolitary, obovate, angular, crowned with a ſmall, five-toothed, partial calyx. *Recept.* naked, convex; the ſcales of the calyx merely ſeparating the florets of the radius.

Eſſ. Ch. Receptacle naked; that of the radius chaffy. Down with five awns. Calyx of one leaf, in many deep ſegments. Florets of the radius three-cleft.

1. H. *autumnale.* Linn. Sp. Pl. 1248. Pluk. Phyt. t. 372. f. 4.—"Leaves ſerrated, very ſmooth."—Native of damp places in North America, flowering from Auguſt to October. The whole plant is extremely bitter. This hardy perennial riſes to the height of ſix or ſeven feet. Many branching *ſtems* ſpring from the *root*. *Leaves* elliptic-lanceolate, ſmooth, alternate, more or leſs deeply ſerrated. *Flowers* large, yellow, numerous, on terminal, finely downy ſtalks; the radius marked with ſtrong parallel ribs.

2. H. *longifolium* (H. autumnale; Mill. Dict. ed. 8.)—Leaves linear-lanceolate, entire, very ſmooth. Flower-ſtalks elongated, naked.—Native of North America. A more ſlender plant than the laſt, with *leaves* twice or thrice as long, much narrower, and entire, or ſlightly waved. The *flower-ſtalks* are greatly elongated, and naked. Cornuti's *Aſter luteus alatus*, Canad. 62. t. 63, rather reſembles this than the former, but we dare not poſitively quote it.

3. H. *pubeſcens.* Ait. Hort. Kew. v. 3. 227.—"Leaves ſerrated, downy."—Native alſo of North America.—This is all the account we have of it.

4. H. *quadridentatum.* Billardiere Act. Soc. Hiſt. Nat. de Paris, v. 1. 22. t. 4. Michaux Boreal-Amer. v. 2. 133. (Rudbeckia alata; Jacq. Ic. Rar. t. 593.)—Upper leaves entire, ſmooth, broad at the baſe. Florets of the diſk four-cleft.—Native of Carolina and Louiſiana. We received it from Kew Garden in 1797. The *root* is annual. *Stem* two feet high, much branched, ſtrongly winged from the decurrent *leaves*, which are lanceolate, broad at the baſe, ſmooth, or very nearly ſo; the upper ones quite entire, the lower ſomewhat ſerrated, or even pinnatifid. *Flowers* much ſmaller than the other ſpecies, being ſcarcely an inch broad, orange-coloured, with broad-wedge-ſhaped three-lobed florets in the radius, and thoſe of the diſk four-cleft only; not five-cleft, as is almoſt univerſally the caſe in this natural order. The *flower-ſtalks* are long, ſlender, ſimple, naked, terminal, and ſolitary.

HELENS, St. in *Geography*, is a ſmall town and pariſh in Eaſt Medina Liberty, Iſle of Wight, England. It has a bay of conſiderable note as a rendezvous for the royal navy; and in time of war is a place of great maritime traffic, the Eaſt India fleet generally ſtopping here for water and proviſions. At the mouth of the bay is a cluſter of rocks called the Mixen. The houſes in St. Helens are neatly built with ſtone, and thatched: their number, at the time of the late return to parliament, was 100, the inhabitants 550. The ancient church was partly taken down about the beginning of the laſt century, the church-yard having been encroached on by the ſea: the tower was ſuffered to remain as a mark for ſeamen. The new church is a ſmall edifice, ſtanding in a more elevated ſituation to the north-weſt of the town.

In this pariſh, oppoſite St. Helens' road, was a priory for Cluniac monks, founded about the middle of the twelfth century, and made ſubordinate to an abbey in Normandy. The ſcite of the ancient building is now occupied by the ſeat of ſir Naſh Groſe, one of the judges of the Court of King's Bench, whoſe manſion, denominated Priory, commands extenſive views of the Hampſhire and Suſſex coaſts. This edifice, which has been much enlarged by the preſent poſſeſſor, ſtands at the head of a ſpacious lawn, that declines from the houſe to the brink of a high ridge, the ſteep bank of which is covered with wood down to the water's edge. In the ſouthern part of the wood are the remains of an ancient watch-tower, ſuppoſed to have belonged to the priory. The whole of this demeſne is formed of a narrow ſlip of ground, extending about a mile along the ſhore.

At a ſmall diſtance north-weſt from Priory is Fairy-Hill, the ſeat of the Rev. Henry Oglander; the houſe is a neat ſtructure, and the grounds are pleaſantly diſpoſed. On the ſea-ſhore, near Old Fort, is a ſaltern. Beauties of England and Wales. Worſley's Hiſtory, &c. of the Iſle of Wight, 4to.—Alſo, a bay on the coaſt of Africa; 30 miles N. of Saldenha bay. S. lat. 32° 40′

HELENUS, in *Fabulous Hiſtory*, a celebrated ſoothſayer, the ſon of Priam and Hecuba. He married Andromache, the wife of Hector and ſlave of Pyrrhus, who gave her to him in marriage, becauſe his predictions had been favourable to him. He was the only one of Priam's children who ſurvived the ruin of his country. After the death of Pyrrhus he reigned over part of Epirus, called Chaonia. His ſon, Ceſtrinus, ſucceeded to a part of his father's dominions, called Ceſtrina. Helenus is ſaid to have learned the art of divination from Caſſandra his ſiſter, the prieſteſs of Apollo. Poſſeſſed of this art, he was much reſpected by the Trojans; and being taken priſoner, in his retirement to mount Ida, by Ulyſſes, he was much urged by the Greeks to reveal the ſecrets of the Trojans, and was at length prevailed upon to inform the enemies of his country that Troy could not be taken whilſt it was in poſſeſſion of the Palladium, nor before Polydectes, leaving his retreat at Lemnos, joined in ſupporting the ſiege. When his country was ruined he became the property of Pyrrhus, whoſe life he ſaved by warning him to avoid a dangerous tempeſt, which proved fatal to all thoſe who ſet ſail. Thus, as we have already ſaid, he gained the favour of Pyrrhus, and his favour was introductory to the other events that occurred. It is ſaid that Helenus received Æneas when on his voyage towards Italy, and predicted to him ſome of the calamities that befel his fleet.

HELEPOLIS, in *Antiquity*, a military machine for battering down the walls of a place beſieged.

The word is Greek ἑλεπολις; compounded of the words ἑλειν, *to take*, and πολις, *a city*.

The helepolis, as deſcribed by Diodorus Siculus, &c. appears to have been no more than the aries or battering-ram, with a roof or covering over it, to prevent its being ſet on fire, as alſo to ſcreen the men who worked it. Some will have it a combination of two or three battering-rams, moving on large ſtrong wheels, roofed over, and covered with raw or wet ſkins. It had ſeveral iron points or heads, wherewith the execution was done, formed much like the thunderbolts which painters repreſent. Within was a great number of ſoldiers, who drove it with force of arm, and by means of ropes, violently againſt the wall where the breach was intended.

Others will have helepolis a generical name, comprehending all the machines uſed by the ancients in beſieging towns; as, among us, the name artillery includes all the ſorts of large fire-arms. But this opinion is chiefly founded on the origin of the name, and does by no means ſuit with thoſe minute deſcriptions given of the helepolis in the ancient writers.

The invention of the helepolis, and divers other military machines, is aſcribed to Demetrius; which, with the great number of cities he took thereby, gave him the denomination of *Poliorcetes*, or city-taker.

HELESAY, in *Geography*, one of the ſmaller Scots Hebrides. N. lat. 57°. W. long. 7° 20′.

HELFING, in our *Old Writers*, a braſs coin among the Saxons, equivalent to our halfpenny.

HELGA, in *Geography*, a lake of Sweden, in the province of Smaland; five miles S. of Wetter lake.

HELGOM, a town of Sweden, in Angermannland; 46 miles N.W. of Hernoſand.

HELIACA, formed from ἥλιος, *ſun* in *Antiquity*, ſacrifices and other ſolemnities performed in honour of the ſun.

HELIACAL, of ἥλιος, *ſun*, in *Aſtronomy*, applied to the *riſing of a ſtar, planet*, &c. denotes its iſſuing or emerging out of the rays and luſtre of the ſun, wherein it was before hid; whether this be owing to the receſs of the ſun from the ſtar; or that of the ſtar from the ſun. When applied to the ſetting of a ſtar, it denotes entering or immerging into the ſun's rays and ſo becoming inconſpicuous by the ſuperior light of that luminary.

A ſtar riſes heliacally, when after it has been in conjunction with the ſun, and on that account inviſible, it gets at ſuch a diſtance from him, as to be ſeen in the morning before the ſun's riſing.

The ſame is ſaid to ſet heliacally, when it approaches ſo near the ſun as to be hid therein. So that, in ſtrictneſs, the heliacal riſing and ſetting are only an apparition and occultation.

The heliacal riſing of the moon happens when ſhe arrives at the diſtance of 17 degrees from the ſun; for the other planets, 20 degrees diſtance is required: and for the ſtars more or leſs, as they are greater or ſmaller. See Arch *of Viſion*.

The ancients computed that a ſtar, between the tropics, would be forty days before it got clear of the ſun's rays, and became conſpicuous again. Heſiod firſt made this computation, and the reſt followed him. The period comes very near to the computation of the moderns; for the ſun advancing nearly a degree every day, it will be twenty days approaching to it, from the heliacal ſetting of the ſtar, and thirty days more withdrawing, till the heliacal riſing.

Some nations of America, and particularly the inhabitants of Cayenne, regulate their civil year by the courſe of Sirius, beignning it with the heliacal riſing of that ſtar.

To find the Heliacal *riſing and ſetting by the globe*, ſee Globe.

Heliacal *Year*. See Canicular and *Egyptian* Year.

HELIADES, in *Mythology*, the daughters of the Sun and Clymenes, according to the poets: they were ſo afflicted, as they ſay, with the death of their brother Phaeton, that the gods, moved with the paſſion, transformed them into poplars on the banks of the river Eridanus.

HELIANTHEMUM, in *Botany*, from ἥλιος, *the ſun*, and ανθεμον, *a flower*, becauſe the bright yellow flowers expand only in the ſunſhine. Tourn. t. 128. Juſſ. 294. Gærtn. t. 76.—This genus, ſeparated from *Ciſtus* by the above authors, who are followed, as we underſtand, by ſome more recent ones, conſiſts of thoſe dwarf ſpecies, generally with yellow flowers, found on expoſed ſunny hills in various parts of Europe, many if not all of which are remarkable for the irritability of their ſtamens. They certainly differ from the true genus of *Ciſtus* in having only three valves to their fruit, which is reported to be of but one cell. We find it however of three cells in *Helianthemum thymifolium*. Another character, remarked by Gærtner, is, that the ſeeds are inſerted into the valves, whereas in *Ciſtus* they grow on the axis, or central column, of the capſule. The calyx-leaves are rather more unequal in *Helianthemum* than in *Ciſtus*, and the habit of the plants is unqueſtionably different. See Cistus, ſection 2d.

HELIANTHUS, derived from ἥλιος, *the ſun*, and ανθος, *a flower*, is a genus univerſally known under the title of Sun-flower. This name originated from the reſemblance which its broad golden diſk and ray bear to the ſun, and is rendered further appropriate by its having the power (which indeed other ſyngeneſious plants poſſeſs) of conſtantly preſenting its flowers to that luminary. This order of plants is only endued, in a very high degree, with the ſame quality that is common to the whole vegetable world, of preſenting themſelves to the light; though this property, where it is eminently conſpicuous, has been poetically conſtrued into a ſort of ſympathy or perception in the plant, like the ancient Heliotrope.—Linn. Gen. 439. Schreb. 573. Willd. Sp. Pl. v. 3. 2237. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 3. 248. Juſſ. 189. Lamarck. Dict. v. 3. 82. Illuſtr. t. 706. Gærtn. t. 172; (Corona Solis; Tourneſ. t. 279.)—Claſs and order, *Syngenſia Polygamia Fruſtranea*. Nat. Ord. *Compoſitæ oppoſitifoliæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common calyx* imbricated, ſomewhat ſquarroſe, expanded, with oblong ſcales, broadiſh at the baſe, gaping in all directions at the tips. *Cor.* compound, radiated; *florets* of the diſk perfect, very numerous, cylindrical, ſhorter than the common calyx, ventricoſe, orbicular and depreſſed at the baſe, with a five-toothed, acute, ſpreading limb; thoſe of the radius female, fewer in number; much longer, ligulate, lanceolate, entire. *Stam.* (in the perfect florets,) Filaments five, curved, inſerted below the protuberance of the floret, as long as the tube; anthers cylindrical, tubular. *Piſt.* (in the perfect florets,) Germen oblong; ſtyle thread-ſhaped, the length of the floret; ſtigma cloven, reflexed: the female or ligulate florets differ in having the germen very ſmall, with neither ſtyle nor ſtigma. *Peric.* none; calyx unchanged. *Seeds* of the perfect florets ſolitary, oblong, obtuſe, quadrangular, compreſſed at the oppoſite angles, the inner ones narrower, crowned with two lanceolate, acute, deciduous ſcales: the ligulate florets form no ſeed. *Recept.* chaffy, large, ſmooth, its ſcales lanceolate, acute, deciduous, two of them ſeparating each ſeed.

Eſſ. Ch. Receptacle chaffy, flat, ſeed-crown of two-leaves. Calyx imbricated, ſomewhat ſquarroſe.

This ſtately genus conſiſts, in the laſt edition of Linnæus, of 13 ſpecies; Willdenow has 21. It is remarkable that they are all of American origin; nor is what Linnæus has been pleaſed to denominate *H. indicus*, an exception, for he received it merely as a cultivated plant from Egypt, and there is not the ſlighteſt reaſon to believe it any thing more than a variety of *H. annuus*, as he himſelf indicates.—Moſt of the *Helianthi* are perennial, herbaceous, with large, alternate, heart-ſhaped or ovate, ſtalked, roughiſh leaves, and copious, radiant, large, yellow or reddiſh, flowers.

H. *annuus*, the firſt that was diſcovered, and the largeſt ſpecies, may ſerve as a ſpecimen. This is a native of Mexico and Peru, where it greatly attracted the notice of the firſt European viſitors, who brought over ſeeds, and the plant being annual, it has ever ſince been preſerved in our gardens. The Society of Arts at London, ſome years ago, offered a premium for the raiſing of a certain quantity of the ſeeds of this Sunflower, to make ſallad-oil, and it was obtained by the late Rev. Henry Bryant, of Heydon, Norfolk, an eminent Engliſh botaniſt; but we know not that any one has adopted or purſued the ſcheme, and we have been informed by that gentleman, that even the ſeeds he raiſed lay idle in the apartments of the ſociety. One of the earlieſt figures of the Annual Sunflower may be ſeen in Gerarde's Herbal by Johnſon, 751, and one of the moſt magnificent in Miller's Illuſtration of the Linnæan Syſtem, t. 68. In its native country it is ſaid to grow to the height of 20 feet or more, and the flower to be two feet broad. This plant might well have authorized the poetical tale of Clytie, of which we ſhall ſay more under the article Heliotropium.

H. *multiflorus*, in a double ſtate, is the common perennial Sunflower of our gardens, with which all the parterres of Paris glow in the autumn.

H. *tuberoſus*, figured in Jacq. Hort. Vind. t. 161, is the Jeruſalem Artichoke, ſo called, as we preſume, from the Italian name *Giraſole*, by which, it having been firſt raiſed in the Farneſe garden at Rome, it was originally diſtributed about Europe. (See Sm. Introd. to Botany 108.) It is a native of Peru, and is cultivated in kitchen gardens for the ſake of its tuberous roots, which are eatable when boiled, and have the flavour of the real Artichoke. But they ſoon pall the appetite, and as Mr. Goodyer obſerves in Gerarde ed. 2. 754, "which way ſoever they be dreſt and eaten, they ſtirre and cauſe a filthy loathſome winde within the body, and are a meat more fit for ſwine than men."

Helianthus, in *Gardening*, compriſes plants of the flowery, herbaceous, hardy kinds; of which the ſpecies chiefly cultivated are, the annual ſunflower (H. annuus); the dwarf annual ſunflower (H. indicus); the perennial

ſunflow[illegible]

ſunflower (H. multiflorus); and the tuberous-rooted ſunflower (H. tuberoſus), or Jeruſalem artichoke.

The firſt of theſe ſpecies has varieties with double flowers, with deep yellow flowers, and with ſulphur-coloured flowers.

Method of Culture.—Theſe large flowery plants are all of them capable of being increaſed with great facility, either by the ſeeds, or parting the roots. The two firſt ſpecies are raiſed by the ſeeds, but the others by the diviſion of their roots.

The proper ſeaſon for ſowing the ſeeds is during the more early ſpring months, which ſhould be performed in a ſort of patches containing four or five ſeeds in each, in the clumps, borders, or other places where the plants are to ſtand for flowering.

As ſoon as the plants preſent themſelves, and are become of proper growth, they ſhould be thinned, ſo as to leave only one or two of the ſtrongeſt and beſt.

But in order to have the plants ready at a more early period, a little ſeed ſhould be ſown upon a moderate hot-bed, under glaſs frames, which, when the plants riſe and become ſufficiently ſtrong, and the weather ſuitable, ſhould be tranſplanted into the ſituations where they are intended to grow and flower. In reſpect to the divided roots they ſhould be planted out in the places where the plants are intended to grow, either in the autumn or early ſpring.

The decayed ſtems, and other parts, ſhould be regularly cleared away and removed, in all the perennial ſorts, as ſoon as they begin to decline. Theſe plants will continue a very great length of time.

The laſt ſpecies is commonly increaſed by planting out the ſmall roots, or pieces cut from ſuch as are of a larger ſize, and which have eyes or buds in them, pretty much in the ſame way as the potatoe, but allowing more diſtance every way. This may be done either in the autumnal or ſpring ſeaſon. The roots in this mode multiply rapidly. They ſhould be taken up for uſe, when the ſtems begin to decay in the autumn after they have been planted.

But when intended to be cultivated as a crop, the ſets ſhould be planted out in an open mellow part of the garden ground, in rows at three or more feet aſunder, and a foot and a half or two feet from ſet to ſet, having the depth of four or five inches.

The proper ſeaſon in this caſe is about the end of March, where the ſoil is of a light quality.

The roots may be taken up for uſe towards the end of September, and the whole ſecured in the following month. Where they are preſerved in ſand, in a properly dry place, they continue good moſt part of the winter.

All the plants that are raiſed by ſeed have a very conſpicuous ornamental effect, when placed backwards in the clumps, borders, and other compartments of large pleaſure grounds, and are capable, by being ſown at different times, of being kept in a ſucceſſion of flowering for a very great length of time.

The firſt ſpecies has lately been introduced into field culture in the view of the ſeeds, and the oil which is capable of being drawn from them, but we believe hitherto without any very great ſucceſs. See Sunflower.

HELIAR, St., in *Geography*, a town of the iſland of Jerſey, ſituated on the eaſt ſide of the bay of St. Aubin, and deriving its name from Elerius, or Helier, a ſaint of this iſland, who was put to death by the Pagan Normans on their arrival hither. The town, which is well built and populous, lies at the eaſt end of a long and high rocky hill; and contains about 400 houſes, moſtly ſhops, near 2000 inhabitants, a handſome town-hall, and a ſpacious watering place. The market-houſe is large, encompaſſed with good houſes, among which is the court of juſtice, and at the top of it is a bronze gilt ſtatue of George II. The market, which is on Saturday, is much frequented. N. lat. 48° 38′. W. long. 2° 8′.

HELIASTES, in *Antiquity*, officers or magiſtrates of Athens, who conſtituted a court of five hundred perſons, called *Heliæa*, and were judges for taking cognizance of civil matters.

Ulpian gives us two etymologies of the word: ſome, ſays he, derive it from ἥλιος, *helios*, *ſun*; and hold it thus called, becauſe they ſat in the open air, in ſight of the ſun. Ulpian himſelf chooſes rather to derive *heliaſtes* from Ἡλιαια, *Heliæa*, the place where this court or council was held; and that from ἁλιζω, *I aſſemble*, of ἅλις, *ſatis*, *enough*.

The court of heliaſtes was one of the ſix civil juriſdictions of Athens, and that before which matters of the greateſt moment were uſually brought; ſo that it was held the firſt and moſt conſiderable of all the civil tribunals. The delinquencies of the military men were alſo brought before the heliaſtes.

This court conſiſted ſometimes of a thouſand, and ſometimes of fifteen hundred or more judges; in the former caſe the members of two other courts, and in the latter thoſe of three courts, were ſummoned by the Theſmothetæ, and before whom they took a ſolemn oath, which is preſerved by Demoſthenes in his oration againſt Timocrates: this court ſat from ſun-riſe to ſun-ſet.

HELICE, or Elice, a name given by the ancient Greeks to the willow.

Helice, Ἑλικη, in *Aſtronomy*, the ſame with Urſa major.

HELICHRYSUM, in *Botany*. See Elichrysum.

HELICIA owes its derivation to ἕλιξ, *a ſcrew*, from the ſpirally revolute form of its petals. Loureir. Cochinch. v. 1. 83.—Claſs and order, *Tetrandria Monogynia*.

Gen. Ch. *Cal.* Perianth inferior, in four ſmall, acute, erect ſegments. *Cor.* Petals four, linear, ſpirally revolute, ſlightly coaleſcing into a ſlender tube before the flower expands. *Stam.* Filaments four, thread-ſhaped, inſerted into the petals, above their middle; anthers linear, level with the top of the corolla. *Piſt.* Germen ovate, ſuperior; ſtyle thread-ſhaped, equal with the ſtamens; ſtigma oblong, cylindrical. *Peric.* Drupa ovate, ſmall, with a longitudinal furrow; kernel ſimple, ovate.

Eſſ. Ch. Calyx four-cleft, inferior. Corolla of four linear, revolute petals. Drupa ovate, with a furrow.

1. *H. cochinchinenſis.* Loureir. Native of woods in Cochinchina.—A *tree* of middling ſize, and furniſhed with ſpreading branches. *Leaves* ovate, pointed; ſome ſerrated, others entire. *Flowers* yellow, in ſimple, oblong, terminal bunches.

We are unable to refer this plant of Loureiro's to any of the Linnæan genera, either in the claſs *Tetrandria*, or to any of the tetrandrous variations in *Pentandria*, though from the deſcription it appears to be nearly allied to many of theſe, and may poſſibly be deſcribed under ſome other name.

HELICITES, in *Natural Hiſtory*, are foſſil remains of ſhells of the genus Conchyliolithus, of the family Turbinatæ helicitæ, in the arrangement of the late Mr. William Martin, of which three ſpecies were diſcovered by that naturaliſt in the Derbyſhire ſtrata, and are figured and deſcribed in his "Petrificata Derbienſia;" *viz.*

1. *H. Auricularis*, or ear-like helicite, tab. 40. figs. 3, and 4: found in Bakewell, but is rather rare.

2. *H. Catillus*, or diſh-like helicite, one ſide flat, like an amorite, but not chambered, tab. 7. figs. 1 and 2: found in Tideſwell and in Winſter in limeſtone, and near Buxton in ſhale, theſe laſt being frequently flattened or compreſſed, ſometimes to the thickneſs of a ſhilling.

3. H. *Puſillus*, or petit heliceite, a very ſmall ſhell, tab. 52. fig. 3.: found near Cheſterfield, in the cavities in a ſuppoſed capſule, or nut of ſome kind, included in the centre of an argillaceous ironſtone ball.

HELICOID Parabola, or the *parabolic ſpiral*, a curve ariſing upon a ſuppoſition of the axis of the common Apollonian parabola's being bent round into the periphery of a circle.

The helicoid parabola, then, is a line paſſing through the extremities of the ordinates, which converge towards the centre of the ſaid circle.

Suppoſe, *e. gr.* the axis of the common parabola to be bent into the periphery of the circle B D M, (ſee *Plate* X. *Analyſis*, *fig.* 1.) then the curve B F G N A, which paſſes through the extremities of the ordinates C F and D G, which converge towards the centre of the circle A, conſtitutes what we call the helicoid, or ſpiral parabola.

If the arch B C, as an abſciſs, be called x, and the part C F of the radius, as an ordinate to it, be called y, and the parameter of the parabola be called l, the nature of this curve will be expreſſed by the equation $l x = y y$.

HELICON, in *Ancient Geography*, the name of a mountain in Bœotia, near the gulf of Corinth, in the neighbourhood of Parnaſſus and Cytheron, ſacred to Apollo and the Muſes, who are thence called Heliconides. This hill was famous for the pureneſs of its air, the abundance of its waters, its fertile valleys, the coolneſs of its ſhades, and the beauty of the venerable trees which covered its ſummit. The nine muſes had their ſtatues in the wood of this mountain; and here were alſo ſtatues of Apollo and Mercury, of Bacchus by Lyſippus, of Orpheus of Thrace, and likewiſe of poets and celebrated muſicians. The fountain Hippocrene, that of Narciſſus, and a ſmall river named Permeſſus, flowed at the foot of this mountain, and here was alſo ſhewn the ſepulchre of Orpheus. It is ſituated in Livadia, and now called Zagura or Zaguya.—Alſo, a river of Greece, in Macedonia, which ran near Dium, and after having purſued a courſe of 65 ſtadia, ſunk under ground, and aſſumed the name of Baphyrus, according to Pauſanias, who adds, that it was navigable to the ſea.—Alſo, a river on the W. ſide of Sicily. Ptol.

HELICONIA, in *Botany*, from the famous mountain ἑλικων, and ἑλικωνιαδες, *the Muſes;* the name having been given by Linnæus, evidently, as it appears to us, from an aſſociation of ideas with *Muſa*, a genus with which the preſent was originally confounded in his works. Linn. Mant. 147. Schreb. 158. Willd. Sp. Pl. v. 1. 1187. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 1. 284. Juſſ. 61. Lamarck. Dict. v. 1. 426. Illuſtr. t. 148. (Bihai; Plum. Gen. 50. t. 3.) Claſs and order, *Pentandria Monogynia*, or perhaps *Hexandria Monogynia*. Nat. Ord. *Muſæ*, Juſſ.—Linnæus refers it to his *Scitamineæ*, to which it is indeed nearly akin, but nearer to his *Coronariæ*.

Gen. Ch. *Cal.* Spathas, both general and partial, alternate, diſtinct. Perianth none. *Cor.* of one petal, ſuperior; tube very ſhort, cylindrical; limb in four oblong, erect, acute, channelled, nearly equal, ſegments, three of which are external, one internal. *Stam.* Filaments ſix, inſerted into the tube of the corolla; five of them equal, as long as the limb, thread-ſhaped, fertile; anthers vertical, erect, long and furrowed; in the place of the ſixth filament is a ſhort, channelled, curved, often notched, leaf or ſcale. *Piſt.* Germen inferior, roundiſh, abrupt; ſtyle curved, about equal to the ſtamens; ſtigma obtuſe, notched. *Peric.* Capſule oblong, abrupt, triangular, of three cells and three valves. *Seeds* ſolitary, oblong, rugged.

Eſſ. Ch. Spathas both general and partial. Calyx none. Corolla in four deep ſegments, one of them internal. Barren filament like a ſcale. Capſule inferior, of three cells and three valves. Seeds ſolitary.

Obſ. What Linnæus terms a nectary of two leaves, appears to us on the one hand an internal petal, for which indeed the term nectary might, according to his cuſtom, be retained; and on the other, moſt undoubtedly, a barren or abortive filament, which, according to Adanſon, appears to be occaſionally perfect. In this reſpect the analogy with *Muſa* is very cloſe. We have corrected the generic characters accordingly. The ſpecies are involved in much confuſion; we ſhall attempt to define ſome of them from authentic materials.

1. H. *caribæa*. Lamarck. Dict. v. 1. 426. Willd. n. 1. (Bihai ampliſſimis foliis, florum vaſculis coccineis; Plum. Ic. 49. t. 59.)—Leaves rounded at both ends. Spathas imbricated. Inner ſegment of the corolla undivided.—Native of bogs in Guiana and the Caribee iſlands. This plant, according to Plumier's manuſcript quoted by Lamarck, has a thick, knotty *root*, and though 10 or 12 feet high, is herbaceous, deſtitute of a real *ſtem*. The *leaves* have long ſheathing *footſtalks*, their baſes enfolding one another ſo as to reſemble a ſtem about five feet tall, and as thick as a man's thigh, after which the ſtalks ſpread in two rows, and are rounded below, channelled above. The *leaf* itſelf is ſix or ſeven feet in length, and a foot and half wide, linear, entire, rounded at each end, flat, ſmooth, pliable, with one rib and numerous parallel tranſverſe veins, altogether reſembling the foliage of the *Muſa* or Plantain-tree. *Flower-ſtalk* radical, central, ſolitary, ſimple, about as tall as the footſtalks, bearing one large, upright, two-ranked ſpike, whoſe *ſpathas* are imbricated in two rows, boat-ſhaped, acute, compreſſed, red, containing abundance of crowded, greeniſh *flowers*. *Capſules* fleſhy, blueiſh.

Lamarck conſiders two other kinds mentioned by Plumier, one with blackiſh, the other with variegated, ſpathas, as varieties of this, but his opinion can neither be confirmed nor refuted till the plants are recovered.

2. H. *Bihai*. Linn. Mant. 211. Am. Acad. v. 8. 253. Willd n. 2. Swartz. Obſ. 96. t. 5. f. 2. H. luteo-fuſca; Jacq. Hort. Schoenbr. v. 1. 25. Muſa Bihai; Linn. Sp. Pl. 1447. Ballia; Merian. Surin. 54. t. 54.)—Leaves pointed at each end. Spathas diſtant. Stalk zigzag. Inner ſegment of the corolla three-cleft.—Native of South America, in mountainous boggy places. The Linnæan ſpecimens from Surinam, intended in the diſſertation called *Plantæ Surinamenſes*, ſo well agree with Merian's *Ballia*, that we cannot doubt their identity. This ſpecies has the ſize and habit of the laſt, but differs in having the *leaves* not rounded at the baſe or point; the common *flower-ſtalk* remarkably zigzag, ſomewhat hairy; the *ſpathas* diſtant, not imbricated, and according to Swartz, the inner ſegment of the *corolla* three-pointed.

The *H. Bihai* of Linn. Suppl. 157, is deſcribed from a flower of *Strelitzia reginæ*, and a leaf which we cannot with certainty determine to belong to it, though it poſſibly may be a narrow variety of that ſpecies.

3. H. *humilis*. Jacq. Hort. Schoenbr. v. 1. 23. t. 48, 49. Willd. n. 3. (Muſa humilis; Aubl. Guian. v. 2. 931.) —Leaves pointed at each end. Spathas rather diſtant. Flower-ſtalk nearly ſtraight. Inner ſegment of the corolla three-cleft; outer ones recurved.—Native of Guiana and Curaſſow. It flowered with Jacquin, in the Imperial garden at Schoenbrun, and, from his fine plates and full deſcription, appears to differ from the laſt in being a much lower plant, with leſs diſtant *ſpathas*, and a ſtraighter *flower-ſtalk*. The revolute or reflexed ſegments of the *corolla*, if conſtant, differ from what Swartz repreſents of the former.

4. H. *pſittacorum.* Linn. Suppl. 158. Swartz. Obſ. 98. Andr. Repoſ. t. 124. Curt. Mag. t. 502.—Leaves taper-pointed, rounded at the baſe. Spathas few, upright. Flowers on ſmooth partial ſtalks. Corolla cloſed.—Native of Surinam and Jamaica. Sent to Linnæus under the name of *Palilia* by Allamand, whoſe ſpecimen, with ſeveral other authentic ones, is before us. The Dutch at Surinam call it *Papagoyen-beck*, or Parrot's-beak, whence the above ſpecific name. It has flowered in ſeveral ſtoves near London, and is very beautiful. The whole plant is ſeven or eight feet high, more ſlender, but more really cauleſcent, than any of the foregoing. *Leaves* reſembling thoſe of a *Canna* or *Maranta*, about a foot long, elliptic-ovate, pointed, ſmooth, with fine tranſverſe veins or ribs. *Spathas* three or four, erect, or ſomewhat lax, lanceolate, diſtant, keeled, but not much compreſſed, of a fine orange hue. *Flowers* three or four from each general ſpatha, with ſcarcely any partial ones, on ſmooth ſtalks, near an inch long. *Corolla* near an inch and a half long, cloſed, curved, angular, orange, tipped with deep green or black. We ſee no reaſon to doubt Swartz's ſynonym, though Willdenow found ſome diſagreement between his deſcription and that of Linnæus, which we ſhall not ſtay to reconcile, having made ours from nature.

5. H. *hirſuta.* Linn. Suppl. 158.—Leaves pointed, ſpathas numerous, two-ranked, aſcending. Common flower-ſtalk zigzag, hairy, as well as the partial ones.—Sent to Linnæus by the celebrated Mutis, who gathered it in New Granada. This approaches to the ſize and habit of ſome of the former ſpecies. The *leaves* are ovate, pointed, ſmooth. *Common flower-ſtalk* zigzag, hairy. *Spathas* numerous, two-ranked, rather near to each other, but not imbricated, direct or a little aſcending, two inches long, broad and ſheathing at their baſe, more or leſs hairy, eſpecially their keel. *Flower-ſtalks* numerous from each, very hairy, from half an inch to an inch long, with no apparent partial ſpathas. *Germen* hairy, as is likewiſe the outſide of the *corolla*. The *petals* are ſtraight at the point. Of their colour we know nothing, except that they appear to have a dark ſtain like the laſt. Two of them ſeem to be broadeſt, hairy and external; two internal, oppoſite, narrower and ſmooth; ſo that perhaps the generic deſcription requires further amendment, which thoſe who can compare the different ſpecies alive, may perhaps ſupply. S.

HELICONII, in *Entomology*, the butterflies or papiliones in the Linnæan ſyſtem, that have the wings narrow, entire, uſually naked or ſemi-tranſparent, the upper ones oblong, the lower ſhort. Fabricius conſiders them nearly the ſame. According to this writer the anterior wings are oblong, the lower ones ſhort and rounded. See Papilio.

HELICTERES, in *Botany*, is derived from ἕλιξ, *a ſcrew*, becauſe its fruit is of a ſpiral ſhape. Linn. Gen. 468. Schreb. 290. Willd. Sp. Pl. v. 3. 720. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 3. 313. Juſſ. 278. Lamarck Dict. v. 3. 86. Illuſtr. t. 735. Gærtn. t. 64. (Iſora; Plum. 24. t. 37.)—Claſs and order, *Decandria Monogynia.* Nat. Ord. *Columniferæ*, Linn. *Malvaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, tubular, half-ovate, ſpreading obliquely, unequally five-cleft, leathery. *Cor.* Petals five, oblong, equal in width, affixed to the receptacle, longer than the calyx; claws long, having a ſmall tooth on each ſide at the baſe; nectary of five, petal-ſhaped, lanceolate, very ſmall ſegments, covering the germen. *Stam.* Filaments five, ten, or more, very ſmall; anthers oblong, lateral. *Piſt.* Receptacle thread-ſhaped, very long, recurved, having an ovate, ſuperior, germen at the top; ſtyle awl-ſhaped, longer than the germen; ſtigma moſtly five-cleft. *Peric.* Capſules five, often twiſted ſpirally, of one cell. *Seeds* numerous, angulated.

Obſ. This genus has been referred to the ſeveral claſſes of *Decandria*, *Dodecandria*, *Monadelphia*, and *Gynandria*, by different authors, but we are induced to place it in the firſt of theſe, from its having generally ten ſtamens perfectly diſtinct from each other above the receptacle.

Eſſ. Ch. Calyx tubular, inferior, obliquely five-cleft. Petals from five to ten. Germen on a very long ſtalk. Style ſomewhat five-cleft. Capſules five, ſpirally twiſted together, each of one cell, with many ſeeds.

1. *H. baruenſis.* Willd. Sp. Pl. v. 3. 720. Jacq. Amer. 236. t. 149.—“Leaves heart-ſhaped, deeply ſerrated, downy underneath. Fruit twiſted, the points ſtraight.”—Native of woods near the ſea-ſide at Panama in South America.—*Calyx* cylindrical, with two lanceolate lips, the upper one bifid, the lower trifid. *Petals* five, linear.

2. *H. jamaicenſis.* Willd. Sp. Pl. v. 3. 720. Swartz. Ind. Occ. v. 2. 1156. Jacq. Amer. 235. t. 179. f. 99.—“Leaves heart-ſhaped, ſerrated, pubeſcent. Fruit ovate, acute, twiſted.”—A maritime ſhrub growing in Jamaica.—*Flowers* terminal. *Calyx* bell-ſhaped, powdery or hairy, five-toothed. *Petals* five, unequal, oblong. *Fruit* like ropes twiſted together, about an inch in diameter.

3. *H. Iſora.* Linn. Sp. Pl. 1366. (*Pluk.* t. 245. f. 2.)—“Leaves elliptical, ſomewhat heart-ſhaped, with tooth-like ſerratures, pointed, rough, downy underneath. Flowers axillary. Fruit twiſted, awl-ſhaped at the top.—Found at Malabar, and in the Molucca iſlands.—*Leaves* ſmooth above, downy or hairy underneath. *Flowers* on foot-ſtalks, from two to four at every axillary point. *Calyx* tubular or club-ſhaped, lengthened out at the baſe, two-lipped at the margin. *Petals* five, unequal, obovate. *Fruit* twiſted, cylindrical, with a long, awl-ſhaped top.

4. *H. hirſuta.* Willd. Sp. Pl. v. 3. 721. Loureir. Cochinch. v. 2. 530.—“Leaves ovate, acute, ſerrated, ſomewhat heart-ſhaped, downy. Flower-ſtalks axillary, bearing many flowers. Fruit oblong, ſtraight, very hairy.—Native of woods on the plains of Cochinchina.—*Stem* ſhrubby, about ſix feet high, hairy. *Flower* dark purple. *Calyx* of one leaf, with a long, curved, hairy coloured tube. *Seeds* bony.

5. *H. undulata.* Loureir. Cochinch. v. 2. 531.—“Leaves lanceolate, waved. Flowers in a bunch. Capſules five, ſtellated.—Native of the woods of Cochinchina. This is a middling ſized tree, with ſpreading branches. *Leaves* entire, ſmooth, alternate. *Flower* ſmall, reddiſh-green, generally terminal. *Capſules* ſcarlet, horizontally arranged in the form of a ſtar. *Seeds* ovate, ſmooth, brown, fleſhy.

6. *H. paniculata.* Loureir. Cochinch. v. 2. 531.—“Leaves ovate, acute. Flower panicled. Stamens numerous.. Capſules five, ſtellated. This, as well as the laſt ſpecies, grows in the woods of Cochinchina. They are both taken up from Loureiro's deſcriptions. The preſent is a large *tree*, with ſpreading branches. *Flower* reddiſh. *Panicles* lax, moſtly terminal. *Capſules* red, of two valves, many-ſeeded, radiating into a circle. *Anthers* above 20, adhering to the ſides of the germen.

7. *H. anguſtifolia.* Linn. Sp. Pl. 1366. Oſb. itin. 232. t. 5.—“Leaves lanceolate, entire. Fruit ovate, ſtraight.” —Native of Canton in China.—*Stem* ſhrubby, about five feet high, erect, branching. *Leaves* plain on the upper ſide, veined at the back, downy. *Flowers* pale purple. *Seeds* numerous, angulated.

8. *H. pentandra.* Linn. Mant. 294. Willd. Sp. Pl. v. 3.. 722.—“Stamens five. Leaves ovate; thoſe about the flowers dark purpliſh.”—Native of Surinam.—*Leaves* alter-

nate, pointed, ſerrated. *Calyx* with branched briſtles. *Capſules* twiſted, woolly.

9. *H. carthaginenſis.* Linn. Sp. Pl. 1366. Jacq. Amer. 237. t. 150.—“ Leaves heart-ſhaped, ſerrated. Fruit oblong, ſtraight.”—Found in the woods of Carthagena, flowering in June and July.—This ſhrub is 12 feet high, erect.—*Leaves* downy on both ſides. *Flowers* very fœtid, coming occaſionally before the leaves, but generally at the ſame time with them. *Calyx* browniſh yellow. *Petals* purple. In habit it is nearly allied to *H. baruenſis*, but differs both in flower and fruit.

10. *H. apetala.* Linn. Sp. Pl. 1366. Jacq. Amer. 238. t. 181.—“ Leaves five-lobed, divaricated. Flowers apetalous.”—Native of woods in Carthagena.—This beautiful tree riſes to the height of 40 feet, with a large elegant head. *Leaves* folded, five-lobed half way down, ſmooth on the upper ſide, ſomewhat woolly beneath; lobes ovate-roundiſh, acute, entire. *Flowers* panicled, numerous, dirty yellow with purple ſpots. The inhabitants call this ſpecies *Camajonduro.*

Helicteres, in *Gardening*, contains plants of the ſhrubby exotic kind, which require the heat of the ſtove; and of which the ſpecies chiefly cultivated are, the ſmall-fruited ſcrew-tree (H. baruenſis); and the great-fruited ſcrew-tree (H. iſora).

Method of Culture.—The increaſe in plants of this deſcription is moſtly accompliſhed by means of the well-ripened ſeed, which ſhould be ſown upon a hot-bed protected by glaſſes in the ſpring ſeaſon, and when the plants appear and are become of ſufficient ſtrength, they ſhould be removed ſeparately into ſmall pots filled with light mould, and plunged into a moderate hot-bed of tan, ſhade from the ſun being carefully given until they have ſtricken freſh root. In the after part of their management they are to be treated in the ſame manner as other tender ſhrubs, the glaſs frames being daily raiſed according to the ſtate of the weather, in order that they may have a proper ſupply of freſh air. During the ſummer ſeaſon the plants ſhould continue under the frames, provided there be ſufficient height; when in autumn they ſhould be again plunged in the tan bed of the ſtove, where they ſhould conſtantly remain; care being taken to ſhift them into larger pots as they ſtand in need of it, and not too much water be given them in the winter. While the hot ſummer weather continues they ſhould, however, be well ſupplied with air as well as water.

Plants of this kind afford curioſity and ornament among collections of other plants of the ſtove kind.

HELIGOLAND, Helgoland, or *Heilgoland*, in *Geography*, a Daniſh iſland in the North ſea, nearly oppoſite to the mouth of the Elbe; about nine miles in circumference. This iſland has been very much ſubject to inundations, and a conſiderable part of it has been deſtroyed, particularly in 1649. It is divided, however, into “ Klif ” and “ Dubnen,” or high and low land. It produces barley and corn, but not enough for the inhabitants, who chiefly ſubſiſt by fiſhing. The uplands afford paſture for about 60 cows and as many ſheep. On the higheſt part of the weſt klif the Hamburghers have erected a light-houſe or beacon. Since the year 1727 the downs have been ſeparated from the reſt of the iſland by a channel ſufficiently deep for veſſels of a ſmall ſize. The number of inhabitants is about 2000, who are deſcendants of the ancient Friſians, and who have their own particular manners and laws. They are ſkilful pilots, and are much employed in conducting ſhips up the Elbe, the Weſer, and the Eider. In 1714 it was annexed to the crown of Denmark. In the year 1807 this iſland was ſeized by the Britiſh. N. lat. 54° 12′. E. long. 8° 24′.

HELIOCARPUS, in *Botany*, is derived from ἥλιος, the *ſun*, and καρπος, a *fruit*, becauſe the fruit of this plant is radiated like the ſun, or rather as artiſts are accuſtomed to repreſent that body. This idea of its derivation is thus expreſſed by Linnæus in his *Critica Botanica*, p. 97. “ Who has ever ſeen the roundiſh fruit of a plant encircled longitudinally at the margin with compound rays, without figuring to himſelf the ſun as it is uſually depicted? This idea once combined with the word *Heliocarpus* is ſo connected with it, that the plant, or rather its name, never occurs without calling to mind the idea above expreſſed.”—Linn. Gen. 241. Schreb. 325. Willd. Sp. Pl. v. 2. 874. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 129. Juſſ. 290. Lamarck Dict. v. 3. 89. Illuſtr. t. 409. Gærtn. t. 49.—Claſs and order, *Dodecandria Digynia.* Nat. Ord. *Columniferæ*, Linn. *Tiliaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of four leaves, coloured; leaflets linear, long, broadiſh, ſpreading, deciduous. *Cor.* Petals four, linear, much ſhorter than the calyx, narrowiſh. *Stam.* Filaments 16, awl-ſhaped, almoſt as long as the calyx; anthers twin, linear, incumbent. *Piſt.* Germen roundiſh; ſtyles two, ſimple, erect, as long as the ſtamens; ſtigmas acute, diſtant. *Peric.* Capſule turbinate-ovate, pedunculated, compreſſed, ſurrounded longitudinally on both ſides with rays pinnately branched, of two cells and two valves, with the partition contrary. *Seeds* ſolitary, ſomewhat ovate.

Eſſ. Ch. Calyx four-leaved. Petals four. Styles ſimple. Capſule of two cells, compreſſed, longitudinally radiated all round.

1. *H. americana.* Linn. Sp. Pl. 643. Hort. Cliff. t. 16. Trew. Ehret. t. 45. This is the only ſpecies known; a native of the warmer parts of America, flowering in December, and appears to have been the *Montia* of Dr. Houſton, which was introduced by him into the gardens at Kew before 1733, though now long ſince loſt.—This plant, which requires to be kept in a ſtove, riſes to the height of 15 or 18 feet, ſending out many lateral *branches* towards its top. *Stem* erect, round, ſmoothiſh, marked with white dots. *Leaves* heart-ſhaped, pointed, unequally ſerrated, ribbed, ſomewhat harſh on each ſide. *Stipulas* awl-ſhaped, ſmooth, bent back and ſpreading, deciduous, ſhort. *Flowers* white, in bunches. *Capſule* ſurrounded with feathery, cloven rays. This genus is nearly akin to *Triumfetta*, though ſufficiently diſtinct from that plant. It is ornamental, but difficult of culture.

HELIOCENTRIC Place *of a Planet*, is the place wherein the planet would appear to be if viewed from the centre of the ſun, or the point of the ecliptic, wherein a planet viewed from the ſun would appear to be.

The word is compounded of ἥλιος, *ſun*, and κεντρον, *centre.* The heliocentric place, therefore, coincides with the longitude of a planet viewed from the ſun. See Place.

Heliocentric *latitude of a planet*, is the inclination of the line drawn between the centre of the ſun and the centre of a planet to the plane of the ecliptic.

The heliocentric latitude of a planet is thus determined: if the circle KDM (ſee *Pl.* XVI. *Aſtron. fig.* 139.) repreſent the orbit of the earth round the ſun, and the inner one ANB*n*, be placed ſo as to be inclined to the plane of the other (for which reaſon it appears in the form of an ellipſis), when the planet is in N or *n* (which points are called its nodes), it will appear in the ecliptic, and ſo have no latitude; if it move to P, then, being ſeen from the ſun, it will appear to decline from the ecliptic, or to have a latitude; and the inclination of the line RP to the plane of the ecliptic, is called the planet's heliocentric latitude; and the meaſure of it is the angle P R q, ſuppoſing the line P q to be perpendicular to the plane of the ecliptic.

This heliocentric latitude will be continually increaſing, till it come to the point A, which they call the limit or utmoſt extent of it; and then it will decreaſe again, till it come to nothing in N; after which it will increaſe again till it come to B; and laſtly, it will be decreaſing again, till the planet comes to be in n, &c.

HELIOCENTROS, in *Natural Hiſtory*, a name given to an inſect of the poiſonous kind, called by Ariſtotle, Phalangium decticum, and by the Latins Solipuga.

HELIOCOMETES, *comet of the ſun*, a phenomenon ſometimes obſerved at the ſetting of the ſun; thus denominated by Sturmius and Pylen, who had ſeen it, becauſe it ſeems to make a comet of the ſun, being a large tail, or column of light, fixed or hung to that luminary, and dragging after it at its ſetting, much in the manner of a tail of a comet.

In that obſerved by M. Pylen, at Grypſwald, March 15, 1702, at five o'clock in the afternoon, the end which touched the ſun was only half the ſun's diameter broad, but the other end, oppoſite to the ſun, was much broader; its length was above ten diameters of the ſun, and it moved in the ſame tract as the ſun; its colour was yellow next the ſun, and darker farther off; it was only ſeen painted on the thinner higher clouds; a little teleſcope eaſily diſcovered, that there was nothing of it on the thicker and lower clouds, though the naked eye could not diſcover ſo much. It laſted in its full vigour the ſpace of an hour, and then gradually diminiſhed.

HELIODORUS, in *Biography*, born at Emeſſa, in Phœnicia, flouriſhed under the emperors Theodoſius and Arcadius, at the cloſe of the fourth century. In his youth he compoſed a romance entitled Æthiopia, and relating the loves of Theagenes and Chariclea, which is ſaid to be a very ingenious and pleaſant compoſition, and has ſerved as a model for ſubſequent works of a ſimilar kind. This was firſt printed at Baſil in 1534; the copy from which it was taken having been ſaved by a common ſoldier at the ſack of Buda. It was tranſlated by a Poliſh knight, and an edition of it, with the learned notes of Bourdelot, was printed at Paris in 1619. The author was afterwards raiſed to the dignity of a biſhop of Tricea in Theſſaly. It has been ſaid that a ſynod, having put it to his choice whether he would burn his romance or renounce his biſhopric, he preferred the latter, and was in conſequence depoſed. This fact is ſtated, as the current report, by Bayle, who gave no credit to it himſelf. Moreri. Bayle.

Heliodorus of Lariſſa, a Greek mathematician, who flouriſhed ſoon after the reign of Tiberius, was author of a treatiſe on Optics, of which a fragment only was publiſhed at Florence, in Greek and Latin, in 1573, and an Italian tranſlation of the ſame by Ignatius Danti, with his edition of Euclid's Optics. The moſt complete edition of the Optics of Heliodorus was publiſhed at Paris, in Greek and Latin, with notes by Bartholin. He is ſuppoſed to have written a treatiſe on weights and meaſures, which was found among the MSS. of Iſaac Voſſius. Gen. Biog.

HELIOGABALUS, a Roman emperor, was ſon of Varius Marcellus, and called Heliogabalus becauſe he had been prieſt of the ſun in Phœnicia. The beauty of his perſon, his imperial connections, and a report circulated by his relations that he was in fact the natural ſon of Caracalla, ſo ingratiated him with the ſoldiers quartered at Emeſſa, that they were induced, by profuſe largeſſes, to proclaim him emperor. This event happened, according to Gibbon, on the 16th of May 218, when he was only about 15 years of age, or at moſt 17. He now aſſumed, as he afterwards polluted, the dignified name of Antoninus; and, to win the favour and ſupport of the army, he pretended to have taken up arms to revenge the death of his father, and the oppreſſions of the military order. His ſucceſſion to the high honour of emperor was oppoſed by Macrinus, who was defeated in battle, driven to flight, and afterwards ſlain. The ſpecious letters in which the young conqueror announced his victory to the ſenate, were filled with profeſſions of virtue and moderation. He declared that the ſhining virtues of Marcus and Auguſtus ſhould ever be conſidered as the guides of his life, and the rules of his adminiſtration. He affected to dwell with a ſort of pride on the ſtriking reſemblance of his own age and fortunes with thoſe of Auguſtus, who in his earlieſt youth had revenged, by a ſucceſsful war, the murder of his father. The commencement of his reign was ſtained with numerous executions of the friends and ſervants of Macrinus; and at Nicomedia he ſlew, with his own hand, Gannys, his preceptor, to whoſe exertions he had been principally indebted for his victory. He now ſhewed his character in its true light, and in a very ſhort time the moſt luxurious effeminacy was united to ſavage ferocity, and his garb and equipage were thoſe of an eaſtern deſpot. He brought the image of the deity, whoſe prieſt he had been, to Rome, and placed it, which was only a block of ſtone, in a temple, on mount Palatine, which he had made the centre of all that was ſacred in the ſtate of religion. He next procured for his idol, the goddeſs Aſtarte or the moon, as a conſort, from Carthage, and ſignalized his mad idolatry by every extravagance which human ingenuity and deſperate licentiouſneſs could deviſe. He made his grandmother Mæſa, and his mother Sæmias, his colleagues on the imperial throne, and choſe a ſenate of women, over which his mother preſided, and preſcribed all the modes and faſhions which prevailed in his empire. Heliogabalus ſeemed to have no other ambition than to ſurpaſs, in folly and debauchery, the very worſt of his predeceſſors. Corrupted by his youth, his country, and his fortune, he abandoned himſelf to the groſſeſt pleaſures with ungoverned fury, and ſoon found diſguſt and ſatiety in the midſt of his enjoyments. A capricious prodigality ſupplied the want of taſte and elegance. He confounded the order of ſeaſons and climates to ſport with the paſſions and prejudices of his ſubjects, and he ſubverted every law of nature and decency. A long train of concubines, and a rapid ſucceſſion of wives, were inſufficient to ſatisfy the impotence of his paſſions. He affected to copy the dreſs and manners of the female ſex, preferred the diſtaff to the ſceptre, and diſhonoured the dignities of the empire by diſtributing them among his numerous lovers, one of whom was publicly inveſted with the title and authority of the emperor's, or, as he ſtyled himſelf, of the empreſs's huſband. His favourites were ſelected from men of the loweſt rank and moſt infamous character. At length all orders of the ſtate were amazed at their own tameneſs, folly, and diſgrace, in ſubmitting to ſo vile a maſter. Even the ſoldiers, who cheriſhed the memory of Caracalla, could not endure the infamy of his ſucceſſor. Heliogabalus was induced by his grandmother to adopt his couſin, Alexander, as his ſucceſſor, whoſe morals the emperor would gladly have corrupted, as a ſort of ſcreen for his own conduct; and when he found himſelf unable to do this, he plotted his deſtruction. His plan did not ſucceed. The Prætorian guards ſwore to protect Alexander, and, in their fury, to revenge the diſhonoured and polluted majeſty of the throne. Heliogabalus was murdered by his own ſoldiers, his mutilated corpſe dragged through the ſtreets of the city, and thrown into the Tyber. His memory was branded with eternal infamy by the ſenate, the juſtice of whoſe decree has been ratified by poſterity. This event happened in the year 222, after a reign of three years and three quarters. Gibbon.

HELIOMETER, formed of ἥλιος, *ſun*, and μετρῶ, *I meaſure*, the name of an inſtrument called alſo *aſtrometer*, invented by M. Bouguer in 1747, for meaſuring with particular exactneſs the diameters of the ſtars, and eſpecially thoſe of the ſun and moon.

This inſtrument is a kind of teleſcope, conſiſting of two object-glaſſes, of equal focal diſtance, placed one of them by the ſide of the other, ſo that the ſame eye-glaſs ſerves for both. The tube of this inſtrument is of a conic form, larger at the upper end, which receives the two object-glaſſes, than at the lower, which is furniſhed with an eye glaſs and micrometer. By the conſtruction of this inſtrument, two diſtinct images of an object are formed in the focus of the eye-glaſs, whoſe diſtance, depending on that of the two object-glaſſes from one another, may be meaſured with great accuracy: nor is it neceſſary that the whole diſk of the ſun or moon come within the field of view, ſince, if the images of only a ſmall part of the diſk be formed by each object-glaſs, the whole diameter may be eaſily computed, by their poſition with reſpect to one another: for, if the object be large, the images will approach, or perhaps lie even over one another; and the object-glaſſes being moveable, the two images may always be brought exactly to touch one another, and the diameter may be computed from the known diſtance of the centres of the two glaſſes; beſides, as this inſtrument has a common micrometer in the focus of the eye-glaſs, when the two images of the ſun or moon are made in part to cover one another, that part which is common to both the images may be meaſured with great exactneſs, as being viewed upon a ground that is only one half leſs luminous than itſelf; whereas, in general, the heavenly bodies are viewed upon a dark ground, and, on that account, are imagined to be larger than they really are. By a ſmall addition to this inſtrument, provided it be of a moderate length, M. Bouguer thought it very poſſible to meaſure angles of three or four degrees, which is of particular conſequence in taking the diſtance of ſtars from the moon. With this inſtrument M. Bouguer, by repeated obſervation, found, that the ſun's vertical diameter, though ſomewhat diminiſhed by the aſtronomical refraction, is longer than the horizontal diameter; and, in aſcertaining this phenomenon, he alſo found, that the upper and lower edges of the ſun's diſk are not ſo equally defined as the other parts; on this account his image appears ſomewhat extended in the vertical direction. This is owing to the decompoſition of light, which is known to conſiſt of rays differently refrangible in its paſſage through our atmoſphere. Thus, the blue and violet rays, which proceed from the upper part of the diſk at the ſame time with thoſe of other colours, are ſomewhat more refracted than the others, and, therefore, ſeem to us to have proceeded from a higher point; whereas, on the contrary, the red rays proceeding from the lower edge of the diſk, being leſs refracted than the others, ſeem to proceed from a lower point; ſo that the vertical diameter is extended, or appears longer than the horizontal diameter. Mem. Acad. Sc. Par. 1748.

Mr. Servington Savery diſcovered a ſimilar method of improving the micrometer, which was communicated to the Royal Society in 1743. See MICROMETER.

HELIOPHILA, in *Botany*, from ἥλιος, *the ſun*, and φιλος, *a friend*, becauſe this genus thrives more particularly in the ſun-ſhine. It was ſo named by profeſſor Burmann, who has deſcribed it in the Tranſactions of the Royal Society at Upſal.—Linn. Gen. 340. Schreb. 443. Willd. Sp. Pl. v. 3. 527. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 397. Juſſ. 238. Lamarck Dict. v. 3. 90. Illuſtr. t. 563: (Chamira; Thunb. Nov. Gen 48.)—Claſs and order, *Tetradynamia Siliquoſa*. Nat. Ord. *Siliquoſæ*, Linn. *Cruciferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of four ſpreading leaves, oblong, concave, membranaceous at the margin, deciduous; the two exterior ones veſiculated at the baſe. *Cor.* of four cruciform petals, which are roundiſh, flat and ſeſſile; nectaries two from the receptacle, recurved towards the veſicle of the calyx. *Stam.* Filaments ſix, awl-ſhaped, erect, as long as the calyx, two oppoſite a little ſhorter; anthers oblong, erect. *Piſt.* Germen ſuperior, cylindrical; ſtyle ſhorter than the germen; ſtigma obtuſe. *Peric.* Pod round, ſomewhat toruloſe, pointed, of two cells and two valves. *Seeds* many.

Eſſ. Ch. Nectaries two, bent back towards the veſicular baſe of the calyx.

Profeſſor Martyn, in his edition of Miller's Dictionary, has enumerated ten ſpecies of *Heliophila*, and Willdenow has deſcribed twelve. They are all natives of the Cape of Good Hope, and it will be ſufficient for us to deſcribe the original ſpecies in order to give a general idea of the genus.

1. H. *integrifolia*. Linn. Sp. Pl. 926. Jacq. Ic. Rar. v. 3. 506. (var.)—"Leaves lanceolate, undivided."—Native of ſtony, uncultivated places at the Cape of Good Hope.—*Leaves* more or leſs hairy above, ſmooth underneath. *Calyx-veſicles* diaphanous. Linnæus has remarked in his *Mantiſſa*, that the *corolla* is blue, ſhutting at night, like flax. *Root* annual. *Stem* round, about ſix inches high, with axillary, aſcending branches. *Lower leaves* oppoſite, lanceolate-linear, thickiſh, undivided, three or four inches long; upper ones alternate, ſhorter. The whole plant is covered with ſlender hairs. *Calyx* yellowiſh. *Petals* of a deep blue or violet colour, white towards the baſe. *Seed* browniſh.

The other ſpecies known are H. *incana*, *amplexicaulis*, *flava*, *caneſcens*, *puſilla*, *filiformis*, *pendula*, *pinnata*, *coronopifolia*, *digitata* and *circæoides*. The laſt is Thunberg's *Chamira cornuta*, and is remarkable among its congeners for the broad heart-ſhaped leaves.

HELIOPOLIS, or *The City of the Sun*, in *Ancient Geography*, a city of Egypt, placed by geographers not far from *Hellé*, at ſome diſtance from the eaſtern point of the Delta. It was built, according to Strabo, on a long artificial mount of earth, ſo as to be out of the reach of the inundation. This cauſeway, covered with rubbiſh, is ſtill viſible two leagues to the N.E. of Grand Cairo, and three from the ſeparation of the Nile. This city had a temple to the ſun, where a particular place was ſet apart for the feeding of the ſacred ox, which was there adored under the name of Mnevis, as he was at Memphis, under that of Apis. There was alſo in this city another magnificent temple in the ancient Egyptian taſte, with avenues of ſphinxes and ſuperb obeliſks before the principal entry. Theſe temples were fallen into decay under the reign of Auguſtus; as the city had been laid waſte with fire and ſword by the fury of Cambyſes. Of the four obeliſks built by Sochis in that town, two were removed to Rome; another has been deſtroyed by the Arabs; and the laſt of them is ſtill ſtanding on its pedeſtal. It is compoſed of a block of Thebaic ſtone, perfectly poliſhed, and is, without including its baſe, 68 feet high, and about 6½ feet wide on each aſpect. They are covered with hieroglyphics. This beautiful monument, and a ſphinx of yellowiſh marble, overſet in the mud, are the only remains of Heliopolis. This city had alſo an oracle of

Apollo, and a college of prieſts ſacriſiced by the barbarity of Cambyſes. Here they obſerved for more than 1000 years the ſtate of the heavens, and ſucceeded in compoſing the ſolar year of 365 days and a few minutes. It was chiefly at Heliopolis that Herodotus became acquainted with the ſciences and the Egyptian myſteries. This city alſo had the honour of teaching philoſophy to Plato, and of accommodating Eudoxus for thirteen years at its college of prieſts, whilſt he was preparing to appear as one of the moſt celebrated aſtronomers of his time. "What now remains to her of all her ſciences," ſays Savary, "of all her monuments? A Perſian barbarian overthrew her temples; a fanatic Arab burnt her books; and one ſolitary obeliſk, raiſed on its ruins, ſays to the paſſengers—*Here ſtood Heliopolis.*"

This city is mentioned in ſcripture (Gen. xli. 45. Ezek. xxx. 17.) and is called און, *on*, in the Hebrew.

Beſides the city above-mentioned, there was another in Egypt, ſituated between Cairo, Coptos, and the Red ſea. From D'Herbelot (Bibl. Or.) we learn, that the Arabian writers call the city of Coos "Ainal Schams," *i. e.* the fountain of the ſun, or Heliopolis, the city of the ſun. According to him it is the ancient Thebes in Upper Egypt; and he ſays, the Arabian geographers place it in lat. 23 30′. Long. 61° 30′. Dapper places Heliopolis 7000 paces E. of Cairo, and near the village of Mattarea, very far from the famous Thebes. It received the name of Heliopolis, as it is ſaid, from having a temple dedicated to the ſun, in which was a looking-glaſs, ſo diſpoſed, that it reflected the rays of that luminary all day long, and enlightened the whole temple with great ſplendour.

Onias, ſon of Onias III., having retired into Egypt, recommended himſelf ſo much to Ptolemy Philometer and his wiſe Cleopatra, as to obtain permiſſion to build a temple at Heliopolis, like that of Jeruſalem, for the uſe of the Jews ſettled in Egypt. (A.M. 3842, B.C. 162.) This temple ſubſiſted in the time of Veſpaſian, who commanded Lupus, governor of Egypt, to ſhut it up. (Joſeph. De Bell. l. vii. c. 37.) Paulinus, who ſucceeded Lupus, ordered it to be deſpoiled of all its ornaments and riches, and the doors to be ſhut, and prohibited religious offices to be performed there. A.M. 3854, B.C. 150.

Heliopolis was alſo a city in Cœle-Syria, between Libanus and Antilibanus, Laodicea and Abila; otherwiſe called *Balbec*, which ſee.

HELIOPOLITES **Nomos**, a nome or province of Egypt, E. of the Nile, between the Aphroditopolite to the N., the Red ſea and Arabia Petræa to the E., and the Bubaſtide nome. It was traverſed lengthways by the canal of Trajan, which communicated with the Nile and the Red ſea by Heroopolis and Babylon.

HELIOSCOPE, in *Optics*, a ſort of teleſcope, peculiarly fitted for viewing and obſerving the ſun, without doing prejudice to the eye.

The word is compounded of ἥλιος, *the ſun*, and σκέπτομαι, *video, ſpecto, I ſee, view, conſider.*

Helioſcopes are neceſſary in viewing the phenomena of the ſun, as his ſpots, eclipſes, &c.

There are various apparatuſes of this kind. As coloured glaſſes are found to diminiſh the force of the ſun's rays, to make a helioſcope, it is enough that both the object-glaſs and the eye-glaſs of the teleſcope be of coloured glaſs; the firſt, *e. gr.* of red, and the latter green.

But as there is a neceſſity for the glaſſes to be very tranſparent and equally coloured, which rarely happens, Hevelius choſe rather to uſe two plain-coloured glaſſes, with a piece of paper between, either tied or cemented together, and applied before the eye-glaſs.

Dr. Hooke, in an expreſs treatiſe on helioſcopes, recommends four reflecting glaſſes placed in the tube: by theſe, he obſerves, the force of the rays will be ſo weakened, as only to ſtrike the eye with a 256th part of their force; and this helioſcope he prefers to all others.

M. Huygens's method is much eaſier; he only blackens the inſide of the eye-glaſs of the teleſcope, by holding it over the flame or ſmoke of a lamp or candle; or, which is yet more commodious, blackens a piece of plain glaſs, and holds it between the eye and the object-glaſs; or, which is the beſt of all, joins the ſmoked glaſs to another, with a rim of thick paper between, to keep the black from rubbing off, and fits the two into a cell or frame; to be applied between the eye and the eye-glaſs.

HELIOSTATA, from ἥλιος, *ſun*, and ἵστημι, *I fix*, the name of an inſtrument invented by Dr. S'Graveſande, and thus called from its property of fixing the ſunbeam in one poſition, *viz.* in a horizontal direction, acroſs the dark chamber whilſt it is uſed.

This is an automaton, or piece of clock-work, conſiſting of the following parts: A A (*Plate* VI. *Optics, fig.* 1.) is a frame in which a metalline ſpeculum S is ſuſpended, moveable about its axis by means of two ſmall ſcrews at *a a*. This frame is fixed to the piece C, which, being hollow, is moveable upon the cylindric ſhaft P about the iron pin *e*. (See the part by itſelf.) This pillar P is fixed to a triangular baſe or foot ſet perpendicularly by the three ſcrews B, B, B.

On the back part of the ſpeculum is fixed a long cylindric wire, or tail D E, in a perpendicular poſition. By this it is connected to the ſecond part of the helioſtata, which is a common twenty-four hour clock, repreſented at H; the plane of which clock is parallel to that of the equator in any given place. This clock is ſuſtained on the column F G, in which it is moveable up and down by a thin lamina or plate that enters it as a caſe, and fixed to a proper height by the ſcrews *d, d*, at the ſide. The whole is truly adjuſted to a perpendicular ſituation by means of the three ſcrews I, I, I, in the tripod L L M, and the plummet Q, whoſe cuſpis muſt anſwer to the point *o* beneath.

The axis of the wheel, which moves the index N O over the hour-circle, is ſomewhat large, and perforated with a cylindric cavity verging a little to a conical figure; and receives the ſhank *p q* of the ſaid index N O very cloſe and tight, that by its motion the index may be carried round. In the extremity O of the index is a ſmall cylindric piece *n*, with a cylindric perforation to receive the tail *t* of the fork T, yet ſo as to admit a free motion therein. In each ſide of the fork are ſeveral holes exactly oppoſite to each other, in which go the ſcrews *r, r*, upon whoſe ſmooth cylindric ends moves the tubular piece R on its auricles *m, m*.

When the machine is to be fixed for uſe, another part is made uſe of to adjuſt it; which is called the *poſitor*, and is denoted by the letters V X Y Z. The cylinder C is removed with the ſpeculum from the foot P, and the braſs column V X put on in its ſtead, and adheres more ſtrictly to the pin *e*, that it may keep its poſition while the machine is conſtituted.

On the top of the column, about X as a centre, moves the lever Y Z, ſo that it may be any-how inclined to the horizon, and keep its poſition. The arm Y Z may be of any length at pleaſure, but the arm Y Z is of a peculiar conſtruction, and of a determinate length. To this arm, which extends no farther than *y*, is adapted a ſliding-piece Z *x* ſharp-pointed at Z. By this the arm X Z is determined to a given length, the piece Z *x* being fixed by the ſcrews *z, z*.

Upon this arm is drawn the ſhort line *v x*, by which it may be lengthened in the whole, and is $\frac{9}{109}$ of the whole length XZ when ſhorteſt. The reaſon is, this arm is always to increaſe and decreaſe in proportion to the ſecant of the ſun's declination to the radius XZ, when ſhorteſt; but the radius is to the ſecant of 23° 30′, (the ſun's greateſt declination,) as 10000000 to 10904411, or as 100 to 109.

Now the reaſon of this conſtruction of the arm XZ is to find for any given day the diſtance of the centre of the ſpeculum S from the top *l* of the ſtyle *l*N, which muſt ever be equal to the ſecant of the ſun's declination; for it muſt always be equal to the diſtance of the top of the ſaid ſtyle *l* from the centre of the cylinder R in the fork T, and that is ever equal to the ſaid ſecant of declination.

For ſince the ſtyle *l*N and the fork T are in a poſition parallel to each other, therefore the middle hole in the ſides of the fork being (as they muſt be) of the ſame height above the end of the index O as is the height of the ſtyle NT, it is evident that on an equinoctial day the ſun's rays will paſs directly through the perforation of the piece R, if it be put in a poſition parallel to the plane of the ecliptic, or that of the clock; and alſo that the top of the ſhadow of the ſame ſtyle will fall exactly on the ſaid hole.

In this caſe the top of the ſtyle is at the leaſt diſtance from the central point of R, and therefore may be repreſented by radius, while in any other poſition above or below, the diſtance will increaſe in proportion to the ſecant of the angle which the rays make with this firſt or middle ray, that paſs by the top of the ſtyle, and through the hole R.

Now it may be demonſtrated, that on any day of the year if the clock and its pedeſtal be ſo fixed that the line of XII be exactly in the meridian, and that the poſition of R in the fork be ſuch, that the ſun's rays go directly through it, and the ſhadow of the ſtyle's top fall juſt upon the hole; moreover, if the diſtance of the centre of the ſpeculum S from the top of the ſtyle *l* be made equal (by the poſitor) to the diſtance of the central point R therefrom; and laſtly, the tail of the ſpeculum DE paſſing through R; if then the clock be put into motion, the index NO ſhall carry about the tail of the ſpeculum in ſuch a manner, that at all times of the day when the ſun can come upon the ſpeculum it will reflect the rays conſtantly in one and the ſame poſition and direction all the time without variation.

The machine thus conſtituted is placed in a box or caſe, and ſet in a window with one ſide open, expoſed to the ſun, and all the other parts cloſe; ſo that when the room is made dark, and the ſolar microſcope fixed to the fore-part of the box in which the helioſtata is placed, juſt againſt the centre of the ſpeculum to receive the reflexed horizontal beam, all the experiments of the darkened room are then performed as uſual. This is a very ingenious conſtruction of a ſolar microſcope apparatus, and full of art, but, it is to be feared, too expenſive and troubleſome for common uſe. However, it is eaſy to ſee that this machine is capable of being greatly reduced; for it may be made to anſwer the end very well without a clock; alſo the ſpeculum may be glaſs inſtead of metal, and all fixed on one foot or pedeſtal.

For a farther account of this inſtrument, the principles of its conſtruction, and its uſe, ſee S'Graveſande's Phyſices Element. Mathematica, &c. tom. ii. p. 715, &c. ed. 3tia. 1742.

HELIOSTROPHUS, in the *Materia Medica*, a name given by ſome of the Greek writers of the later ages to the gum ammoniacum of the ancients, which ſeems to have been a very different thing from what is called gum ammoniacum at this time; it being yellow and friable, our's whitiſh and tough.

HELIOTROPE, HELIOTROPIUM, among the *Ancients*, an inſtrument or machine for ſhewing when the ſun arrived at the tropics and the equinoctial line. This name was alſo uſed for a ſun-dial in general.

HELIOTROPE, in *Mineralogy*, *Silex heliotropius*, Wern. *Jaſpis variegata heliotropius*, Wall. *Heliotrope*, Broch. *Heliotropium*, Kirw. *Eliotropio*, Napion. *vulg. Blood-ſtone*, Engl. *Jaſpe oriental*, *Jaſpe ſanguin*, &c. Fr. *Grüner jaſpis*, *Orientaliſcher jaſpis*, Germ.

The colour of this mineral is green, generally between graſs and leek-green; the depth of the colour is proportionate to the degree of tranſparency: the varieties that are but little tranſlucent are ſometimes blackiſh-green; it alſo occurs of a colour between ſeladon and blueiſh-green, and ſometimes exhibits a mixture of ſeveral of theſe tints unequally diſtributed. The red and yellow ſpots and veins with which it is often marked, are produced by diſſeminated particles of jaſper of thoſe colours.

It is found maſſive and in rounded and angular pieces, with now and then ſmall botroidal ſurface; a ſpecimen before us is furniſhed with many minute globular excreſcences, coated with a yellow ochrey cruſt.

It is hard, but eaſily frangible. Its fracture large and flat-conchoidal, approaching to even; internal luſtre gliſtening, often approaching to reſinous. Fragments indeterminately angular, very ſharp-edged, of different degrees of tranſlucidity, from nearly tranſparent to feebly tranſlucent at the edges.

Specific gravity 2.633, Blumenbach; 2.620—2.700, Kirwan.

The heliotrope is infuſible before the blow-pipe without addition; it only becomes rather more brittle; its green colour is changed into greyiſh-white, or reddiſh-brown, the red ſpots diſappear, leaving ſmall vacuities, with a loſs in weight of 0.01.

Its native places are not well aſcertained. It is well known that the epithet *oriental*, applied to ſtones held in eſtimation, conveys no other meaning than that of ſuperior quality or beauty. It appears, however, to be met with in ſeveral parts of Weſtern Aſia, eſpecially in Perſia; alſo in Egypt, in ſome parts of Italy, eſpecially Sicily, (where it likewiſe occurs with yellow veins,) and in Iceland.

The heliotrope is *uſed* for ornamental purpoſes, and for ſnuff boxes, ſmall veſſels, &c.; nor is it neglected by the glyptic artiſt. See GEMS, *engraved*.

It is probable, that the heliotrope of Pliny, which is deſcribed by this author as a leek-green ſtone traverſed by blood-red veins, is the ſame with our blood-ſtone. It received the Latin name from its ſuppoſed quality of reflecting the ſolar rays blood-red, when immerſed in water.

The green baſe of blood-ſtone, (the grains of red jaſper are accidental,) is an intimate combination of chalcedony with green earth, not with chlorite. The more tranſparent varieties reſemble much the plaſma, and ſome varieties of praſe.

Of its geognoſtic ſituation we know but little; according to the accounts of ſome mineralogiſts it occurs, in a ſimilar manner as chalcedony, in rocks belonging to Werner's fletztrap-formation.

Mr. Accum has given the deſcription and analyſis of an Egyptian heliotrope, which, in its external and phyſical characters, agrees pretty well with the European and Aſiatic varieties already known. By ignition it changed its original colour for chocolate brown, with white and yellow veins, and loſt rather more than $\frac{1}{21}$ of its weight. The 500 grains analyſed by the above chemiſt, conſiſted of

Silex

Silex	365 grains
Alumine	$20\frac{1}{4}$
Oxyd of iron	$29\frac{1}{4}$
Lime	$56\frac{1}{2}$
Water	24
	495
Loſs	5
	500 Nichols. Journ. vol. vi.

HELIOTROPIUM, in *Botany*, ἡλιοτροπιον το μεγα of Dioſcorides, from ἡλιος, *the ſun*, and τροπη, a *turning* or *inclination*, "becauſe," ſays that ancient writer, "it turns its leaves round with the declining ſun." Whether he literally means the leaves of the plant, or the corolla of the flowers, may admit of doubt, but the latter is generally ſuppoſed; yet theſe bloſſoms are too inconſpicuous, and their change of poſition, one would think, too trifling, to have attracted notice on this account, as ſo many common flowers more evidently exhibit the ſame phenomenon. The deſcription of Dioſcorides, however, is preciſe enough, and that of Ovid in his fable of Clytie, though vague, is not contradictory. Yet the *American* Sunflower, ſee HELIANTHUS, commonly ſerves, as in a beautiful picture by Annibal Caracci which has been engraved, to illuſtrate this *Grecian* ſtory. A fine buſt of Iſis, emerging from a flower of the Lotus, which belonged to the late Mr. Townley, was, on its firſt arrival in England, taken, without heſitation, for Clytie changing into a ſun-flower, what is meant for the Lotus, having a great reſemblance to the *Helianthus*. This error, very ſtriking to a botaniſt, was immediately corrected by the excellent Mr. Dryander, whoſe accuracy only exceeded his vaſt knowledge. Richelet, in his French dictionary, though a moſt claſſical writer, confounds the *Tournefol* and the *Soleil* as one and the ſame plant. The latter, nevertheleſs, is the *Helianthus*, the former the *Heliotropium*; or more generally in France, *Croton tinctorium*, which affords the blue dye called *litmus* or *lacmus*, and has nothing in common with the genus *Heliotropium*, except a reſemblance to the ſhape and grey hue of its leaves. See *H. europæum* hereafter.—Linn. Gen. 73. Schreb. 99. Willd. Sp. Pl. v. 1. 740. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. ed. 2. v. 1. 284. Sm. Prodr. Fl. Græc. v. 1. 111. Brown. Prodr. Nov. Holl. 492. Juſſ. 130. Lamarck. Illuſtr. t. 91. Tourn. t. 57. Gærtn. t. 68.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Aſperifoliæ*, Linn. *Borragineæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, with five ſegments, permanent. *Cor.* of one petal, ſalver-ſhaped; tube the length of the calyx; limb flat, half five-cleft, obtuſe, with ſmaller and ſharper ſegments between the larger ones; orifice without valves. *Stam.* Filaments five, very ſhort, in the mouth of the corolla; anthers ſmall, concealed by the tumid or plaited edge of the orifice. *Piſt.* Germens four, ſuperior; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma notched. *Peric.* none; except the upright, permanent, unaltered calyx. *Seeds* four, ovate, pointed, in the bottom of the calyx.

Eſſ. Ch. Corolla ſalver-ſhaped, five-cleft, with intermediate teeth: its mouth without valves. Seeds four, naked.

Obſ. Mr. Brown conſiders the intermediate teeth as not invariably conſtant, and defines the ſtigma as peltate and ſomewhat conical.

The 14th edition of Syſt. Veg. has nine ſpecies, Willdenow 22, to which Mr. Brown adds four, (making Forſkal's *H. ovalifolium* diſtinct from *coromandelianum* of Retzius), which are ſtrictly of this genus; and nine beſides which conſtitute a ſection, or ſub-genus, termed *Orthoſtachys*. Theſe have ſolitary and ſtraight, not twin and revolute ſpikes; the throat of their corolla is bearded within, which in the former is beardleſs; their embryo curved, which in thoſe is ſtraight; and they have moreover a leafy bractea nearly oppoſite to every flower, which the others have not. —On the other hand, Mr. Brown excludes from the genus altogether *H. indicum* of Linnæus, becauſe its fruit is deeply two-lobed, like a mitre, the lobes each ſeparable into two, and each of theſe has two cells, one of which is empty. We ſcarcely think this more thtn a ſlight aberration of ſtructure, in a natural genus. The ſame ingenious author removes *H. malabaricum* of Retzius, and *ſupinum* of Linnæus and Willdenow, from hence, becauſe their tubular calyx has but ſhallow teeth; this, however, we preſume to think, the analogy of the natural order will hardly juſtify. He ſeparates *villoſum* of Willdenow with great propriety, it having, according to Mr. Brown, five awl-ſhaped teeth or valves in the mouth of the flower.

Good examples of this genus are the following.

H. *peruvianum*. Peruvian Turnſole or Heliotrope. Linn. Sp. Pl. 187. Curt. Mag t. 141.—Leaves elliptic-lanceolate. Stem ſhrubbly. Spikes numerous, collected into a corymbus.—Native of Peru. Well known, and generally cultivated, for the delightful almond ſcent of its *flowers*, which are of a blueiſh white, and produced in a ſtove or warm green-houſe at almoſt all ſeaſons. The *ſtem* is a foot or two in height, rough, as well as the *leaves*, which are alternate, rugoſe, ſomewhat crenate, an inch and half, or more, in length, of a dull darkiſh green. The *corolla* is prettily undulated, the *flowers* numerous and cloſe-ſet, redder before they open. It is eaſily propagated by cuttings, but requires a pure air, ſome artificial heat, and in hot weather plenty of water. Miller received the ſeeds about ſixty years ago from the duke d'Ayen afterwards Marechal de Noailles, and was the firſt who raiſed the plant in England.

H. *europæum*. European Turnſole.—Linn. Sp. Pl. 187. Jacq. Auſtr. t. 207.—Leaves ovate, entire, rugged, downy. Spikes in pairs.—Native of the ſouth of Europe. Dr. Sibthorp found it a moſt common weed in the fields and vineyards of the iſlands of the Archipelago, as well as about Athens. This is unqueſtionably the plant of Dioſcorides above-mentioned. His ἡλιοτροπιον το μικρον is probably the *Croton tinctorium*.—The *root* of the *H. europæum* is annual. *Herb* about a foot high, much branched, of a pale greyiſh green and hoary. *Flowers* ſmall and white. Jacquin ſays the intermediate teeth of the corolla are often wanting.

H. *gnaphalodes*. Linn. Sp. Pl. 188. Pluk. Phyt. t. 193. f. 5.—Leaves linear, obtuſe, denſely ſilky. Corolla externally hairy. Stem ſhrubby.—Native of the Weſt Indies. Diſtinguiſhed by its copious, narrow, thick and ſilvery *leaves*. The *flower-ſtalks* are uſually in pairs, terminal.

From Willdenow's enumeration of ſpecies muſt be removed the laſt, *H. pinnatum*, which is more properly deſcribed by Lamarck as *Hydrophyllum magellanicum*, Journ. d'Hiſt. Nat. v. 1. 372. t. 19. Vahl, whom Willdenow copies, ſeems to have made it a *Heliotropium* becauſe Commerſon had done ſo, without adverting to the ſtigmas, which in Commerſon's ſpecimens are evidently deeply divided. Willdenow appears not to have ſeen the *Journal d'Hiſtoire Naturelle*. We take the opportunity of this reference to it to correct an over-ſight of our own, under the article HELENIUM. Lamarck deſcribes in the 2d vol of the Journal, 213. t. 35, *Helenium canaliculatum*; "leaves lanceolate, toothed. Stems ſimple. Florets of the radius channelled."—Its native country is unknown, but the roots were ſuppoſed to have been ſent from the Engliſh gardens to thoſe of Paris. We find a ſpecimen very much like it in the Linnæan herbarium, except having four flowers, in a corymboſe poſition, at the top of the ſtem. This was conſidered as the *autumnale* by Linnæus, nor can we well diſtinguiſh it. Our *longifolium* agrees with Lamarck's figure in the flower, but the long, narrow, nearly entire leaves are very different. We conclude that the different appearances of this genus, whether ſpecies or varieties, are not yet clearly underſtood. S.

HELIOTROPIUM, in *Gardening*, comprehends plants of the ſhrubby, annual, biennial, and herbaceous kinds; of which the ſpecies moſtly cultivated are, the Peruvian turnſole, or heliotrope (H. peruvianum); the Indian turnſole, or heliotrope (H. indicum); the ſmall flowered turnſole, or heliotrope (H. parviflorum); the glaucus turnſole, or heliotrope (H. curaſſaicum); and the Canary heliotrope (H. canarienſe).

The ſecond ſpecies has a variety which is a ſmaller plant, being ſeldom more than two feet in height, with leaves an inch and half in length, and half an inch in breadth; and the ſpikes of the flowers ſlender, and only about two inches long, the flowers being ſmall, and of a light blue colour.

Method of Culture.—The firſt ſpecies is capable of being raiſed by ſowing the well ripened ſeeds, which ſhould be done in the early ſpring ſeaſon, upon a moderate hot-bed, or in pots, which ſhould be plunged in the ſame ſort of bed. As ſoon as the young plants have attained a proper growth, they muſt be removed into ſeparate pots of ſmall ſizes filled with light mould, replunging them in the hot-bed and affording them due ſhade until they have become fully rooted again.

After this they ſhould be gradually inured to the action of the open air, in order to be ſet out in warm ſituations during the ſummer months. But they muſt conſtantly have the protection of a good green-houſe, in the autumn and winter ſeaſons.

This ſpecies is alſo capable of being increaſed by cuttings, which ſhould be planted out in pots of light mould during the ſummer ſeaſon, plunging them in a mild hot-bed immediately afterwards. The cuttings ſoon ſtrike root and form plants, which afterwards require to be managed in the ſame way as the ſeedlings; but they rarely make ſuch good plants.

The three ſucceeding ſpecies may be raiſed by ſowing the perfectly ripened ſeeds in the early ſpring months upon a moderate hot-bed, removing them as the heat declines in it, to another, if there ſhould be a neceſſity; letting them have the general treatment of balſams and other tender annuals, and, about the middle of the ſummer ſeaſon, removing them to the places where they are to flower, with good balls of earth about their roots. In this mode they moſtly ſucceed well.

The laſt ſpecies may be increaſed by planting cuttings of the young ſhoots during the ſummer, in pots, or in a ſhady part of the ground, letting them have water in a pretty free manner. In the latter inſtance, when they are become perfectly rooted, they may be carefully taken up, and be planted out in pots, depoſiting them in ſhady ſituations, until they are again become well rooted.

In their after management they ſtand in need of the protection of the green-houſe during froſty and other ſevere weather, being put with plants of the more hardy green-houſe ſorts, ſuch as thoſe of the myrtle and other ſimilar kinds, which require in mild open weather the free admiſſion of air.

The firſt and laſt ſpecies afford much ornament among the more hardy ſorts of green-houſe plants; and the reſt have a good effect among the more tender flowery plants, either in pots or the borders and clumps of pleaſure grounds.

HELISPHERICAL LINE, in *Navigation*, denotes the rhumb line.

It is thus called, becauſe, on the globe, it winds round the pole helically, *i. e.* ſpirally, and ſtill comes nearer and nearer to it.

HELIX, in *Anatomy*, is the whole circuit or extent of the auricle, or border of the ear outwards.

In oppoſition to which, the inner protuberance ſurrounded thereby, and anſwering thereto, is called *anthelix*.

HELIX is alſo applied, in *Architecture*, to the caulicoles, or little volutes, under the flowers of the Corinthian capital; called alſo *urillæ*. See CAULICOLES.

HELIX, in *Conchology*, a genus of univalves, the animal of which is a limax; the ſhell ſpiral, ſub-diaphanous, and brittle; and the aperture contracted, ſemi-lunar, or roundiſh.

Before the time of Linnæus, the ſhells embodied by that writer, under the name and character above-mentioned, were too indiſcriminately called *cochleæ*, a term applied to the helices of the ſame natural family, and ſome analogous ſhells, in common with others, bearing only a remote reſemblance to them, and that barely in the general form (ſuch as the neritæ and turbines). The early writers, however, divided their *cochleæ* into two families as we find in Liſter, the diſtinction of which is very ſtrongly marked by nature in their inſtinctive habits, namely, the *terreſtrial*, and the *aquatic*; and beſides this, they had ſub-diviſions of the latter, conſiſting of two families, the firſt comprizing thoſe kinds which inhabit the freſh water, and the other the ſea. Theſe diſtinctions were incompatible with the principles of the Linnæan ſyſtem, the foundation of which reſted on external and immediate characters, and they were therefore rejected by that author; but notwithſtanding this, he defined the genus collectively with greater certainty than his predeceſſors, and for this reaſon his character is uſeful. Yet the genus, as he propoſed it, was ſtill too vague and indeterminate, and of this, Linnæus was himſelf ſenſible, for in order to embrace the ſpecies he deſcribes, he was conſtrained to inſtitute many ſections, the very character of which, as he himſelf deſcribes them, prove they are generally different. Various alterations in the diſtribution of the Linnæan ſpecies have been propoſed by ſubſequent writers, ſome of which are to be eſteemed improvements, but it is not to be denied that the inſtitution of ſeveral new genera, and conſequently a new arrangement altogether, would alone enable us to reduce the whole of the diſcordant ſpecies it contains at preſent to lucid order. This is not a new idea. Geoffroy long ſince conſtituted ſeveral diſtinct genera of the Linnæan helices; and the number has been progreſſively increaſed with various amendments and modifications by later writers, as Da Coſta, Fabricius, and Poli, and alſo of late by Müller, Bruguière, Lamarck, Draparnaud, and Latreille. Some of the genera of Geoffroy, as well as thoſe conſtructed recently, are very good, others are obſcure, and, in our own opinion, not altogether neceſſary; while again, if we miſtake not, two or three other new genera might be introduced with ſome advantage and propriety. This may appear obvious to others from a due conſideration of the following new genera, into which the Linnæan helices are now divided.

Helix. The tribe or genus of the Linnæan helices, to which, by the conſent of moſt writers, the name of helix is retained, conſiſts of thoſe ſhells that are ſub-globoſe or orbicular, with the ſpire convex or conoid; and the aperture entire, and roundiſh, or ſomewhat lunar. Theſe are uſually divided into two or three families, according to the form of the ſhell, as conic, globoſe, and ſub-depreſſed. The firſt of theſe ſections is exemplified by the *helix elegans* (Gualt. tab. 1. fig. 0.);—the ſecond by *helix variabilis*, Gualt. *piſana*, Müll.; and *pomatia*, *nemoralis*, and *griſea*, Linn.;—the third by the Linnæan ſpecies algira, and alſo hiſpida and cricetorum.

Helicina is a genus eſtabliſhed by Lamarck upon a ſingle ſpecies deſcribed by Liſter. (Tab. 17. f. 59.) The ſhell of this kind is ſub-globoſe, the opening entire, ſemioval, covered with an operculum; the pillar lip callous, and compreſſed below.

Janthina is another of the ſub-globoſe helices, the ſhell of which is diaphanous; and the opening triangular, with an angular ſinuoſity at the right margin. The Linnæan helix janthina affords an illuſtrative example of this genus.

Ampullaria is a genus formed of the ſpecies helix ampullaria by Lamarck, and which ſeems to form an intermediate tribe between the true helices and the newly inſtituted genus Bulimus. The character conſiſts in the ſhell being globoſe, ventricoſe, umbilicated at the baſe, without any calloſity at the left margin, and having an opening entire, of greater length than breadth.

Bulimus has an oval or oblong ſhell, with the laſt whorl of the ſpire much larger than the one preceding; the opening entire, of greater length than breadth, and the pillar lip ſmooth and not truncated at the baſe. The Gmelinian helix ſepium is ſaid by Boſc to be of this genus. Bulimus is a genus inſtituted by Bruguière.

Lymnæa is a genus eſtabliſhed by Lamarck, and adopted by Draparnaud, being that originally formed by Geoffroy under the name of *buccins*, and which ſeem cloſely allied to the bulimus before-mentioned. The ſhell is oblong, and nearly turrited; the opening entire, of greater length than breadth; and having on the pillar lip a very oblique plait or fold. Some authors divide theſe into two families, according to the height of the ſpire. The Linnæan helix ſtagnalis, and bulimus auricularius of Bruguière, (helix auricularia, Linn.) are both of this genus.

Melenia is diſtinguiſhed by the turrited form of the ſhell; the opening being entire, of greater length than breadth, and widening at the baſe, and the pillar lip without plait or fold. This genus is elucidated by the helix amarula of Linnæus; melania of Lamarck, and bulimus of Bruguière.

Planorbis contains ſuch of the Linnæan helices as are of a diſcoid form with either the ſpire low, flat, or depreſſed; the opening entire, and of greater length than breadth. This is a genus propoſed by Geoffroy, and afterwards adopted by Da Coſta, Müller, and moſt of the late writers. The Linnæan flat freſh water helices, as cornea, ſpirorbis, and planorbis, appertain to this genus.

Theſe appear the moſt material among the newly inſtituted genera of Linnæan helices, and ſuch as we ſhould conceive moſt worthy of being retained, were it in contemplation to form an improved arrangement of the ſpecies compoſing that extenſive genus. Some of the above genera are terreſtrial, reſiding entirely on various kinds of plants, others aquatic, living either partially or ſolely in the ſea; and the remainder inhabit freſh waters.

The animals of certain kinds are pretty clearly aſcertained; others, and thoſe eſpecially that are natives of diſtant climes, are totally unknown. Moſt, if not all the animals of this tribe, unite in each individual the prolific properties of both ſexes, ſubject neverthelеſs to certain modifications which demand the co-operation of another of its ſpecies, in the ſame manner as among animals that are each of one ſex only. The globoſe land helices, ſuch as *hortenſis*, or the garden ſnail, and many others, are known by naturaliſts to be of that deſcription. There is ſome little variation in the mode of courtſhip in particular tribes; among which that of the garden ſnail is by no means the leaſt curious, or deficient in intereſt; and this alſo will ſerve to explain, in a general way, the manners in which the amours of theſe animals are conducted. The pairing ſeaſon happens about May or June, and at this period every individual is furniſhed with a number of little pointed horny darts, contained within a cavity on the right ſide of the neck; and when they approach each other within the ſpace of two or three inches, a ſcene of apparent hoſtility commences, each diſcharging theſe darts with conſiderable force at the other. The battle continues till the reſervoir be exhauſted of theſe offenſive weapons, and then a perfect reconciliation and union takes place. The eggs are about the ſize of peas, and perfectly round. (Brit. Shells, &c.) Something ſimilar to this is obſervable in the courtſhip of other ſpecies. There are ſome, however, in which a difference of manners is perceptible in this reſpect, though none are ſo remote as to afford any reaſonable grounds for believing they are not hermaphrodite. The animals of the globoſe land helices, or ſnails, are ſo familiar as not to require particular deſcription. Thoſe of Lymnæa (all which are of the aquatic kind) have the head furniſhed with two flat tentacula, having the eyes placed at the inner baſe; two triangular ears, and the feet ſmall. In the planorbis which are alike aquatic, the animals have two long filiform horns, at the inner baſe of which are placed the eyes, and their feet are ample.

The following diſtribution of the helices, in which they are conſidered after the Linnæan manner, as conſtituting only a ſingle genus, is nearly in conformity with the arrangement adopted in the Gmelinian Syſtema Naturæ.

Species.

* *Shell roundiſh, and without umbilicus or perforation.*

Hortensis. Shell imperforated, globular, pale with broad interrupted brown bands; lip white. Donov. Br. Shells. *Cochlea vulgaris*, Da Coſta. *Helix hortenſis*, Penn. *H. hortenſis*, Maton and Rackett Linn. Tranſ.—*Helix lucorum*, Pultney.—*Helix aſpera*, Montagu.—*Common garden ſnail.*

The common variety of the garden ſnail is ſo familiar, that it would appear ſuperfluous to enter into its deſcription with minuteneſs; there are, however, few ſhells more variable; it is an inhabitant of Europe, Aſia, and other parts of the world, and in point of ſize, colours, and diſpoſition of its marks, exhibits the moſt inconceivable diverſity; we are ourſelves acquainted with many hundred diſtinct varieties. It may be obſerved generally that the larger, and more beautiful kinds are natives of Aſia and Southern Europe, the ſize gradually diminiſhing, and the colours becoming leſs vigorous as the ſpecies approaches the north. Theſe ſnails feed on all kinds of vegetables, and are conſidered very deſtructive in orchards and gardens; they couple about May or June. Snails are uſed with ſucceſs, it is ſaid, in ſome conſumptive caſes.

Nemoralis. Imperforated, ſub-rotund, thin, pellucid, and banded; aperture ſomewhat roundiſh-lunate. Linn.

Cochlea faſciata, Da Coſta. *Girdled ſnail*, Donov. Brit. Shells.

A general inhabitant of Europe, living among trees and hedges, and in gardens. The breadth is about an inch, the colours variable, the ſpecies affording nearly forty diſtinct and permanent ſpecies. The moſt frequent varieties are thoſe with yellowiſh or browniſh grounds, marked with four or five ſpiral lines or bands of brown; and alſo thoſe of an uniform colour without bands. Thoſe of an uniform pale citron, are rather leſs frequent; and thoſe in which the fleſh colour prevails, either with or without bands, are ſtill more rare. Moſt of the varieties are remarkable for their elegance.

JANTHINA. Shell nearly imperforate, roundiſh, obtuſe, diaphanous, and very brittle; aperture dilated behind, with an emarginate lip. Linn.

An inch in height; colour violet, with a ſub-triangular aperture; animal ſhines by night, and ſtains the hand with a purple or violet dye.

GIGANTEA. Shell imperforate, roundiſh, ſolid, with a depreſſed ſpire. Scopoli.

Shell very large, ſmooth, white, and browniſh within; ſpire yellowiſh, with ſix contiguous whorls, the firſt bay within; lip margined.

VIVIPARA. Shell imperforated, ſub-oval, and obtuſe; olive girdled with about three brown lines; ſpire ventricoſe; mouth ſomewhat orbicular. Donov. Br. Shells. *Helix vivipara*, Linn. *Vivipara faſciata fluviatilis*, Liſt. *Cochlea vivipara*, Da Coſta. *Viviparous water-ſnail.*

Found in ſtagnant waters and rivers in moſt parts of Europe. The ſhell is thin, pellucid, and very finely ſtriated longitudinally; the length from one to two inches; the colour more or leſs inclining to olive, or ſometimes reddiſh, and the bands or ſpiral lines, which are three in number, reddiſh or cheſnut. The head of the animal bears ſome reſemblance to that of a bull, and hence it is called by ſome French writers *limaçon à tête de bœuf.* The ſpecies is viviparous, whence its trivial name, and is ſaid to feed on duck-weed.

FASCIATA. Shell ovate-ventricoſe, white, with three ſhining bands of red. Gualt.

Length from nine to fifteen lines; bands on the firſt whorl three, on the ſecond two; ſpire acute; throat blueiſh-white. Native of Italy.

DISSIMILIS. Shell ſub-ovate, pointed, yellowiſh white, with the lip black. Gmel. *Nerita diſſimilis*, Müll.

Inhabits Tranquebar. The ſhell pellucid, glabrous with ſix whorls, and a pellucid, gloſſy, yellowiſh-brown operculum.

VARIEGATA. Shell imperforate, ſub-ovate, barred, and covered with a brown cuticle; aperture white within. Knorr.

Native of Italy. Shell brown and radiated with white; and marked with yellow white ſpotted bands; or ſometimes reddiſh white with four brown bands undulated with white, and two narrower ones undulated with white on the ſecond whorl.

SOLIDA. Shell imperforated, ſolid, ovate and ſmooth, with ſix round contiguous whorls; pillar thickened. Born.

Length an inch and three lines; ſhell roſy, with very thin red and white interrupted lines.

APERTA. Shell imperforate and ſub-globular, very finely ſtriated longitudinally; whorls three, the firſt ventricoſe; aperture lunar; pillar ſpiral. Chemn.

Prevalent colour brown; country unknown.

GRISEA. Shell imperforated, ſub-ovate, obtuſe, grey, with two pale bands; aperture rather oblong. Gualt.

Reſembles helix pomatia, and inhabits the woods of Europe.

HÆMASTOMA. Shell imperforated, roundiſh, brown, with a longitudinal white band; aperture purple. Seba, &c.

Native of Ceylon; breadth an inch and a half; the ſhell obtuſe, within white, with five round whorls, the firſt twice the ſize of the reſt, the laſt reddiſh.

PULLA. Shell imperforated, ſub-ovate, brown and ſtriped; aperture oblique, margined and whitiſh. Liſt.

Whorls four; the breadth two inches, height an inch and a half. Country unknown.

VENUSTA. Shell imperforated, ſub-ovate, ſulphur colour, with a white band margined with red; lip reflected and margined. Kæmm.

Breadth ten lines, height rather leſs; whorls four, thin, ſmooth, within whitiſh.

PICTA. Shell imperforated, ſub-globular, glabrous, with four round whorls, the firſt ventricoſe, the others depreſſed; aperture lunar. Born.

Inhabits Italy. The ſhell pale cinereous, with a brown pillar, and tranſverſe line at the ſuture; ſometimes roſy, or ſulphur, with a brown pillar and red lines.

VERSICOLOR. Shell imperforated, roundiſh, and tranſverſely ſtriated; whorls round, the firſt ventricoſe; aperture ovate. Born.

Size of helix pomatia; ſhell ſnowy, with tranſverſe parallel brown lines and intermediate ſaffron and roſy bands; pillar roſy.

PERVERSA. Shell ſub-umbilicated, ovate-oblong, and ſulphur colour; whorls reverſed. Liſt. Chemn. &c.

This ſpecies inhabits India, and varies from one to two inches in length, the whorls are from ſix to eight in number, and the difference in colour not unfrequently conſiderable; the prevailing hues are yellow, more or leſs inclining to ſulphur, green, or white, with bands and ſtreaks of brown, or ſpots of reddiſh.

DEXTRA. Shell conic yellow, with a reflected white lip. Martini.

Nearly reſembles the laſt, except that the whorls of the ſpire are not reverſed; the ſhell glabrous, ſulphur, citron, or white, variouſly ſtreaked, or ſpotted with brown and ſometimes plain.

RECTA. Shell conic, a little pointed, whitiſh, with a band and ſtreaks of rufous; lip reflected. Müll.

Length two inches and five lines; whorls ſeven. Native place unknown.

INVERSA. Shell conic, pointed, and reverſed, with a rufous band and ſtreaks; lip reflected. Liſt.

Reſembles the laſt ſpecies, but the whorls are contrary, eight in number, and obliquely ſtriated; aperture ovate, and with the lip white. Length two inches and a half. Inhabits Mauritius and Bourbon iſlands.

INTERRUPTA. Shell conic, pointed, white, with fulvous ſtreaks; lip white and reflected. Chemn.

Country unknown. Shell twenty-two lines in length; whorls ſeven, with a number of tranſverſe tricoloured lines, being fulvous above, rufous beneath, and obſolete in the middle.

JAMAICENSIS. Shell globular, cheſnut-brown, barred with white; lip fringed white; crown obtuſe. Liſt.

Native of Jamaica.

CONTRARIA. Shell conic, pointed, and contrary, white, with undulated interrupted brown ſtreaks; lip reflected. Chemn.

Length fifteen lines; ſhell poliſhed, the extreme tip black; aperture ovate, with pellucid ſtreaks. A rare kind; the country unknown.

Læva. Shell ſub-cylindrical, glabrous, contrary, and barred; lip ſlightly reflected; pillar yellow. Liſt.

White, with from two to ſix rufous bands; length from twelve to ſixteen lines.

Arenaria. Shell gloſſy, whitiſh with very thin longitudinal ſtriæ; ſpire contrary and hemiſpherical. Spengler.

A minute ſhell, found on the ſands of the Armenian ſhores.

Rhodia. Shell ſub-globular, depreſſed, with a concave baſe and lunate aperture. Chemn.

Inhabits Rhode Iſland.

Pudica. Shell oblong, rather wrinkled, and roſy; aperture toothleſs; lip dilated and white. Chemn.

Length twenty lines, poliſhed with a white mouth; aperture ovate-oblong; lip yellowiſh roſy; whorls about ſix.

Labiosa. Shell oblong, poliſhed, and white; aperture toothleſs; lip dilated. Chemn.

Native of India. The length eleven lines; ſhell diaphanous, with eight whorls; aperture ovate; margin of the lip a little jagged.

* * *Shell roundiſh; with an umbilicus or perforation.*

Pomatia. Shell umbilicated, ſub-globoſe, whitiſh faſciated with brown; mouth rather roundiſh-lunate. Donov. Br. Shells. *Helix pomatia*, Linn. *Cochlea pomatia*, Da Coſta. *Pomatia Geſneri*, Liſt. *Edible ſnail.*

This is the largeſt ſpecies of land ſnail in England. When full grown the ſhell is from an inch and a half to two inches in diameter in our climate; on the continent, towards the ſouth, its ſize is much ſuperior. It is found in hedges, woods, and ſimilar ſituations.

The animal of this ſpecies being large and fleſhy, and not of an unpleaſant flavour, has been eſteemed an article of food from early times. It was a favourite diſh with the Romans, who had their cochlearia, or ſnail-ſtews, in which they were bred and fattened. Pliny relates that the firſt inventor of this luxury was Fulvius Harpinus, a little before the civil wars between Cæſar and Pompey. Varro has handed down to us a deſcription of theſe ſtews and the manner of making them: he ſays open places were choſen ſurrounded by water, that the ſnails might not abandon them, and care was taken that the places were not much expoſed to the ſun or to the dews. The ſtews were generally made under rocks or eminencies, whoſe bottoms were watered by lakes or rivers, and if a natural dew or moiſture was not found they formed an artificial one, by bringing a pipe to it bored full of holes, like a watering-pot, by which the place was continually ſprinkled or moiſtened The ſnails required little attention or food, for as they crawled they found it on the floor or area, and on the walls or ſides, if not hindered by the ſurrounding water. They were fed with bran, and ſodden lees of wine, or ſimilar ſubſtances intermixed with a few laurel leaves.

Pliny tells us there were many ſorts of theſe ſnails as whitiſh from Umbria, the large ſort from Dalmatia, the African kind, &c. Varro declares that ſome of theſe ſnails grew to a ſize ſo conſiderable, that one of their ſhells would contain ten quarts, but of what ſpecies theſe might be, we cannot venture to conceive. The helix pomatia is to this day uſed as food in many parts of Europe; eſpecially during Lent, and they are preſerved in ſtews for this purpoſe. In Italy they are commonly ſold in the markets, and are called bavoli, martinacci, and gallinelle. In France, ſays Liſter, they boil them in river water, and ſeaſoning them with ſalt, pepper, and oil, make a hearty repaſt; and this practice continues at the preſent period.

The helix pomatia is not an indigenous, but naturalized ſpecies in Britain, that has throve ſo well in our climate as to be found now in ſome parts in vaſt abundance. It was firſt imported to us from Italy, about the middle of the laſt century, by a *ſcavoir vivre*, as an article of food. Mr. Aubrey informs us, this was a Charles Howard, eſq. of the Arundel family, who, on that account, ſcattered and diſperſed thoſe ſnails all over the downs and in the woods at Albury, an ancient ſeat of that noble family; and alſo near Aſhted, Boxhill, Dorking, Epſom, and Surrey, where they have increaſed ſo greatly, that even the confines of Suſſex abounds with them. His example was followed by others in different parts of the kingdom, but by none with ſo much ſucceſs as by ſir Kenelm Digby, who diſperſed them about Gothurſt, the ſeat of that family near Newport-Pagnel, in Buckinghamſhire. Vide Br. Shells.

Glauca. Shell umbilicated, roundiſh, and pointed; lip margined; aperture oval. Knorr, &c.

Shell pale brown, with four tranſverſe darker bands; aperture yellowiſh. Native place unknown.

Citrina. Shell ſomewhat umbilicated; convex, obtuſe, and yellowiſh, with a brown band. Linn.

Colour ſulphur, with one or two white bands, or a purple yellow, or reddiſh band joined to a white one; whorls five. The ſpecies inhabits the woods of Jamaica.

Castanea. Shell perforated, ſub-globular, dull cheſnut, with a rufous band united to a white one; whorls ſtriated. Chemn.

Shell pellucid, hard, and thick; whorls ſeven; aperture lunate. Country unknown.

Rapa. Shell perforated, ſub-globular, with hollow dots, and a red band; firſt whorl larger, and deflected inwardly above. Chemn.

Shell eight lines in diameter, white, and yellowiſh above.

Globulus. Shell globular, ſub-umbilicated, and white; lip reflected. Liſt.

Glabrous, immaculate, and thickiſh, ſometimes ſlightly ribbed tranſverſely, with five whorls.

Lactea. Shell imperforated, depreſſed, grey with white dots; aperture red-brown; lip the ſame colour, and denticulated. Chemn.

Inhabits Portugal.

Incisa. Shell depreſſed, umbilicated, and white, with cut margin. Favanne. Country unknown.

Arbustorum. Shell umbilicated, convex, and pointed; aperture ſub-orbicular; and a little reflected at the rim; brown, with a ſingle black ſpiral band. Liſt.

Inhabits ſhrubberies and hedges of Europe; ſhell three quarters of an inch in diameter, the colour yellowiſh and brown ſpeckled, with a ſingle dark band; whorls about five.

Fulva. Shell nearly imperforate, globular, pellucid, fulvous, with a white lip. Müll.

Found in the marſhy woods of Denmark. Diameter from one to three lines; ſhell glabrous, and very finely ſtriated tranſverſely; aperture arched and narrow; whorls ſeven. Animal hyaline with black tentacula.

Epistylium. Shell ſub-imperforate, ſomewhat globular, ſtriated, white, with ſeven whorls. Liſt.

Shell twelve lines in diameter, hyaline, beneath flattiſh, and ſmooth; aperture lunate; lip reflected and poliſhed.

Cincta. Shell ſub-imperforate, ſub-globular, white, with rufous lip and bands; whorls five. Müll.

Diameter eighteen lines. Country unknown.

Ligata. Shell ſomewhat imperforate, and ſub-globular, white, with rufous bands; lip white; whorls four.

Native of Italy, and reſembles the former, but is ſmaller. The diameter fourteen inches.

Aspersa. Shell ſub-imperforate, ſub-globular, pale yellow, with four rufous bands interrupted with white ſpots; lip white. Müll.

Rough with minute impreſſed dots; whorls four; aperture elongated. Diameter from twelve to eighteen lines. This ſpecies inhabits Italy.

Extensa. Shell ſub-imperforate, ſub-globular, pale and immaculate; aperture large. Müll.

Diameter ſixteen lines, whorls four; the ſpecies reſemble helix pomatia, but the ſpire is leſs prominent.

Pisana. Shell perforated, globular, white, with ſomewhat interrupted red bands; lip roſy. Müll.

Inhabits Barbary and Italy. The ſpecies has five or ſix bands, and is from five to ſeven lines in diameter.

Nemorensis. Shell perforated, globular, and poliſhed, white with brown bands. Chemn.

Native of India; breadth fifteen lines, and reſembles helix memoralis, but is conſiderably larger, thicker, and harder; ſhell poliſhed and tinged with yellowiſh.

Strigata. Shell perforated, with the crown depreſſed, white with rufous bands, and numerous lines; lip white each ſide. Müll.

Shell poliſhed with ſlightly curved ſtriæ; diameter ten lines. The ſpecies inhabits Italy.

Zonaria. Shell umbilicate, convex, ſlightly depreſſed; aperture rather oblong and margined. Müll.

Native of Europe; the diameter from eleven to thirteen lines; colour whitiſh or yellow, with from one to ſix rufous bands; whorls five, the firſt very ventricoſe. A land ſpecies.

Hispida. Shell umbilicated, convex, hairy, and diaphanous; whorls five; aperture roundiſh-lunated. Linn. *Hiſpid or briſtly ſnail,* Donov. Br. Shells.

Breadth about half an inch, convex, gloſſy, very thin, and brown or horn colour. When the animal is alive the ſhell is of a dark red colour, approaching to black, and is very elegantly beſet all over with minute, ſhort, white briſtles, or hairs, which eaſily rub off when the animal dies. Found at the bottoms of trees, among moſs; in woods, and wet ſhady places.

Ericetorum. Shell umbilicated, depreſſed, and yellowiſh, with one or more fuſcous bands. Müll. *Cochlea compreſſa,* &c. Liſter. *Helix albella.* Penn. *Heath ſnail,* Donov. Br. Shells.

Found on heaths and ſandy ſoils, and is very common in various parts of Europe. When full grown, this ſhell is three quarters of an inch in breadth, and one-third of an inch in height; the ſpire flat; outermoſt wreath very convex beneath, and the umbilicus central, large, and deep; mouth circular. The young ſhells are quite plain, whitiſh, or horn colour, and ſemi-tranſparent. In the adult ſtate marked with one or more ſpiral bands or lines of brown.

Arbustorum. Shell umbilicated and convex, with a ſingle dark ſpiral band; aperture ſomewhat orbicular; lip reflected. Donov. Br. Shells.—*Helix arbuſtorum,* Linn. —*Cochlea maculata,* &c. Liſt. *Cochlea unifaſciata,* Da Coſta.

A ſpecies about an inch in breadth or rather leſs, found in coppices and ſhrubberies in England, and other parts of Europe, but not very commonly; the colours, as in the ſpecies nemoralis and hortenſis, are variable, but it may pretty uniformly be diſtinguiſhed by the ſingle narrow ſpiral band. We have ſometimes met with it in woods.

Zonaria. Shell umbilicated, convex, rather depreſſed, and ſtriped; aperture rather oblong and margined. Linn. *Cochlea virgata,* Da Coſta. *Striped ſnail,* Donov. Br. Shells.

Inhabits dry ſandy heaths and banks. The diameter from half to three quarters of an inch; ſtripes or zones various.

Rufescens. Shell umbilicated, and ſtreaked with pale reddiſh. Donov. Br. Shells. *Cochlea dilute rufeſcens,* &c. Liſt. *Cochlea umbilicata,* &c. Da Coſta.

"This ſhell is about half an inch in diameter, and is readily diſtinguiſhed by a ſlight carination, or ridge that ſurrounds the firſt or largeſt wreath of the ſhell. The colour, as the name implies, is reddiſh when the animal is alive, and after its death whitiſh and diſcoloured; the carena is uſually paler than the reſt of the ſhell." Da Coſta ſpeaks of this ſpecies as being not very common, obſerving, at the ſame time, that he had received it from Cornwall and Hampſhire; and it is pretty frequent, he adds, about Leeſwood in Flintſhire, between the bark and wood of trees thrown down and decayed, the alders eſpecially. Dr. Liſter found it in plenty about Tadcaſter, &c.—"To this we ſhould add, that the ſpecies appears to be more frequent in many parts of Britain than is generally imagined. It delights chiefly in marſhy places." Br. Shells, v. 5.

Pallida. Shell inflated, ſlightly umbilicated, fragile, and pale; whorls ſix, and convex; aperture ſemi-lunar. Donov. Br. Shells.—*Helix cantiana,* Maton and Rackett. Linn. Tranſ.

Rather a local ſpecies found chiefly in Kent. It is ſaid to have been firſt noticed by Liſter as an inhabitant of that county. Since that period it has been met with at Spetiſbury in Dorſet, and Alton, Hants, by the Rev. Thomas Rackett; and by ourſelves at Caerwent in Monmouthſhire. Vide Donov. Tour South Wales.

Nitens. Shell umbilicated, ſub-depreſſed, fulvous horny, or yellowiſh green, pellucid, and ſub-ſtriated, aperture large. Gmel.

Inhabits damp woods of Europe. The ſhell brittle, thin, and pellucid; aperture ſemi-lunar, with an acute margin; whorls four or five.

Costata. Shell ſomewhat depreſſed, umbilicated, and cinereous; whorls ribbed; aperture circular, with a white reflected lip. Müll.

A rare ſpecies, found in the high lands of Denmark; diameter one line; ſhell rather convex, and opaque; whorls four, and tranſverſely plaited.

Pulchella. Shell umbilicate, and ſub-depreſſed; aperture circular; lip white and reflected. Geoffr. &c.

Found in the moiſt woods of Denmark; ſize of the laſt; whorls four; animal white.

Rotundata. Shell umbilicated and ſub-depreſſed, with elevated tranſverſe lines, and ſpots of ferruginous. Schroet. &c.

Inhabits ſame ſituations as the laſt, and is very common in France, Germany, and Denmark. Breadth two lines and a half; the ſhell white, beneath convex with ſquare ſpots, or ſometimes none; whorls from four to ſix; aperture arched, and without pillar lip. Animal white, with obſcure ſpots above, and black head and tentacula.

Cellaria. Shell umbilicate, depreſſed, yellowiſh, poliſhed, beneath white; aperture large. Schroet.

Breadth three lines and a half; ſurface glabrous, pellucid, beneath convex; whorls five; aperture lunated. Animal white, pellucid, with a black eye, and blue optic nerve. Inhabits Germany.

Obvoluta. Shell umbilicated, depreſſed both ſides; whorls obvolute. Müll.

Inhabits Italy and Thuringia. Diameter four or five lines.

Strigosula. Shell perforated, ſub-depreſſed, and ſtriated, white with a rufous band. Müll.

Breadth five lines ; ſhell convex, with about ſix whorls ; lip thickiſh and white. Inhabits France.

RADIATA. Shell perforated, depreſſed, and ſtriated ; beneath convex and radiated. Liſt.

Inhabits the South of France. This ſhell is thick, externally variegated with rufous and white, within white ; aperture lunate, and without pillar lip.

LACUNA. Shell umbilicated, ſub-globoſe ; whorls tumid and ſmooth, the firſt very ventricoſe ; pillar ſinuate. *Helix lacuna*, Montagu.

A marine ſhell ; length one quarter of an inch, thin, pellucid, and pale horny.

CRYSTALLINA. Shell perforated, depreſſed, gloſſy-white, and diaphanous. Müll.

A rare kind, found among moſs in Denmark ; breadth a line, beneath convex ; with from four to five whorls.

UNGULINA. Shell umbilicated and convex ; the aperture margined, ſub-orbicular and elongated above. Linn. *Lapillus*, Rumpf.—*Planorbis indica*, Petiv.

Breadth ſixteen lines, and general form reſembling an apple ; the ſhell yellowiſh, rufous, glabrous, and poliſhed; the upper part a little depreſſed, finely ſtriated tranſverſely ; mouth purple and lip white. Native of India.

VARICA. Shell globular, umbilicated, and whitiſh-yellow ; whorls contrary, the outermoſt divaricated. Müll.

Hard, rather pellucid, with five rounded whorls, the firſt ventricoſe ; aperture with an acute margin. Breadth nineteen lines. Country unknown.

FRUTICUM. Shell globular and umbilicated ; aperture without pillar-lip. Schroet.

Inhabits the hedges of Denmark and Thuringia ; breadth ſeven lines and a half ; ſhell rather pellucid, with ſix whorls ; colour pale yellow, with ſcattered gold dots, or blackiſh ſpots and dots ; ſometimes yellow with a purple band, or brown with black ſpots. Animal white, or various ſhades of black, and dark tentacula.

LUCENA. Shell ſub-globular, umbilicated, beneath gibbous ; lip reflected and white. Chemn.

Shell pellucid glabrous, ſometimes entirely white, ſometimes yellowiſh above ; whorls five, the firſt very convex ; aperture lunate. Country unknown.

VITTATA. Shell ſub-globular and ſub-umblicated, white with crowded cheſnut bands, and blue crown ; lip reflected and white. Chemn.

Inhabits Coromandel ; the ſhell opaque, with a ligneous appearance, marked with concentric veins ; whorls five ; aperture black-brown, with an acute lip ; diameter nine lines.

ROSACEA. Shell ſub-globular, and ſomewhat umbilicated ; fleſh-coloured, and tranſverſely ſtriated ; lip reflected and brown. Müll.

Reſembles H. pomatia, ventricoſe with five whorls, and lunate roſy aperture ; breadth nineteen lines.

ITALA. Shell umbilicated, convex, and obtuſe, with five whorls ; umbilicus wide ; aperture ſub-orbicular, Gmel.

A terreſtrial ſpecies found in ſouthern Europe ; ſhell the ſize of a nut, whitiſh, with a brown band.

LUSITANICA. Shell umbilicated, perforated, convex, obtuſe, with five rounded yellowiſh white whorls ; umbilicus ſpreading. Gmel.

Inhabits ſame countries as the laſt ; the ſpecies of one colour, and the ſize of a ſmall apple.

MAMMILLARIS. Shell umbilicated and ovate, with three ſtriated whorls ; aperture ovate and united to the tip. Argenv.

Inhabits the rivers of Africa ; the ſhell with fine tranſverſe crowded ſtriæ, and remoter longitudinal ones ; aperture large.

HISPANA. Shell umbilicated, convex, with five round whorls ; umbilicus thin and perforated ; aperture ſub-orbicular. Gmel.

Native of Southern Europe ; ſhell horn colour.

LUTARIA. Shell umbilicated, ovate-oblong, internally more coloured ; aperture ſub-ovate. Linn.

Country unknown. The ſurface very finely ſtriated ; umbilicus oblique ; aperture white within.

OVALIS. Shell perforate, ovate, ventricoſe, and ſtreaked ; tip ribbed, and with the lip roſy ; pillar white. Chemn.

Length about four inches, thick, pale yellow, with roſy clavicles ; whorls ſix ; aperture oval.

OBLONGA. Shell perforated, ovate-oblong, and ſtriated, with lip and pillar roſy. Liſt. Seba, &c.

Native of South America and India. Length three inches, colour pale or yellowiſh-white, with ſix whorls ; aperture oval. The animal cinereous, varied with lighter and darker ſhades, and ſtreaks tinged with blueiſh and roſe-colour. The eggs are covered with a hard calcareous ſhell, and in form reſemble thoſe of the ſparrow.

FLAMMEA. Shell perforated, oblong, and white with longitudinal rufous bands ; pillar lip reflected and ſtraight. Adanſ.

Inhabits Guinea ; the ſhell thin, pellucid, and glabrous, with waved bands, and eight or nine equally decreaſing whorls ; lip gloſſy white.

PILEUS. Shell top-ſhaped, white, with rufous bands ; aperture tranſverſe and large ; lip a little reflected. Chemn.

Length fifteen lines ; bands from three to five ; whorls ſix. Country unknown.

NUCLEATA. Shell top-ſhaped, umbilicated, convex both ſides, brown, with prickly ribs ; lip whitiſh. Chemn.

Inhabits the woods of Denmark. The ſhell ſub-pellucid, with four rounded whorls, on each of which are from twenty-eight to thirty whitiſh ribs ; lip a little reflected and membranaceous. Animal hyaline, with head and tentacula black. Breadth three-fourths of a line.

VOLVULUS. Shell top-ſhaped, umbilicated, acuminated, and variegated ; aperture circinated ; lip reflected. Liſt..

Shell from eleven to twenty-two lines in breadth, the ſurface poliſhed, glabrous, and ſomewhat ſtriated ; colour varied, yellow rufous and brown, with a broad deeper band.

INVOLVULUS. Shell top-ſhaped, umbilicated, and pointed ; white, with ſpiral convex ſtriæ ; aperture circinate ; lip reflected. Born, &c.

Breadth thirteen lines, the ſurface very finely ſtriated longitudinally, and ſpotted and banded with rufous.

NERITINA. Shell glabrous, rather hard, and umbilicated ; cheſnut with white bands ; whorls flat beneath ; aperture ovate-oblong. Kæmm.

Length an inch. The country unknown.

TURTURUM. Shell umbilicated, rounded, and thin, with a ſemi-lunar aperture. Liſt.

Inhabits the woods of Europe.

OLIVETORUM. Shell umbilicated, a little depreſſed, and yellow ; aperture compreſſed ; firſt whorl flattiſh round. Gualt.

Native of Florence, where it inhabits olive groves.

BADIA. Shell umbilicated, ſub-globular and ſmooth ; above depreſſed ; aperture lunar. Born.

Height one inch, the breadth an inch and a half ; and the colour cheſnut.

Cretacea. Shell ſomewhat umbilicated, ſmooth, whitiſh with brown bands; whorls convex; aperture lunated. Born.

Height ten lines, the breadth rather more than one inch.

Pileata. Shell ſub-umbilicated and conic, white with cheſnut bands; aperture ſemi-lunar; tip obtuſe.

Fuscescens. Shell rounded, ſub-umbilicated, and thin, with a ſemi-lunar aperture. Schroet.

Colour brown, white, and margaritaceous, often barred with duſky. Inhabits Thuringia.

Crepuscularis. Shell umbilicated, depreſſed and white, with ſix rounded whorls, the third and fourth brown, the laſt reddiſh at the tip; aperture ſemi-lunar and ſmooth. Martini.

Native of Guinea; ſolid, with a ſub-pyramidal ſpire.

Terrestris. Shell umbilicated, with an obtuſely mucronate ſpire; the firſt whorl very large, the reſt gradually decreaſing; aperture ſemi-lunar, and margined. Schroet.

Dull fleſh-colour, or whitiſh with ſix whorls.

Nivea. Shell rounded, umbilicated, thin, gloſſy-white; aperture ſemi-lunar. Schroet.

Reſembles the laſt, but is more rounded.

Media. Shell flat both ſides, umbilicated, with ſix whorls, the firſt round; aperture ſub-orbicular. Schroet.

White, ſometimes barred with brown. Inhabits Germany.

Tenella. Shell umbilicate, very thin, flat, poliſhed, and convex above; aperture ſemi-lunar and compreſſed. Schroet.

A land ſpecies; ſhell white, teſtaceous, horny, or margaritaceous; whorls five contiguous.

Avellana. Shell umbilicated, obtuſely ſub-triangular, rough, plaited, and ſilvery within; aperture ſmooth eared, the firſt whorl with an elevated circle. Spengl.

Size and colour of a nut, the pillar lip white. The ſpecies inhabits the Southern ocean.

Rufescens. Shell inflated, ſub-umbilicated, fragile, with five whorls, the firſt very large and ſub-compreſſed, the reſt convex: aperture ſemi-lunar. Schroet.

Inhabits the rivers of Hamburgh; breadth ſix lines, colour reddiſh with cheſnut ſpots.

Pervia. Shell umbilicated, obtuſely ſub-pyramidal, with four convex whorls, the firſt with an elevated circle, the reſt with a groove; aperture ſemi-lunar. Schroet.

A minute ſpecies; the country unknown.

Lævissima. Shell umbilicated oblong, with ſmooth round whorls; aperture orbicular. Schroet.

Reſembles the laſt.

Fascicularis. Shell umbilicated and pellucid, with three whorls divided by a groove; aperture orbicular and without margin. Schroet.

Inhabits the waters of France, and is very rare; the ſhell broad and duſky; animal furniſhed with a creſt, and two tentacula.

Tennis. Shell umbilicated, pellucid, horny, tranſverſely ſtriated and convex, with ſix gradually decreaſing whorls, and ſemi-lunar aperture. Shroet.

Diameter from four to five lines.

Holosericea. Shell umbilicated, depreſſed, a little concave above, the firſt whorls villous and flat; aperture triangular and margined. Gualt.

Inhabits the waters of France, Switzerland, and Thuringia. The breadth half an inch; whorls ſix; aperture with a reddiſh or white margin within.

Turgida. Shell thin, fragile, white, and umbilicated with fainter bands; firſt whorl round and inflated; aperture ſub-orbicular and not margined. Schroet.

Breadth three quarters of an inch; bands about eight; whorls ſix. The ſpecies inhabits the waters of Hamburgh.

Coriacea. Shell cartilaginous, horny, pale yellow, ſub-pellucid, and gibbous; ſpire ſimple, with circular ſtriæ. Pallas.

Inhabits the Kurile iſlands. The ſpire covered with a calcareous cruſt within.

Cornu venatorium. Shell depreſſed and deeply umbilicated. Chemn.

A terreſtrial ſpecies, found on the leaves and branches of trees in Senegal.

Elegans. Shell pyramidal, white, and umbilicated, with ſix acute flattiſh margined whorls. Favanne.

Native of Barbary and ſouthern Europe; a land ſpecies.

Cookiana. Shell pyramidal, ſmooth white, and obtuſe, with a convex imperforated baſe. Chemn.

Inhabits the South Sea Iſlands.

Bidentata. Shell pyramidal, and ſub-carinated, banded and very minutely ſtriated with a two-toothed reflected lip. Chemn.

Found in the botanic garden at Straſburgh.

Turbo. Shell pyramidal and ſub-imperforate, varied with yellow and rufous. Chemn.

Native of Coromandel.

Trifasciata. Shell conic-ovate, white with three browniſh bands on the firſt whorl; aperture fringed with a dilated white lip. Liſt.

A land ſpecies found in Tranquebar.

Bontia. Shell conic-ventricoſe, perforated, pellucid with a black tip; firſt whorl with three yellowiſh bands; aperture ovate. Chemn.

Shell very brittle. Native of Bengal.

Trochoides. Shell top-ſhaped, perforated, poliſhed, longitudinally ſtriated; whorls contrary, the firſt carinated; aperture angular; pillar cheſnut brown. Chemn.

Country unknown.

Tomentosa. Shell umbilicated, with three briſtly whorls, and roundiſh aperture. Linn. Tranſ.

This and the four following are minute ſpecies found by Mr. Adams on the coaſt of Pembrokeſhire. H. tomentoſa is found in boggy ground.

Fasciata. Shell ſub-umbilicated, with three longitudinally ſtriated whorls; the firſt more ventricoſe; aperture dilated. Linn. Tranſ.

Colour white, pellucid, with three dark belts, the middle one broadeſt. Sands at Tenby.

Nitidissima. Shell umbilicated, with two whorls very finely ſtriated tranſverſely. Linn. Tranſ.

Horny, pellucid, with a brilliant gloſs.

Bicolor. Shell ſlightly umbilicated, and ſmooth with two whorls. Linn. Tranſ.

Reſembles the laſt, but is ſmooth, and not gloſſy; within white.

Tubulata. Shell with three longitudinally ſtriated whorls, and a margined tube at the baſe. Linn. Tranſ.

Probably not of this genus; the ſhell is ſaid to have a ſingular margined tube inſtead of umbilicus extending beyond the ſurface of the ſhell.

Ampullacea. Shell ſomewhat umbilicated, ſub-globular, and glabrous, the whorls more ventricoſe above; aperture very large, ovate oblong; umbilicus nearly covered Liſt. *Nerita*, &c. Müll.

Native of Aſia and America, and is from one to five inches in diameter, with the firſt whorl very large; the ſurface poliſhed, yellowiſh or brown, with a few bands in general; the animal edible.

Piscinalis. Shell globular, perforated, and reddiſh brown. *Nerita piſcinalis*, Müll.

Rather hard, opaque, very finely ſtriated tranſverſely, and the whorls four in number. The ſpecies inhabits fiſh-ponds in Denmark.

Pusilla. Shell globular, perforated, greeniſh; aperture rolled ſpirally inwards. *Nerita puſilla*, Müll.

Reſembles the laſt except in being ſmaller, and inhabits the lakes of Germany.

Sphærica. Shell globular, horny, with an obtuſe crown. Gmel. *Nerita ſphærica*, Müll.

Diameter from one to two lines; the ſhell white, or cinereous, immaculate, and glabrous, with four convex whorls, the firſt ventricoſe. Found in the ſeas of Denmark.

Cornua arietis. Shell umbilicate, flattiſh, with an oval aperture. Linn. *Planorbis contrarius*, Müll. *Cochlea marina compreſſa*, Liſter.

Shell an inch or rather more in diameter; white, with from three to ſeven bands of red; hard and finely ſtriated tranſverſely. Inhabits China.

Cornea. Shell above umbilicated, flat, and blackiſh, with four rounded whorls. Linn. *Planorbis fluviatilis major vulgaris*, Petiv. *Flat whirl*, Grew. *Purpura*, Liſt. *Horny, or ram's horn ſnail*, Donov. Br. Shells.

The adult ſhells of this ſpecies are from three quarters of an inch to an inch and a quarter in diameter; the colours various, generally browniſh or aſhen colour, inclining in ſome to red, in others to yellow; the young ſhells are whitiſh and more tranſparent. It is very common in ponds and rivers in Europe. Helix nana or dwarf of Pennant is conſidered by Da Coſta and other conchologiſts as a young ſhell of this ſpecies.

The animal of this ſpecies is blackiſh, and emits a fine ſcarlet dye, if a grain of ſalt or pepper be put into the mouth of the ſhell; and this may be obtained at any ſeaſon of the year, but in the greater perfection in April and September. This is deſcribed at length by Dr. Liſter. The ſcarlet humour, he ſays, may be readily got, and in large quantity, if a large parcel of theſe ſhells be wrapt up in a cloth bag, and ſprinkling over it a little ſalt, which will cauſe the ſcarlet liquor to ooze out plentifully. This colour, it is aſcertained however from repeated experiment, is ſo evaneſcent that no acid or aſtringent has been hitherto found ſufficient to preſerve the elegance of its tint. Vide Britiſh Shells, vol. 2.

Spirorbis. Shell concave each ſide, flat, whitiſh, with five rounded whorls. Martini.

Found in the waters of Europe, eſpecially thoſe of France and Germany. The ſhell is a line and a half in diameter, pellucid, yellowiſh, and obſoletely ſtriated; whorls four or five; aperture ſlightly labiated.

Polygyra. Shell flattiſh and orbicular; aperture oval; lip fringed. Born.

Country unknown.

Contorta. Shell thick, ſomewhat umbilicated and flattiſh; aperture narrow and creſcent-ſhaped. Donov. Br. Shells. *Helix contorta*, Linn. *Tiney many-circled, thick, river cheeſe ſhell*, Petiv. *Planorbis craſſa*. &c. Da Coſta.

An aquatic ſpecies, lately found in the river Thames. Da Coſta miſtook it for the Linnæan helix complanata. The ſhell is rare, the colour whitiſh, or clouded with brown, and the diameter about a quarter of an inch. Animal grey, with tentacula edged with white.

Nitida. Shell poliſhed, yellowiſh, above convex, umbilicated, beneath flat, and perforated. Mart.

Length from one to three lines in diameter; the ſhell brown in general, diaphanous, and highly poliſhed; whorls from three to five, the outermoſt much broader than the reſt; aperture heart-ſhaped. Animal black, the tentacula white at the tip. Inhabits ditches in Denmark.

Alba. Shell white, umbilicated each ſide; aperture dilated. Martini.

Found on aquatic plants in Denmark. The ſhell is pellucid, flattiſh above, beneath convex; whorls four, round, the outer larger than the reſt, and the whole decuſſated with fine ſtriæ; aperture large and oblique. The animal grey, with white tentacula, and black eyes.

Similis. Shell pellucid, umbilicated above, and ſtriated with dots. Martini.

Inhabits the ditches of Berlin and Denmark.

*** *Shell angulated each ſide.*

Scarabæus. Shell ſomewhat umbilicate, ovate, with both edges carinated; aperture toothed. *Helix ſcarabæus*, Linn. *Helix* (*pythia*) Müll. *Cochlea imbrium*, Rumpf.

Length an inch and a half, the colour white and brown variegated; whorls contiguous, the firſt convex; aperture narrow, compreſſed, and rather flexuous; lip three-toothed, the outer lip acute and unequal. Inhabits mountains in Aſia.

**** *Whorls with a carinated acute margin.*

Lapicida. Shell umbilicated, and convex each ſide; aperture tranſverſe, margined and ovate. Linn. Müll. Donov. Br. Shells, &c.

Found in woods, hedges, the bodies of old trees and ſtones in Britain and ſome other parts of Europe. The ſhell is reddiſh horn colour, with whitiſh and ferruginous marks; whorls five; umbilicus pervious. The diameter of the ſhell about half an inch.

Marginata. Shell ſomewhat umbilicated, and a little depreſſed, obliquely ſtriated with rufous bands; aperture tranſverſe. Müll.

Native place unknown. This ſpecies is convex above, beneath flattiſh; whorls four and glabrous, the firſt with three bands, the reſt with two; aperture ſub-triangular.

Cicatricosa. Shell umbilicated, ſomewhat depreſſed, wrinkled, and yellowiſh with concentric rufous lines; whorls contrary. Müll.

Shell thin and pellucid, above convex, beneath gibbous: whorls five; the outermoſt with rufous bands; umbilicus pervious; aperture nearly ſquare, within white. Diameter three quarters of an inch. Country unknown.

Ægophthalmos. Shell umbilicate, a little depreſſed, greeniſh, without ſpots, and with ſeven whorls. Gmel.

Shell horny, finely ſtriated, and ſlightly carinated when young; umbilicus pervious; aperture lunate; mouth white. Diameter one inch. The ſpecies inhabits India, Barbary, and South America.

Oculus capri. Shell ſomewhat carinated, umbilicated, and convex; aperture margined. Argenv.

Shell glabrous, whitiſh, with the centre brown; whorls rather depreſſed, and yellowiſh brown; aperture white, beneath yellow. Inhabits trees in Aſia.

Maculata. Shell perforated, flattiſh, ſub-carinated, white dotted with brown, beneath gibbous, with linear bands Müll.

Whitiſh with two bands of brown dots; whorls three. Diameter rather leſs than half an inch. Country unknown.

Albella. Shell umbilicated and flattiſh, beneath gibbous; aperture ſomewhat heart-ſhaped. Linn.

A ſmall ſpecies, being about five lines and a half in length, found on rocks and dry ſandy banks of Europe; the ſhell is glabrous and white, without ſpots; whorls five; rounded on the outſide, and very finely ſtriated tranſverſely.

Albina. Shell perforated, flattiſh, and white, beneath gibbous; aperture quadrangular. Müll.

Reſembles H. albella, and may be only a variety of that ſpecies: the whorls are three, and the diameter one-fourth part of an inch.

Striatula. Shell ſub-carinated, umbilicated, convex, and ſtriated, beneath more gibbous; aperture roundiſh lunulate. Gmel.

Grey or whitiſh, and very finely ſtriated tranſverſely; whorls four or five. A ſmall ſhell, found, according to Brander, in the waterfalls of Lombardy.

Algira. Shell ſomewhat angular, umbilicated, and convex, with ſix whorls; umbilicus pervious. Favanne.

Native of Mauritiana. The ſpire of the ſhell has ſix whorls, which are obſoletely angulated; the perforation much dilated.

Leucas. Shell ſub-carinated, umbilicated, convex, and ſmooth; beneath gibbous; umbilicus very minute; aperture roundiſh lunate. Gmel.

Shell whitiſh, with a purple band above and lines of the ſame beneath. The ſpecies is found in Africa.

Exilis. Shell perforated, depreſſed, and ſub-carinated, pale with a rufous band united to a white one; whorls ſtriated. Chemn.

Native of Tranquebar; the ſhell pellucid, thin, beneath convex; whorls five, aperture with an acute margin. Diameter 10 lines.

Lævipes. Shell perforated, ſub-depreſſed, and ſomewhat carinated contrary; pale with a rufous band united to a white one. Müll.

Country unknown; the ſhell pellucid, thin, beneath more convex; whorls five, very finely ſtriated tranſverſely; aperture with an acute margin. Diameter three quarters of an inch.

Vermiculata. Shell ſub-globoſe, depreſſed, rough, and imperforated; dotted with white, with four browniſh bands; lip reflected and white. Chemn.

Inhabits Italy and Luſitania.

Candida. Shell umbilicate, each ſide convex; aperture not margined. Kæmmer.

Reſembles lapicida, but is thinner; the height five lines, breadth ten lines; umbilicus narrower. Country unknown.

Spadicea. Shell perforated and ſub-depreſſed, umbilicated and cheſnut, with five whorls. Gmel.

Height ſeven lines, breadth 11; umbilicus and margin of the lip whitiſh. Country unknown.

Incarnata. Shell perforated, ſub-globoſe, ſomewhat carinated and horny; whorls ſix; lip fleſh colour. Müll.

A rare ſpecies, about ſix lines in length, found in the woods of Denmark and Germany: this ſhell is immaculate, with a pale edge and very narrow perforation.

Crenulata. Shell perforated, globoſe, ſub-carinated, ſtriated, and white with a brown band. Liſt.

Inhabits Lyons. Shell three lines and a half wide; the tip brown; lip acute; whorls five in number.

Sericea. Shell perforated, ſub-globoſe, ſomewhat carinated, each ſide convex and downy. Müll.

Native of Denmark, where it inhabits gardens: the ſhell is horny, tranſparent, with a pale ridge, and three lines in diameter.

Planorbis. Shell ſub-carinated, umbilicated, flat, above concave; aperture oblique, ovate, and acute each ſide. Linn. Donov. Br. Shells.

A ſmall ſpecies of a pellucid horny colour that inhabits the ponds and rivers of Europe; the whorls are from four to five in number, the firſt much larger than the reſt.

Complanata. Shell carinated downwards, umbilicated, and convex, beneath flat; aperture ſemi-cordated. Müll. Donov. Br. Shells.

Like the laſt, inhabits watery places: the animal black with rufous tentacula; ſhell brown, ſub-pellucid, and very finely ſtriated tranſverſely; whorls five or ſix. Native of Europe.

Ringens. Shell ſub-carinated, imperforated, and convex, with an inverted ringent aperture; lip four-plaited behind. Gmel.

A rare ſpecies, found in India; the breadth an inch and a half; colour yellowiſh-brown, or cinereous, with ferruginous ſpots, or white with ſpots of brown; aperture oblong-oval, with from four to eight paits; whorls about ſix.

Lucerna. Shell imperforate, white, above flattiſh, beneath gibbous; aperture tranſverſe and bidentated. Müll.

The native place of this ſpecies is unknown; the breadth rather exceeds an inch; the colour white, ſurface not ſtriated, and the whorls much depreſſed.

Sinuata. Shell imperforate, ſub-carinated, and brown; carina white; aperture dentated, tranſverſe, and three-plaited behind. Müll.

This ſhell is roughiſh, flattiſh both above and beneath, with five roundiſh whorls, and reflected. It inhabits America, and is about nine lines in diameter.

Lampas. Shell imperforate, above flattiſh, beneath gibbous; whorls cicatrized, the outermoſt divaricate. Müll.

A rare ſpecies, 31 lines in diameter; the ſurface finely ſtriated, fulvous, with a whitiſh ridge and yellowiſh mouth: lip orange, glabrous, and very much reflected; whorls four, broad, and flattiſh.

Carocolla. Shell imperforate, a little convex each ſide, with tranſverſe white lip. Müll.

Reſembles the laſt, but ſcarcely exceeds half its ſize: the ſhell uſually cheſnut with black rays, ſometimes white beneath, or white intermixed with pale yellow, or blackiſh with whitiſh lip; whorls five or ſix, ſub-convex, with ſomewhat triangular aperture. A land ſpecies found in India.

Lychnuchus. Shell imperforate and top-ſhaped; white with fulvous bands; aperture tranſverſe and bidentated. Liſt.

Country unknown. Shell with a double band on the upper part of the whorl.

Cepa. Shell ſub-globular, umbilicated, ſub-carinated, yellowiſh with a whitiſh band; aperture tranſverſe, bidentated, and ſinuate behind. Liſt.

Diameter half an inch; ſhell convex each ſide, with five contiguous whorls; aperture lunated; lip a little reflected; pillar lip reflected and thick.

Cornu militare. Shell ſub-carinated, imperforated, and convex; aperture with a wide margin. Gualt.

A land ſpecies of rather conſiderable ſize, found in India; the ſhell is glabrous, white covered with a brown ſkin; whorls obtuſe; aperture fulvous, with a brown border.

Pellis serpentis. Shell ſub-carinated, with bands of flame colour, and white, beneath ſurrounded with four rows of dots; aperture fringed. Favanne.

Inhabits the warmer parts of America.

Vortex. Shell carinated; above ſlightly convex, beneath flat; aperture oval. Donov. Br. Shells. *Helix vortex*, Linn. *Cochlea exigua quinque orbium*, Liſt. *Planorbis polygirata minor*, Petiv. *Whirl*, Penn. *Planorbis*, Da Coſta. *Common whirl ſhell.*

Flat, thin, and rather more than one-third of an inch in diameter; the colour whitiſh. Frequent in ſtagnant waters.

Scabra. Shell ſomewhat carinated, imperforate, ovate, pointed, and ſtriated. Gmel.

Native place unknown; ſhell with brown divided bands, the lower whorl with an elevated line.

Gothica. Shell convex each ſide, horny, with ſub-ferruginous bands. Gmel.

Inhabits the woods of Sweden.

Gualteriana. Shell imperforate, and depreſſed, with decuſſate ſtriæ; aperture at each ſide acute. Gmel.

A land ſpecies found in India; the colour dirty white or grey; beneath convex; aperture triangular and caniculate, the border white.

Tricarinata. Shell top-ſhaped, ſomewhat umbilicated, and acuminated with convex ſpiral ſtriæ and triple ridge; aperture dilated. Müll.

Native place unknown; ſhell nearly an inch wide; the colour pale with tranſverſe yellow ſtreaks and obſolete ſpiral ſtriæ; whorls five; aperture nearly circular; lip white with an acute margin.

Isognomostomos. Shell browniſh and depreſſed, the firſt whorl round; aperture contracted, nearly triangular, three-toothed, and margined. Liſt.

Inhabits Virginia and Alſace; ſhell nearly imperforate.

Oculus communis. Shell depreſſed and umbilicated; whorls contiguous, the firſt very large; aperture oblong-ovate, with a pale fulvous border within. Gmel.

Native place unknown. Shell large, ſolid, fleſh-colour, grey, or alternately browniſh and yellow, with generally ſix or more bands of brown or blueiſh; whorls ſix, the outermoſt mucronate; aperture compreſſed; the operculum red on the outſide, knotty and gloſſy.

Punctata. Shell ſub-umbilicated, ſomewhat carinated, a little depreſſed and rounded; whorls round; aperture tranſverſe oblong, with a margined three-toothed lip; pillar thickened, and emarginate. Born.

This ſhell is brown, with narrow tranſverſe yellow bands on the back, and dotted rays towards the future. Country unknown.

Affinis. Shell umbilicated, and convex each ſide, variegated white and cheſnut; aperture winged and ſlightly margined. Born.

Native place unknown.

Marginella. Shell umbilicated, obliquely ſtriated, above convex, beneath a little depreſſed; firſt whorl carinated; aperture triangular tranſverſe margined. Born.

Breadth an inch and a half, height two-thirds of an inch; colour white with a brown band.

Sinuosa. Shell ſomewhat carinated and imperforated, convex each ſide, with hollow dots; whorls ſub-convex and contiguous; aperture tranſverſe and beſet with ſeven teeth. Born.

Shell with ſix whorls. Country unknown.

Maculosa. Shell umbilicated, ſub-carinated, obliquely ſtriated, and a little depreſſed, beneath convex; aperture lunate, with a margined lip. Born.

White with fulvous ſpots. Country unknown.

Vitrea. Shell ovate, and ſomewhat umbilicated; glabrous, and ſemi-pellucid; whorls five, the firſt gibbous, the reſt carinated; aperture oblong-ovate. Born.

Height two inches; yellowiſh brown, with longitudinal waved ſulphur bands. Native place unknown.—Obſ. In Linn. Tranſ. vol. 8., another ſhell is deſcribed under the name of helix vitrea. The latter is the turbo vitrea of Montagu. and will be referred by us to the turbines, from a perſuaſion that the ſhell is rather of the turbo than helix genus.

Annulata. Shell umbilicated, a little depreſſed and white; whorls four, the firſt gibbous and bicarinated. Schroet.

Shell two lines in diameter, with an ovate aperture.

Rhenana. Shell umbilicated and white; above depreſſed; whorls carinated, with irregular ſtriæ, the laſt brown. Schroet.

Found in the Rhine.

Corrugata. Shell umbilicated, wrinkled, obliquely ſtriated, and grey; aperture lunated; lip fleſh colour, and reflected within. Liſt.

Native of Jamaica.

Nævia. Shell rather depreſſed, umbilicated, white, with longitudinal black ſpots above, and five bands beneath. Chemn.

Inhabits Santa Cruz.

***** *Ovate and imperforated.*

Amarula. Shell imperforated, oblong, with ſpinous toothed whorls. Linn. *Buccinum (teſta ſubovata nigra, &c.)*, Müll. *Voluta fluviatilis*, Rumpf.

From half an inch to about an inch in length; colour black, immaculate, with ſpiral ſub-convex ſtriæ, and five or ſix whorls, each of the whorls on the upper part armed with ten ſharp ſpines; aperture large, wide and white; outer lip acute; inner one thick.

Pupa. Shell nearly imperforated, ovate-oblong, and coarſe, with ſix whorls, and lunated oblong aperture. Brander.

Twice the ſize of a barley-corn, and inhabits Mauritania.

Barbara. Shell imperforated, oblong, and coarſe, with eight whorls, and roundiſh lunate aperture.

Inhabits Algira, and is half the ſize of the former.

Nævia. Shell tranſverſely grooved, white, with blackiſh ſtriæ; ſpire pointed, with flattiſh whorls, the firſt larger and round. Kemm.

Rather more than an inch long, and inhabits the Southern ocean.

Aspera. Shell-pointed, cinereous, and tranſverſely ſtriated; whorls toothed and marked with red ſtreaks. Chemn.

Inhabits the maritime marſhes of Coromandel; length from five to eight lines; ovate, pellucid, ſometimes dirty grey-brown, with convex ſpiral ſtriæ, and undulated, longitudinal, tuberculated ſtreaks; whorls ſeven or eight, each armed with 12 ſpines; aperture ovate; outer lip acute, inner one gloſſy brown; throat pale with pellucid punctured red ſtreaks.

Stagnalis. Shell imperforated, ovate, tapering to a point; ſomewhat angular; aperture oblong-oval. Linn. *Turbo ſtagnalis*, Da Coſta. *Lake ſnail*, Donov. Br. Shells.

The largeſt and moſt produced of the Britiſh river ſnails, and is found in plenty in moſt lakes, ponds, and other ſtill waters. The length is an inch and a half, or ſometimes more when full grown. Liſter and Petiver make two ſpecies of this ſhell, maximum and minus, both being of the ſame kind in different ſtages of growth.

Fragilis. Shell imperforated, ovate, tapering round, pellucid; aperture oblong-ovate. Linn. *Brittle river ſnail*, Donov. Br. Shells.

Found on plants in rivulets, and ſtill waters in Europe. Length from an inch to an inch and a quarter, the colour whitiſh, aperture not margined, and often yellowiſh; the firſt wreath ventricoſe. Gmelin ſuggeſts that helix fragilis is probably only a variety of helix ſtagnalis, an opinion conſidered erroneous (in Brit. Shells,) " helix fragilis being clearly diſtinguiſhed from helix ſtagnalis, and one or two other analogous ſpecies of river ſnails by the number of ſlight ridges which ſpirally traverſe the whole ſhell in the former, and which are in particular obvious on the firſt wreath: it is likewiſe more uniformly elongated than H. ſtagnalis, the primary whorl being leſs ſwollen, and the remainder more ſo than in that ſhell." Vol. 5. This ſpecies is not common.

FONTINALIS. Shell imperforated, ovate, pointed, glabrous, horny; volutions five, the firſt and ſecond ventricoſe. *Smooth freſh-water ſnail*, Donov. Br. Shells, vol 5. 171.

A new ſpecies found in ſome rivulets in Devonſhire: reverſed ſhells of this kind occur ſometimes with the others.

PUTRIX. Shell imperforated, obtuſe, ovate, yellow: aperture ovate. Linn. *Helix ſuccinea*, Müll. *Trianfractus, three-ſpired*, Da Coſta. *Helix putris, mud-ſnail*, Donov. Br. Shells.

This is remarkably fragile, pellucid, and membranaceous; with three whorls, the firſt very large, the other two ſmall; aperture without lip. Length about an inch or rather leſs; colour variable, generally yellowiſh. This ſhell is very common in muddy ditches, ponds, and other watery places, and eſpecially in thoſe overgrown with weeds.

BULLAOIDES. Shell ovate, ſmooth, gloſſy, horny, brittle; whorls reverſed; ſpire ſhort. Donov. Br. Shells.

" Received from Lincolnſhire by the late ducheſs of Portland, from whoſe collection the ſpecimen at this time in our poſſeſſion was obtained. It is a new ſpecies, and apparently of the aquatic kind, but we are entirely unacquainted with its hiſtory." Vol. 5. 168.

GLABRA. Shell cylindrical, pointed, and horny, with an ovate aperture. Schroet.

Length four lines and a half, pellucid, with about eight round whorls, the firſt with a kidney-ſhaped tranſparent black belt. Animal black with whitiſh horns. Inhabits moiſt meadows in Denmark.

TRUNCATULA. Shell ovate-oblong, the whorls truncated upwards; aperture ovate. Schroet.

Inhabits Greece; length from one to five lines; ſhell black, ſomewhat pellucid, with five whorls, and incumbent ſqualid lip.

PEREGRA. Shell horny and ſub-conic, with an acute projection; aperture ovate. Gualt.

Length from two to eight lines, and inhabits the ſtagnant waters of Denmark. Shell pellucid and whitiſh, or ſometimes dark.

GLUTINOSA. Shell ventricoſe, with an obtuſe projection: aperture wide. Gmel. *Buccinum peregrum*, Müll.

Found in Denmark, chiefly on the leaves of the nymphæa lutea; length from one to four lines; ſhell brittle, thin and yellow with two or three whorls, and rounded aperture. Animal white dotted with cinereous dots, and furniſhed with a gelatinous membrane, covering the ſhell.

ACUTA. Shell conic-pointed, white with a red band; aperture toothleſs. Liſt.

Inhabits Italy; length four lines; ſhell with ſeven whorls, and ſometimes two red bands on the larger whorl; aperture ovate.

PAPILLA. Shell conic, perforated, with rugged ſtriæ; aperture tranſverſe; lip reflected. Chemn.

Breadth ten lines and a half; ſhell varied with white and reddiſh brown wrinkles; whorls about ſix, and convex; aperture ovate with a thick white lip.

MINUTA. Shell ſub-cylindrical, with an oval toothleſs aperture. Müll.

Reſembles turbo muſcorum, but is much more linear and pointed; whorls five. Native of Greece.

DETRITA. Shell conic, white, with tranſverſe, rufous lines, and ovate aperture. Gualt.

Inhabits Saxony; ſhell eight lines and a half long, poliſhed, and obſoletely ſtreaked; whorls ſix, the lip a little reflected at the pillar.

VENTRICOSA. Shell conic, pale and ſtriated; aperture toothleſs. Müll.

Length two lines; whorls ſeven, the four outermoſt very nearly of equal width. Inhabits Greece.

OBSCURA. Shell conic, brown; aperture toothleſs; lip white. Liſt.

Inhabits Europe, at the roots of trees; ſhell pointed and finely ſtriated; whorls ſix; aperture oval, with an acute margin; lip gloſſy white. Animal white, above duſky, eyes black.

LUBRICA. Shell conic, fulvous, poliſhed, pellucid, and acute; aperture toothleſs; lip reddiſh. Liſt.

Lives among moſs and wet rotten wood in Europe; the length two lines and a half; ſhell glabrous, finely poliſhed, rarely whitiſh with five or ſix whorls, and ovate aperture. Animal black, beneath white.

LIMOSA. Shell imperforated, ſomewhat oblong, pellucid and acute, with an ovate aperture. Chemn.

Inhabits wet meadows of Europe.

CONTORTUPLICATA. Shell turbinated, cinereous, nearly imperforated; crown truncated. Gmel. *Nerita contorta*, Müll.

Found in muddy ditches in Europe; length two lines and a half; ſhell pyramidal, ſqualid, and opaque; whorls about five; aperture circinated.

ANGULARIS. Shell imperforated and greeniſh; the whorls ſpirally angular; throat white. Liſt. *Nerita angularis*, Müll.

Native of China; length twelve lines; ſhell conic, very finely ſtriated tranſverſely; whorls five, nearly perpendicular; aperture rounded.

BALTHICA. Shell imperforated, ovate and pointed, with elevated wrinkles; aperture ovate and dilated. Linn.

Inhabits the ſhores of the Baltic; ſhell pellucid, with four whorls. Animal black with two tentacula.

NERITOIDEA. Shell imperforated, convex, and longitudinally ſtriated, cleft umbilical; aperture roundiſh. Linn. Livid, with about forty ſtriæ.

PERSPICUA. Shell imperforated, convex, and ovate, without lip; aperture extending to the tip. Linn.

Allied to the bulla genus; the ſhell milk white, tranſparent, and very brittle. Inhabits the Mediterranean.

HALIOTOIDEA. Shell imperforated, depreſſed, with waved ſtriæ; aperture oval, and open to both ends. Linn. *Bulla velutina*, Müll.

Cloſely allied to the genus haliotis; the ſhell elliptic, thin, pellucid, white, or reddiſh with a white band, or orange with two paler bands, ſlightly cancellated outwardly: whorls four and placed laterally; lip very acute. Animal ſmall, white with two ſhort tentacula; operculum none.

MURALIS. Shell imperforated and ſub-depreſſed, white with ſix whorls. Schroet.

Breadth ſix lines; ſhell pellucid, convex each ſide, with a thickiſh white lip. Inhabits France.

TENTACULATA. Shell imperforated, ovate, obtuſe, the ſpire ſub-conic; aperture rather oval. Donov. Br. Shells. *Helix tentaculata*, Linn. *Cochlea parva pellucida*, &c. Liſt. *Cochleola, &c. ſmall freſh-water turbo with five wreaths*, Petiv. Wallis, &c. *Turbo nucleus*, Da Coſta. *Kernel, or olive water ſnail.*

Length from one quarter to one-third of an inch; ſhell horny, diaphanous, glabrous, and variable from whitiſh to brown, or reddiſh; operculum ovate, horny, and pellucid white.

AURICULARIA. Shell imperforated, ovate, gibbous, with a narrow depreſſion in the middle of the lip; ſpire acute and very ſhort; aperture very much dilated. Linn. *Buccinum ſub-flavum*, &c. Liſt. *Turbo patulus*, Da Coſta. *River ear ſnail*, Donov. Br. Shells.

Length in the adult ſtate about an inch and a quarter, the colour whitiſh yellow, or browniſh, the inſide pure white. Animal white, with cinereous dots and black eyes. Inhabits ponds in Europe.

LÆVIGATA. Imperforated, pellucid, roundiſh, of two wreaths, the firſt very large, the ſecond ſmall, obtuſe, and placed laterally. Donov. Br. Shells. *Helix lævigata*, Linn. *Smooth ſnail.*

A marine ſpecies rarely found on the coaſts of Britain.

LUTEA. Shell imperforated and ſub-oval; aperture patulous, and oval. Maton and Rackett, Linn. Tranſ.—*Helix lutea*, Montagu.

Length half an inch, breadth one quarter, ſmooth and ſomewhat pellucid; whorls ſcarcely three, the firſt ample. Perhaps a marine ſpecies.

VERTIGO. Shell cylindrical, glabrous, obſcure and fulvous; whorls round, and contrary aperture nearly ſquare, and ſix toothed. Gmel. *Vertigo puſilla*, Müll.

Inhabits Denmark, in decayed wood; length one line; ſhell with four or five whorls. Animal pellucid, above blueiſh, beneath white, with two linear tentacula bearing each an eye at the tip.

PYRUM. Shell ſub-cylindrical, with decuſſate ſtriæ, hyaline with cheſnut marks and brown at the tip; whorls contrary, three of them large, and depreſſed in the middle. Martini.

Spire with ſeven whorls. This ſpecies inhabits Guinea.

CARYCHIUM. Shell hyaline, ſub-conic, glabrous; aperture ovate, with about three teeth within. Gmel. *Carychium minimum*, Müll.

Native of Denmark, among rotten leaves; length leſs than one line; whorls five and rounded. Animal yellow, with two truncated tentacula having each an eye at the baſe.

CARTUSIANA. Shell imperforated, ſub-depreſſed, and white; whorls ſix. Müll.

Inhabits France; ſhell pale; diameter ſix lines; lip white and rather thick.

AMBIGUA. Shell ſub-imperforated and convex, with remote compreſſed grooves; aperture ſemi-orbicular. Adanſ.

Small, white, and reſembling a nerita, except that the inner lip is not reflected; with the umbilicus open in the younger, and cloſed in the adult ſhells; ſpire lateral and obtuſe, ſurrounded with ſix elevated grooves. Inhabits the Mediterranean.

CORVUS. Shell imperforated, ovate, and black; aperture ovate. Martini.

Inhabits the ſtagnant waters of Greece, and reſembles helix ſtagnalis, but is only half the ſize, and leſs pointed, the firſt whorl not ſo ventricoſe, and the lip leſs prominent.

MAMORATA. Shell marbled with white, cinereous, and blue; form obtuſe; whorls round; the firſt twice as long as the reſt, inflated in the middle and longitudinally ſtriated; aperture ovate. Schroet.

Length three quarters of an inch; whorls five. Found in the rivers of Straſburgh.

ACHATINA. Shell cheſnut pellucid, and thin, with an ovate aperture. Schroet.

Reſembles the laſt, but is leſs, and has only four narrower whorls.

LUGUBRIS. Shell ovate, pointed, and pellucid, tranſverſely ſtriated, ochraceous with cheſnut undulations, and covered with a black ſkin; firſt whorl twice as large as the reſt; aperture oblong ovate. Schroet.

Length nine lines; whorls ſeven.

MINIMA. Shell ovate, conic, and ſub-imperforated; aperture orbicular; two laſt whorls placed in the centre of the firſt. Schroet.

INFLATA. Shell white, ſolid, and opaque, the firſt whorl twice as large as all the reſt; aperture large and margined. Schroet.

Found in the river Inſtrut, in Thuringia.

ALBICANS. Shell white, opaque, and pointed; aperture oval. Schroet.

Inhabits the waters of Hamburgh.

REPANDA. Shell ovate, pointed, and ſub-imperforated; firſt whorl ventricoſe and larger than all the others; aperture ſemi-circular. Schroet.

Lives in ſtagnant waters. Shell from ſix to ſeven lines long.

OPACA. Shell ovate, pointed, ſolid, whitiſh, and opaque; aperture ovate oblong; firſt whorl larger than the reſt. Schroet.

An aquatic ſpecies, with about five whorls.

TURGIDA. Shell obtuſe, with four diſtant whorls inflated in the middle; aperture orbicular, margined. Schroet.

Length two lines.

CÆRULESCENS. Shell blueiſh, ovate, and pointed, with ſomewhat ventricoſe whorls; aperture oblong and rounded. Schroet.

Inhabits Frankfort; length two lines; whorls four.

CINEREA, Shell inflated with four ſhort whorls, the two lower ones diſtant; aperture oblong and without margin. Schroet.

Native of Alſace; length two lines.

UNDATA. Shell imperforated, oblong, white, with longitudinal red undulations; firſt whorl of the ſpire thrice as large as the next; aperture ovate. Gualt.

Length an inch and a quarter; whorls ſix or ſeven.

TERES. Shell imperforated, oblong, thin, and brown; firſt whorl ovate, and thrice as large as the next; aperture ovate. Gault.

Shell with four whorls.

SUBSTRIATA. Shell ſub-imperforated, and oblong; very finely ſtriated with white; firſt whorl twice as large as the next; aperture oval and margined. Gualt.

Length a quarter of an inch; the whorls five.

TRIGONOSTOMA. Shell ſmooth and brown, with a triangular margined aperture. Gualt.

A minute ſpecies, the country unknown.

TUMIDA. Shell ventricoſe, pointed and cinereous; firſt whorl larger than all the reſt; aperture oval, large, and margined on one ſide. Gualt.

Length one inch and a quarter, with a white band at the pillar.

ACICULA. Shell oblong, pointed, longitudinally ribbed and tranſverſely ſtriated; aperture oval. Schroet.

Length a quarter of an inch; ſhell ſtriped between the ribs with cheſnut, and covered with a black ſkin; whorls ten, equally decreaſing. Inhabits Coromandel.

TURBINATA. Shell oblong, imperforated, ſmooth, pointed; whorls inflated, the firſt much larger, the reſt gradually decreaſing; aperture ſub-oval, margined. Marſigl.

Length three inches and a half, and inhabits the Danube.

DANUBIALIS. Shell oblong, imperforated, with diſtant ventricoſe whorls; aperture orbicular. Marſigl.

Length three inches and a half, and inhabits the Danube.

DANUBIALIS. Shell oblong, imperforated, with diſtant ventricoſe whorls; aperture orbicular. Marſigl.

More ventricoſe than the laſt; length two inches and a half; inhabits the Danube.

CURVATA. Shell oblong, curved, ſub-imperforated, with an oval margined aperture. Marſigl.

Length two inches and a half, and inhabits the Danube.

EXILIS. Shell thin, ſmooth, white, with cheſnut bands; ſpire obtuſe, with flattiſh whorls. Kæmm.

Varies in length from ſix lines to one inch; native place uncertain.

COCCINEA. Shell ovate and imperforate, ſmooth, and red, with a pale yellow aperture. Mart.

Native of New Zealand.

AFRA. Shell imperforated, and ovate, with ſix flattiſh contiguous whorls; aperture unequal and five-toothed. Adanſ.

Native of Senegal; length three lines; colour pale, fulvous or whitiſh, the firſt whorl much larger than the reſt.

NUCLEUS. Shell imperforated, ovate, glaucous, and ſtriated tranſverſely with black belts; aperture ſinuous. Mart.

Inhabits Otaheite.

****** *Shell tapering.*

DECOLLATA. Shell imperforated and tapering; ſpire truncated. Liſt.

Inhabits Europe, Aſia, and Africa; length from 10 to 15 lines; ſhell whitiſh, oblong, poliſhed, and ſub-ſtriated; whorls from four to ſeven, the firſt nearly twice the ſize of the reſt.

SCALARIS. Shell conic, tapering, imperforated, with remote whorls; aperture ovate. Chemn.

Native place unknown; ſhell obliquely ſtriated, pale rufous with two whitiſh bands; ſpire obtuſe, with five ventricoſe whorls.

CIRCINATA. Shell hyaline, tranſverſely ribbed, perforated, and rather tapering; whorls diſtant; aperture circular. Kæmm.

Height ſix lines; breadth ſeven lines and a half; lip acute.

SUBCYLINDRICA. Shell imperforated, tapering, ſubcylindrical obtuſe, with four whorls and ovate aperture. Chemn.

Inhabits freſh waters of northern Europe; ſize of a grain of rye, horny, pale, with a very obtuſe lip; interior margin of the aperture reflected.

TENERA. Shell tapering, convex, and ſtriated; white with a few fulvous ſtreaks; pillar ſinuate and inflected. Chemn.

Length two inches and a half, thin, pellucid, longitudinally ſtreaked; whorls ſeven or eight, margins incumbent; aperture ovate-oblong.

COLUMNA. Shell tapering, white with a fulvous tip, and ſpotted contrary whorls; aperture oblong. Favanne.

Country uncertain; length 27 lines and a half; ſhell in pellucidity and colour reſembling alum.

PELLA. Shell imperforated, ovate, pointed, and tranſverſely ſtriated; brown with yellow bands. Müll.

Native of Iceland; ſhell ruſty brown, decumbent, ovate-oblong; band on the firſt whorl double, on the reſt ſingle; aperture ſemi-ovate.

PLICARIA. Shell ſubulate, ſemi-pellucid, and longitudinally plaited; whorls round; aperture ovate. Born.

Whorls ten. Country unknown.

UNDULATA. Shell ſubulate, ſmooth, very finely ſtriated tranſverſely; whorls round; aperture ovate. Born.

Pale, with longitudinal cheſnut undulations; whorls twelve; pillar glabrous.

STAGNORUM. Shell ſub-imperforate, a little tapering, with five whorls and ovate aperture. Gmel.

Inhabits freſh waters; ſize of a barley-corn.

LACKHAMENSIS. Shell ſomewhat perforated, oblong-ovate; aperture ſub-rotund-lunate; margin reflected.— *Helix lackhamenſis*, Montagu.

Found at Lackham, and Bow-wood, Wilts. Length five-eighths of an inch; breadth one quarter of an inch; colour ſordid brown.

OCTANFRACTA. Shell imperforated, tapering, and ſomewhat ſtriated; whorls eight; aperture ovate. Maton and Rackett, Linn. Tranſ. *Helix octona*, Penn.

Length five eighths of an inch; breadth one quarter. Found in ponds.

FOSSARIA. Shell imperforated and ſub-ovate; whorls five or ſix, and rounded; ſuture conſpicuous; aperture ovate. Maton and Racket, Linn. Tranſ. *Helix foſſaria*, Montagu.

Inhabits ſtagnant waters; length three-eighths of an inch, breadth one eighth.

FUSCATA. Shell ſubulate, ſmooth, and very finely ſtriated tranſverſely; whorls round; aperture ovate. Born.

Yellowiſh-brown, the mouth cinereous; whorls about ten; pillar ſmooth.

PRIAPUS. Shell imperforated, tapering, and glabrous, with inflected pillar, and ſomewhat depreſſed whorls. Gronov.

Colour bay with four dotted bands, the firſt whorl thrice as large as the reſt; aperture ovate.

FOLLICULUS. Shell tapering, pellucid glabrous, with ſomewhat plaited pillar-lip thin. Gronov.

Size of an oat, white, with five or ſix round whorls of equal ſize; aperture ovate.

SEPIUM. Shell tapering, milk-white, longitudinally ſtriated, with ſeven contiguous whorls; aperture ovate. Martini.

Inhabits the mountains of ſouthern Europe; length half an inch; ſhell ſometimes marked with longitudinal grey lines.

SPLENDIDULA. Shell thin, gloſſy, and pellucid, pale brown with an oblong aperture. Gmel.

Native of France and Thuringia; about a quarter of an inch long; ſpire with ſix whorls.

MITRA. Shell tapering, with diſtant ribbed whorls, the firſt round, the reſt flattiſh; aperture oval. Schroet.

Length an inch, thin and whitiſh, with eight or nine whorls.

CUSPIDATA. Shell tapering and horny, very finely ſtriated tranſverſely, and longitudinally plaited; aperture oval; lip acute. Liſt.

Inhabits rivers of India.

ATRA. Shell tapering, black, and very minutely ſtriated, with rather convex whorls, and oblong-oval aperture. Gualt.

Length two inches; whorls ſeven.

CRENATA. Shell tapering, white, ſub-ſtriated tranſverſely, and ſurrounded with a crenulated belt near the ſuture. Chemn.

Inhabits rivers of India.

CARINULA. Shell tapering, ſub-umbilicated and white; the firſt whorl ſub-carinated, with blackiſh bands. Chemn.

CROCEA. Shell cylindrical glabrous, yellowiſh-orange, with an obtuſe tip. Chemn.

LANSCHAURICA. Shell rather tapering, very glabrous, cheſnut brown with darker ſpots; throat whitiſh. Chemn.

Found in the freſh waters of Coromandel.

Obtusata. Shell white, denſely ſtriated, and ſub-cylindrical; whorls a little convex; lip margined. Kæmm.

Length three inches.

Purpurea. Shell ovate-oblong, purpliſh, teſſellated with darker purple; within irideſcent. Gmel.

Native of New Zealand.

Helix, in *Geometry*, a ſpiral line. See Spiral.

The word is Greek, ἕλιξ, and literally ſignifies a *wreath*, or *winding*; of ἑλισσω, *involvo*, *I environ*.

In *Architecture*, ſome authors make a difference between the helix and the ſpiral.

A ſtair-caſe, according to Davila, is in a helix, or is helical, when the ſtairs or ſteps wind round a cylindrical newel; whereas the ſpiral winds round a cone, and is continually approaching nearer and nearer its axis.

Helix, in *Natural Hiſtory*, is a term applied by Dr. Grew, ("Rarities at Greſham College, p. 260, 261.) to ſeveral ſpecies of Cornu *ammonis*, which ſee.

HELIXANTHERA, in *Botany*, is derived from ἕλιξ, *a ſcrew*, on account of its ſpiral-ſhaped anthers. Loureir. Cochinch, v. 1. 142.—Claſs and order, *Pentandria Monogynia*.

Gen. Ch. *Cal.* Perianth cylindrical, truncated, coloured, propped by an ovate, fleſhy ſcale of the ſame colour as the calyx. *Cor.* of one petal, ſuperior; tube ſhort; limb in five deeply-divided, reflexed, oblong, obtuſe ſegments; nectary with five ſides, five-cleft at the top, forming an arch over the ſtyle. *Stam.* Filaments five, thread-ſhaped, inſerted into the mouth of the corolla; anthers linear, ſpirally revolute. *Piſt.* Germen oblong, concealed by the calyx; ſtyle equal with the ſtamens; ſtigma thickiſh. *Peric.* Berry formed out of the calyx, oblong-ovate, containing an ovate *ſeed*.

Eſſ. Ch. Calyx oblong, truncated. Corolla five-cleft. Anthers ſpiral-ſhaped. Berry formed out of the calyx, containing a ſingle ſeed.

1. *H. paraſitica*. Loureir.—It creeps over the ſtems of cultivated trees in the gardens of Cochinchina.—*Stem* paraſitical, woody, long, branched. *Leaves* lanceolate, ſmooth, entire, undulated, bent back at the top. *Flowers* ſmall, in long, ſimple, axillary, ſcarlet ſpikes. *Calyx* and *Berries* of the ſame ſcarlet colour.

Such is Loureiro's account. We have ſeen no ſpecimens of this plant, but part of his deſcription ſeems to indicate an affinity to *Baſella*.

HELL, a place of puniſhment, wherein the wicked are to receive the rewards of their evil deeds after this life.

In this ſenſe *hell* ſtands oppoſed to *heaven*.

Among the ancients hell was called Ταρταρος, Ταρταρα, *Tartarus*, *Tartara*; Ἅδης, *Hades*, *Infernus*, *Inferna*, *Infera*, &c. See Tartarus and Ades. See alſo Elysium.

The Jews, wanting a proper name for it, called it *Gehenna* or *Gehinnon*, from a valley near Jeruſalem, wherein was a Tophet, or place where a fire was perpetually kept. See Gehenna.

Divines reduce the torments of hell to two kinds; *pœna damni*, the loſs and privation of the beatific viſion; and *pœna ſenſus*, the horrors of darkneſs, with the continual pains of fire inextinguiſhable.

Moſt nations and religions have their notions of a hell. The Greeks borrowed their notions of the infernal regions from the Egyptians. To this purpoſe Diodorus Siculus informs us (l. i. c. 36.), that the puniſhments of the wicked in Tartarus, the manſions of the bleſſed in the Elyſian fields, and ſome other ſuch notions, are evidently borrowed from the funeral rites of the Egyptians. Mercury, the conductor of ſouls, among the Greeks, was formed on the model of a man, to whom the ancient Egyptians uſed to commit the care of Apis's dead body to carry it to another, who received it under a maſk with three heads like thoſe of Cerberus. It is ſaid that the whole fable of the infernal regions was introduced into Greece by Orpheus. See Elysium.

The hell of the poets is terrible enough, witneſs the puniſhment of Tityus, Ixion, Theſeus, Tantalus, Prometheus, the Danaids, Lapithæ, Phlegyas, &c. deſcribed by Ovid in his Metamorphoſis. Virgil, after a ſurvey of hell, Æneid, lib. vi. declares, that if he had a hundred mouths and tongues, they would not ſuffice to recount all the plagues of the tortured.

Accordingly he thus deſcribes the manſions of the dead:

"Deep, deep, a cavern lies, devoid of light,
All rough with rocks, and horrible to ſight:
The gaping gulph incloſ'd with ſable floods,
And the brown horrors of ſurrounding woods.
From her black jaws ſuch baleful vapours riſe,
Blot the bright day, and blaſt the golden ſkies;
That not a bird can ſtretch her pinions there,
Through the thick poiſons and incumber'd air;
O'ertook by death her flagging pinions ceaſe,
And hence Aornus was it called by Greece.
Hither the prieſteſs four black heifers led,
Between their horns the hallow'd wine ſhe ſhed;
From their high front the top-moſt hairs ſhe drew,
And in the flames the firſt oblations threw, &c."
Pitt's Æneid, vi. 332.

Again,

"At hell's dread mouth a thouſand monſters wait:
Grief weeps, and *Vengeance* bellows in the gate:
Baſe *Want*, low *Fear*, and *Famine*'s lawleſs rage.
And pale *Diſeaſe*, and ſlow repining age;
Fierce, formidable fiends! the portal keep;
With *Pain*, *Toil*, *Death*, and Death's half-brother *Sleep*.
There *Joys* embittered with *Remorſe* appear;
Daughters of *Guilt!* here ſtorms deſtructive *War*.
Mad *Diſcord* there her ſnaky treſſes tore;
Here ſtretch'd on iron beds, the *Furies* roar.
Full in the midſt a ſpreading elm diſplay'd
His aged arms, and caſt a mighty ſhade.
Each trembling leaf with ſome light viſion teems,
And heaves impregnated with airy dreams,
With double forms, each *Scylla* took her place
In Hell's dark entrance, with the *Centaur*'s race;
And cloſe by *Lerna*'s hiſſing monſter, ſtands
Briareus dreadful with a hundred hands,
There ſtern *Geryon* raged; and, all around,
Fierce *Harpies* ſcream'd, and direful *Gorgons* frown'd."
Ibid. 385.

The rivers of hell, according to the poets, were Acheron, Phlegethon, Cocytus, and Styx; which ſee reſpectively. The three infernal judges were Minos, Eacus, and Rhadamanthus, who were appointed to this office on account of their ſtrict probity. The infernal gods were Pluto, Ceres, Proſerpine, and Cottytta. To theſe have been added Night, Sleep, and Death. Although neither temples nor altars were erected to theſe divinities, nor hymns compoſed to their honour; yet ſome worſhip was paid to them, with a view of appeaſing their anger, and preventing their doing miſchief.

The New Teſtament repreſents hell as *a lake of fire and brimſtone*, and *a worm which dies not*, &c. (Rev. xx. 10, 14, &c. Mark, ix. 43, &c. Luke, xvi. 23, &c.) The Caffres are ſaid to admit thirteen hells, and twenty-ſeven paradiſes ; where every perſon finds a place of recompence ſuited to the degree of good or evil he has done.

There are two great points of controverſy among writers concerning hell: the firſt, whether there really be any local hell, any proper and ſpecific place of torment by fire? the ſecond, whether the torments of hell are to be eternal? I. The locality of hell, and the reality of the fire thereof, have been controverted from the time of Origen. That father, in his treatiſe Περι Αρχων, interpreting the ſcripture account metaphorically, makes hell to conſiſt not in external puniſhments, but in the conſcience of ſinners, the ſenſe of their guilt, and the remembrance of their paſt pleaſures. St. Auguſtine mentions ſeveral of the ſame opinion in his time ; and Calvin, and many of his followers, have embraced it in our's.

The retainers of the contrary opinion, who are much the greateſt part of mankind, are divided as to the ſituation and other circumſtances of this horrible ſcene. The Greeks after Homer, Heſiod, &c. conceived hell, τόπον τινα ὑπο την γην μεγαν, &c. *a large and dark place under the earth.* Lucian, De Lucta; and Euſtathius, on Homer.

Some of the Romans lodged it in the ſubterranean regions directly under the lake Avernus, in Campania ; which they were led to from the conſideration of the poiſonous vapours emitted by that lake. Through a dark cave near this lake Virgil makes Æneas deſcend to hell. See Averni.

Others placed hell under Tenarus, a promontory of Laconia ; as being a dark frightful place, beſet with thick woods, out of which there was no finding a paſſage. This way, Ovid ſays, Orpheus deſcended to hell. Others fancied the river or fountain of Styx, in Arcadia, the ſpring-head of hell, becauſe the waters thereof were deadly.

But theſe are all to be conſidered as only fables of poets, who, according to the genius of their art, allegorizing and perſonifying every thing, from the certain death met with in thoſe places, took occaſion to repreſent them as ſo many gates or entering places into the other world. The primitive Chriſtians, conceiving the earth a large extended plain, and the heavens an arch drawn over the ſame, took hell to be a place of the earth, the fartheſt diſtant from the heavens ; ſo that their hell was our antipodes.

Tertullian, De Anima, repreſents the Chriſtians of his time as believing hell to be an abyſs in the centre of the earth ; which opinion is chiefly founded on the belief of Chriſt's deſcent into *Hades*, *hell*, Matt. xii. 40. See the following article Hell and Ades.

Mr. Whiſton has advanced a new opinion. According to him, the comets are to be conceived as ſo many hells, appointed in the courſe of their trajectories or orbits, alternately to carry the damned into the confines of the ſun, there to be ſcorched by his flames ; and then to return them to ſtarve in the cold, dreary, dark regions, beyond the orb of Saturn.

Mr. T. Swinden, in an expreſs enquiry into the Nature and Place of Hell, not contented with any of the places hitherto aſſigned, contends for a new one. According to him the ſun itſelf is the *local* hell.

This does not ſeem to be his own diſcovery : it is probable he was led into the opinion by that paſſage in Rev. xvi. 8, 9. Though it muſt be added, that Pythagoras ſeems to have had the like view, becauſe he places hell in the ſphere of fire, and that ſphere in the middle of the univerſe. Add, that Ariſtotle mentions ſome of the Italic or Pythagoric ſchool, who placed the ſphere of fire in the ſun, and even called it Jupiter's Priſon. De Cœlo, lib. ii.

Swinden's arguments for the ſun's being the local hell are,

1. Its capacity. Nobody will deny the ſun ſpacious enough to receive all the damned conveniently ; ſo that there will be no want of room. Nor will fire be wanting, if we admit of Mr. Swinden's argument againſt Ariſtotle, whereby he demonſtrates that the ſun is hot, p. 108, & ſeq. The good man is "filled with amazement to think what Pyrenean mountains of ſulphur, how many Atlantic oceans of ſcalding bitumen, muſt go to maintain ſuch mighty flames as thoſe of the ſun ; to which our Ætna and Veſuvius are mere glow-worms." p. 137.

2. Its diſtance and oppoſition to the empyreum, which has uſually been looked upon as the local heaven : ſuch oppoſition is perfectly anſwerable to that oppoſition in the nature and office of a place of angels and devils, of elect and reprobate, of glory and horror, of hallelujahs and curſings ; and the diſtance quadrates well with Dives ſeeing Abraham *afar off, and the great gulf between them*, which this author takes to be the ſolar vortex.

3. That the empyreum is the higheſt, and the ſun the loweſt place of the creation, conſidering it as the centre of our ſyſtem ; and that the ſun was the firſt part of the viſible world created, which agrees with the notion of its being primarily intended or prepared to receive the angels, whoſe fall he ſuppoſed to have immediately preceded the creation.

4. The early and almoſt univerſal idolatry paid to the ſun ; which ſuits well with the great ſubtilty of that ſpirit to entice mankind to worſhip his throne.

Againſt this hypotheſis it may be objected, that we muſt admit a vaſt number of hells, if, as this author himſelf allows, the fixed ſtars be ſuns ; and it ſeems extremely improbable, that as ſoon as a ſyſtem is created, an abode of torment ſhould be prepared for its inhabitants.

Others, by adopting a direct counterpart to Mr. Hallet's hypotheſis concerning heaven (ſee Heaven), have imagined that the earth would be the ſeat of future puniſhment, and that when left in the flames of the laſt conflagration, wicked men would be caſt down into it, alleging a peculiar propriety in making that the place of their puniſhment which was the ſcene of their iniquity. On this ſubject, however, we muſt be content to remain in ignorance and indeciſion.

Heaven and hell, as they are uſed in ſcripture, ſeem to be ſtrongly figurative terms, and to denote more a ſtate or condition of being, than a place ; but if we maintain their locality, it does not ſeem to be improbable that they ſhould not be very remote from the preſent habitation of mankind ; and poſſibly they may conſtitute diſtinct ſocieties, ſeparated from each other by an impaſſable boundary. But the world of ſpirits, however firmly we may believe their preſent and future exiſtence, and the various capacities they poſſeſs and operations they perform, is to us at preſent a kind of "terra incognita," or unknown world.

II. As to the eternity of hell-torments, we have Origen, again, at the head of thoſe who deny it : it being the doctrine of that writer, that not only men, but devils themſelves, after a ſuitable courſe of puniſhment anſwerable to their reſpective crimes, ſhall be pardoned and reſtored to heaven. (Aug. De Civit. Dei. lib. xxi. cap. 17.) The chief principle Origen went upon was this, that all puniſhments are emendatory ; applied only as painful medicines, for the recovery of the patient's health. And other objections inſiſted on by modern authors are the diſproportion between temporary crimes and eternal puniſhments, &c.

The ſcripture phraſes for eternity, as is obſerved by archbiſhop Tillotſon, do not always import an infinite duration : thus, in the Old Teſtament, *for ever* often ſignifies only a long time, particularly to the end of the Jewiſh diſpenſation : thus, in the epiſtle of Jude, ver. 7. the cities of Sodom and Gomorrah are ſaid to be ſet forth for an example, ſuffering the vengeance of *eternal fire;* that is, of a fire that was not extinguiſhed till thoſe cities were utterly conſumed. So one generation is ſaid to come, &c. but the earth endureth *for ever*.

In effect, M. Le Clerc notes, that there is no Hebrew word which properly expreſſes eternity: הולמ, *bolam*, only imports a time whoſe beginning or end is not known; and is accordingly uſed in a more or leſs extenſive ſenſe according to the thing treated of.

The Greek and Hebrew words tranſlated *eternal, everlaſting*, and *for ever*, though they do not denote an abſolute eternity, nor are uſed in this ſenſe in the N. T. the LXX, or Pagan authors, generally, however, repreſent a long duration; and this is ſometimes limited by the context, or nature of the ſubject, ſometimes not. According to this interpretation the puniſhments of the wicked will be of long duration; but one might rather conclude from the words of the original, ſays Dr. Hartley, (Obſ. on Man. prop. xciv.), if their derivation be conſidered, that they will end at the expiration of ſome long period, than that they will be abſolutely eternal.

Archbiſhop Tillotſon, however, argues very ſtrenuouſly, that where hell-torments are ſpoken of, the words are to be underſtood in the ſtrict ſenſe of infinite duration; and what he eſteems a peremptory deciſion of the point is, that the duration of the puniſhment of the wicked is in the very ſame ſentence expreſſed by the very ſame word, which is uſed for the duration of the happineſs of the righteous, which all agree to be eternal. "Theſe, ſpeaking of the wicked, ſhall go away, εις κολασιν αιωνιον, *into eternal puniſhment;* but the righteous, εις ζωην αιωνιον, *into life eternal*."

The ſame great author attempts to reconcile this eternity with the divine juſtice, which had not been ſatisfactorily done before. Some had urged, that all ſin is infinite, in reſpect of the object againſt whom it is committed, *viz.* God; and therefore deſerves infinite puniſhment: but, that crime ſhould be heightened by the quality of the object to ſuch a degree, is abſurd; ſince the evil and demerit of all ſin muſt be equal, inaſmuch as none can be more than infinite; and conſequently there can be no foundation for degrees of puniſhment in the next life. Add, that for the ſame reaſon as the leaſt ſin againſt God is infinite, in reſpect of its object, the leaſt puniſhment inflicted by God may be ſaid to be infinite, becauſe of its author; and thus all puniſhments from, as well as ſins againſt God, would be equal. Whereas both ſcripture and reaſon prove, that there are different degrees of guilt, proportionable to the different circumſtances attending them. To this conſideration it has been replied, that where the *duration* of the puniſhment is equal, there may be ſuch a difference in the *degree*, as may be correſpondent to the degree of the crime: and if this anſwer be not allowed to be ſatisfactory, it will be difficult to ſay how the doctrine of different degrees of eternal rewards can be vindicated as conſiſtent with itſelf.

Others have urged, that if the wicked were to live for ever they would ſin for ever; but this, ſays the author, is mere preſumption. Who can ſay, that if a man lived ever ſo long, he would never repent? Beſides, the juſtice of God only puniſhes ſins which men have committed, not thoſe they poſſibly might have committed.

Others therefore urge, that God gives men the choice of everlaſting happineſs and miſery; and that the reward promiſed to obedience is equal to the puniſhment threatened to diſobedience. To which it has been anſwered, that though it be not contrary to juſtice to exceed in rewards, that being matter of mere favour, it may be ſo to exceed in puniſhments.

It may be added, that a man in this caſe has nothing to complain of, ſince he has only his election. But though this may ſuffice to ſilence the ſinner, and make him acknowledge his deſtruction to be of himſelf, it does not ſatisfy the objection from the diſproportion between the crime and the puniſhment. All the conſiderations, therefore, hitherto alleged, proving ineffectual, our great author is left to ſolve the difficulty himſelf.

In order to this he obſerves, that the meaſure of penalties, with reſpect to crimes, is not only, nor always, taken from the quality and degree of the offence, much leſs from the duration and continuance of it; but from the reaſons of government, which properly require ſuch penalties as may ſecure the obſervation of the law, and deter men from the breach of it. Among men it is not reckoned injuſtice to puniſh murder, and many other crimes, which perhaps are committed in a moment, with perpetual loſs of eſtate, or liberty, or life; ſo that the objection of temporary crimes being puniſhed with ſuch long ſufferings is of no force.

In effect, what proportion crimes and penalties are to bear to each other, is not ſo properly a conſideration of juſtice, as of wiſdom and prudence in the lawgiver, who may enforce his laws with what penalties he pleaſes, without any impeachment of his juſtice, which is out of the queſtion.

The primary end of all threatening is not puniſhment but the prevention of it: God does not threaten that men may ſin, and be puniſhed; but that they may not ſin, and ſo eſcape: and therefore the higher the threatening runs, the more goodneſs there is in it.

After all, it is to be conſidered, ſays the good archbiſhop, that he who threatens has ſtill the power of the execution in his own hands. There is this difference between promiſes and threatenings; that he who promiſes, paſſes over a right to another, and thereby ſtands obliged to him, in juſtice and faithfulneſs, to make good his word: but it is otherwiſe in threatenings; he that threatens, keeps the right of puniſhing ſtill with him, and is not obliged to execute what he has threatened, any farther than the reaſons and ends of government require. Thus, God abſolutely threatened the deſtruction of Nineveh, and his peeviſh prophet underſtood the threatening to be abſolute, and was angry for being employed in a meſſage that was not made good; but God underſtood his own right, and did what he pleaſed, notwithſtanding the threatening he had denounced, and notwithſtanding Jonah was ſo touched in point of honour, that he had rather have periſhed than Nineveh ſhould have eſcaped. Tillotſon's Sermons, vol. i. p. 411. ed. fol. 1710.

To this reaſoning it has been replied, that where God has not only forbidden any ſinful action on ſuch a penalty, but has expreſly declared that he will execute that penalty, and that he will not ſuſpend the execution of it on any condition; though we could not ſay his *faithfulneſs* would be impeached by acting in a different manner, yet it would be hard to vindicate his *veracity*, eſpecially ſince he muſt know, even when he publiſhed the threatening, that it would not be executed, without the greateſt injury offered to the moral perfections of his nature. It alſo ſeems inconſiſtent with his *wiſdom* to have pronounced ſuch threatenings as theſe, and yet to have given mankind reaſon to believe that he will not and cannot execute them, which this objection ſuppoſes he has given; for a threatening, which the perſon threatened knows another cannot fulfil, is the vaineſt and moſt contemptible thing one can imagine: and it is worth obſerving, that Matt. xxv. 41. 46. is ſuch a *prediction* of a future and moſt ſolemn fact, as cannot with any decency be ſuſpected, and yet on this hypotheſis cannot be accounted for. Piſtorius, in his notes on "Hartley's Obſervations on Man," expreſſes his opinion, that by ſuppoſing that the threats of eternal puniſhment will not be executed in the utmoſt rigour of the words by which they are expreſſed, but that God has a right, like human legiſlators, to mitigate the ſeverity of his puniſhments according to circumſtances, we diſparage God's truth, and conſequently weaken the grounds on which our truſt in his word muſt be built. It will therefore be of no avail, as he thinks, to make a diſtinction between threats and promiſes, and to maintain that theſe muſt be certain and determinate, but that thoſe may be altered by the ſubſequent reſolves of God: and he conceives that the compariſon of human legiſlators and magiſtrates is not applicable to the preſent caſe. If we were once to admit that the intent of the divine threatenings is not equally ſtrict with the expreſſion, and that a mitigation of them may be expected, we ſhould be reduced to a dangerous uncertainty, which would greatly favour the hope of abſolute impunity; or, at leaſt, it would much weaken the impreſſion of the threats of puniſhment, and conſequently militate againſt the end for which they are deſigned. This writer, however, ſuggeſts, that theſe threats of eternal puniſhment, which are expreſſed in an unconditional and unlimited manner, may be underſtood in a conditional and limited ſenſe, without doing violence to the words, and without ſapping the foundations of God's truth. It may be ſuppoſed that eternal puniſhments are threatened to ſin and ſinners; that is, to the former as long as it is practiſed, or, as long as it exiſts; to the latter ſo far as they are ſinners, or ſo far as they continue to offend againſt the deſigns and ordinances of their creator. If the divine threats may be underſtood, with this limitation, it would not follow, that puniſhment muſt endure to all eternity, if, in ſome portion of eternity, ſin would ceaſe, and be annihilated, and the ſinner be ſome time converted. It may be ſaid they relate to ſin, and preſume its actual exiſtence. They concern the ſinner ſo far as he is a ſinner. If, then, he ceaſe to be ſo, it would ſeem that his puniſhment muſt alſo ceaſe. There are parallel modes of expreſſion in ſcripture, which appear to favour this interpretation. See 1 John, v. 18. Thus, it is ſaid with regard to the wicked, "the wrath of God remaineth upon him," with the limitation, that the wicked remain objects of God's wrath as long as they are wicked. See alſo, 1 Cor. vi. 9, 20: ſee alſo the paſſage above referred to, reſpecting the Ninevites. In ſimilar caſes, we may expect every thing from the mercy of God, and that his threats may be conditionally underſtood, when they are unconditionally expreſſed.

If it be aſked, why theſe threats were unconditionally ſpoken, and why this condition was not clearly expreſſed in words, it may probably be anſwered; an unconditional threat may make a deeper impreſſion on the mind of a ſinner, excite a terror that will be more efficacious for being united with doubt and anxiety, and thus produce a more earneſt repentance, in thoſe who require for their amendment a ſtrong ſenſe of terror. It is not difficult to perceive that the threats of eternal miſery, uttered in the ſcriptures againſt ſin and ſinners, are moſt ſuitably and efficaciouſly expreſſed in an unconditional manner. The inſtructions of ſcripture are confined to the teaching us, how we muſt lead our lives here, to ſecure happineſs hereafter. They extend not to a future life; they tell us not how we muſt conduct ourſelves in it: they only aſſure us, that we ſhall be in it what we are fitted for by our conduct in the preſent life, and that it will be a ſtate of the moſt juſt and adequate retribution of the works we perform, and the diſpoſition we cultivate here. They teach us, that he who oppoſes the order and purpoſes of his wiſe and benevolent creator will be the object of puniſhment and wretchedneſs, and that an oppoſition to the ordinances of God will be attended with eternal miſery. The ſcripture teaches us, that in the future world, the virtuous will be happy, and the wicked miſerable, without any commixture of circumſtances tending to weaken the proper fate of each. The queſtions, however, whether the good may there become worſe, or the wicked better; and what alterations the deſtiny of either would, in that caſe, undergo; on which, according to this ſtate of the caſe, reſts the whole doctrine of the future ſtate of the bleſſed, and of the damned, it leaves to be anſwered by philoſophy.

On the other hand, it has been alleged, as we have already obſerved, that eternal puniſhments for finite offences are inconſiſtent with the juſtice of the Divine Being. Moreover, it is ſaid to be inconſiſtent with the *goodneſs* and *mercy* of God, to give exiſtence to a number of rational creatures, who, he ſaw, would be eternally miſerable, and to leave them in ſuch circumſtances, as thoſe in which it is plain they are left, if all who die impenitent paſs into everlaſting torment. To this argument it has been replied, that God has given his intelligent and moral offspring ſufficient means for ſecuring everlaſting happineſs, ſo that this miſery is to be charged not upon him but upon themſelves. It has alſo been ſuggeſted, that the everlaſting miſery of ſome ſinful creatures may be the moſt effectual means of exhibiting and maintaining, in mutual harmony, all the divine attributes and the character of God as a moral ſovereign, and the majeſty and honour of his government. Beſides, if we comprehend within our ſurvey the whole extent of the divine government, in its relation to other habitable worlds, as well as to our earth, the number of wicked and miſerable beings may bear a ſmaller proportion to that of the good and happy than a grain of ſand does to the whole body of the ſun. But it is further objected, that however minute and inconſiderable our rank, number, or figure in the creation may be, if God intended man for happineſs, as he certainly did in the original conſtitution of his nature, it would be inconſiſtent with his *wiſdom*, to ſuffer his main end to be fruſtrated, in the eternal miſery of the greater part of the ſpecies. To this objection it has been anſwered, that we do not know that the greater part of mankind are eternally miſerable; as *perhaps* all infants may be ſaved, and ſuch univerſal virtue may hereafter prevail, for ſucceeding, and thoſe very long-lived and fruitful generations, as ſhall turn the balance of number, even among the *adult*, on the ſide of religion and happineſs; and ſome have even queſtioned, whether it is proper to ſay, that the ultimate end of God in the creation of man was the final happineſs of the greater part of the ſpecies.

Dr. Hartley (ubi ſupra) obſerves, that if the eternity of future puniſhment be a doctrine of the Chriſtian religion, it is ſo eſſential, that it could not have been omitted by any inſpired writer, nor fail to have been declared in the moſt expreſs terms, which, he thinks, cannot be ſaid of any of the texts alleged to prove it. The words tranſlated *eternal* and *for ever*, muſt have been ambiguous to the Jews, *i. e.* to the firſt Chriſtians; and the figurative expreſſion, "their worm dieth not" &c. is far leſs determinate than many phraſes, which our Saviour might have choſen, had it been his intention to denounce abſolutely eternal miſery. This critic adds, that it does not appear from the writings of the moſt ancient fathers, that they put ſuch a conſtruction upon the words of the New Teſtament; and the omiſſion of this doctrine in the ancient creeds ſhews, that it was no original doctrine, or not thought eſſential; which yet could not be, if it was believed; or that many eminent perſons for ſome centuries were of a contrary opinion. And indeed the doctrine of purgatory, taught by the Papiſts, ſeems to be a corruption of a genuine doctrine held by the ancient fathers concerning a purifying fire. It may perhaps be ſaid, ſays this author, that the abſolute eternity of puniſhment was not received, till after the introduction of metaphyſical ſubtleties relating to time, eternity, &c. and the ways of expreſſing theſe, *i. e.* not till after the Pagan philoſophy, and vain deceit, had mixed itſelf with, and corrupted Chriſtianity. He adds, it by no means appears to be conſonant to the nature of the Chriſtian religion to interpret the New Teſtament in a ſtrict literal manner, or adhere to phraſes in oppoſition to the general tenor of it; and therefore we are rather to follow the general tenor of it than to adhere to particular expreſſions. Hence it follows, that we ſhould advert to thoſe other paſſages whoſe ſtrict and literal ſenſe is contrary to the doctrine of eternal miſery. In ſuch a caſe it ſeems, that the infinite goodneſs of God, ſo many ways declared in the ſcriptures, muſt ſoon turn the ſcale. For the ſcriptures muſt be made conſiſtent with themſelves, and the veracity and goodneſs of God ſeem much rather to oblige him to perform a promiſe than to execute a threatening.

It has been ſaid, however, that it is dangerous, in a moral view, to announce the denial of the eternity of hell torments. But this, it has been replied, appears to be unfounded. On the other hand it has been ſaid, that the avowal of this doctrine may drive men to deſpair, that it gives religion a gloomy aſpect, deprives it of its pleaſing form, and ſeems more adapted to make the Deity terrible to us than an object of love. Beſides, the majority of mankind are incapable of forming a clear, determinate, and effectual idea of eternal puniſhment. The expreſſion is too abſtract, not ſenſible, not concrete enough to affect the minds of ſuch men, who cannot conceive abſtract expreſſions otherwiſe than by applying them to particular caſes. Tell ſuch a man that he ſhall remain a very long time in priſon, he will be much leſs affected, than if a certain number of years were mentioned. The expreſſion, *eternal puniſhment*, will convey to him no idea; as he will imagine it to repreſent a certain number of years, ſo that the proper idea of eternity, at which he cannot arrive, will be loſt to him, or at leaſt will make no impreſſion on his mind, which a determinate number of years would not have done with equal force and certainty. Let us, however, ſuppoſe that he can form a juſt idea of eternal duration, probably one of the two following conſequences would enſue. His religion, if it did not make him totally abandon it, and fall into practical Atheiſm, would be chiefly ſuperſtition, conſiſting more in fear and terror than love and confidence in God; or he would ſeek to leſſen his burdenſome fear and diſquiet by the hope that the number of the damned, amongſt believing Chriſtians at leaſt, muſt be extremely ſmall; that a man, baptized in the name of Chriſt, could not draw upon himſelf damnation but by an eminently wicked life, or the moſt deteſtable religious errors; and that, if he were not worſe than the majority, or guilty of immediately offending God; and of crying injuſtice againſt his neighbour, but took care to avoid crimes forbidden by the law, he ſhould eſcape eternal puniſhment, and conſequently all puniſhment, as he knows no other. Beſides, as every one believes, that there is a certain proportion between crimes and their puniſhment, both in degree and duration, it would be natural for perſons, chargeable with what they might deem ſmall offences, to conſider eternal puniſhment as too diſproportionate to the ſum of their guilt for them to fear it; or not to hope being ſecured from it by an adherence to the worſhip of the church to which he belongs, a right faith, and an obſervance of the ceremonies of religion.

Amongſt thoſe who deny the eternity of hell-torments, a queſtion has occurred of conſiderable importance; and that is, how theſe torments terminate? Some have maintained, that they end, after a certain degree of ſuffering correſponding to the demerit of the offender, in the total deſtruction or annihilation of the conſcious being. This is what ſome have ſuppoſed to be the "ſecond death" denounced againſt the workers of iniquity in the book of Revelation (ch. ii. 11. xx. 16. 24.); and the "everlaſting deſtruction from the preſence of the Lord," mentioned by the apoſtle Paul. (2 Theſſ. i. 9.) This is what the advocates of this opinion ſuppoſe to be meant by our Lord, when he ſays to his diſciples, "Fear him who is able to deſtroy both ſoul and body in hell." (Matt. x. 28. Luke xii. 5.) Here, they ſay, he plainly propoſes the *deſtruction* of the ſoul (not its endleſs pain and miſery) as the ultimate effect of the divine diſpleaſure, and greateſt object of our fear. Again, when he ſays, (Matt. xxv. 46.) "Theſe ſhall go away into everlaſting puniſhment, but the righteous into life eternal;" it appears evident, it is ſaid, that by that "eternal puniſhment," which is ſet in oppoſition to "eternal life," is not meant any kind of "life," however miſerable, but the ſame which the apoſtle expreſſes by "everlaſting deſtruction, &c." It is further alleged, that the term "death" is the moſt frequently made uſe of to ſignify the end of wicked men in another world, or the final effect of divine juſtice in their puniſhment. (Rom. vi. 23. James, i. 15.) Death, it is ſaid, when applied to the end of wicked men in a future ſtate, properly denotes "their ceaſing to exiſt," or a total "extinction of life and being." It is added, in confirmation of this ſenſe of the word, that the bodily diſſolution which all men undergo in this world is uſually termed by our Saviour and his apoſtles, not "death," but "ſleep;" becauſe, from *this* death, the ſoul ſhall be raiſed to life again; but from the *other*, that which is fully and properly "death," and of which the former is but an image or ſhadow, there is no recovery; it is an "eternal death," or an "everlaſting deſtruction." The figures, it is alſo ſaid, by which the eternal puniſhment of wicked men is deſcribed, agree to eſtabliſh the ſame doctrine. One figure is that of combuſtible materials thrown into a *fire*, and which will conſequently be entirely conſumed, if the fire be not *quenched*. (Matt. xxv. 41.) Accordingly, it is ſaid, that the image of *fire unquenchable or everlaſting* is not intended to ſignify the degree or duration of *torment*, but the abſolute certainty of *deſtruction* beyond all poſſibility of a recovery. Thus, the cities of Sodom and Gomorrha are ſaid to have "ſuffered the vengeance of an eternal fire;" that is, they were ſo effectually conſumed and deſtroyed, that they could never be rebuilt. (Compare Matt. xviii. 8. Mark, ix. 43. 46. Iſaiah, lxvi. 24. ch. xxxiii. 14. Rev. xx. 14.) It is farther obſerved, that death, ſpiritual and eternal, or annihilation, is properly ſtated in the New Teſtament an *everlaſting* puniſhment, as it is irrevocable and unalterable for ever. Others, as Origen among the ancients, and ſeveral modern writers, particularly Dr. Hartley and chevalier Ramſay, have apprehended, that at length all the damned, not excepting the fallen angels and Satan himſelf, will be ſo reformed by the diſcipline of their puniſhment, as to be brought to real penitence and piety; upon which they will not only be releaſed from their priſon, but admitted to partake with the bleſſed in everlaſting happineſs. Thoſe ſcriptures, in which God is ſaid to "deſire" and "will the ſalvation of all," as well as the arguments that are alleged to demonſtrate the abſurdity of eternal puniſhments, compared with the arguments both from reaſon and ſcripture, in proof of the immortality of the ſoul, are urged to this purpoſe. In proof of the final happineſs of all mankind, it has been urged, that all the evils that befal either body or mind in this ſtate, have a tendency to improve one or both. Arguing from analogies taken from this ſtate concerning that which is future, we ought to infer, that the evils of a future ſtate will have the ſame tendency and final cauſe with thoſe of the preſent life, *viz.* to meliorate and perfect our nature, and to prepare them for ultimate unlimited happineſs. Moreover, the generation of benevolence, by the natural and neceſſary tendency of our frames, is a ſtrong argument for the ultimate happineſs of all mankind. It is inconſiſtent to ſuppoſe that God ſhould thus compel us to learn univerſal unlimited benevolence; and then not provide food for it. This and the preceding argument are both ſupported, independently of the divine benevolence, by the analogy and uniformity apparent in the creation, by the mutual adaptations and correſpondencies of things exiſting at different times, and in different places; but they receive much additional force from the conſideration of the goodneſs of God, demonſtrated by other evidences. Moreover, the infinite goodneſs of God is an argument for the ultimate happineſs of mankind; and the infinite happineſs and perfection of God afford, not only an argument, but, as it were, a pledge of the ultimate happineſs and perfection of all his creatures. The impartiality of God, in reſpect of all his creatures, ſeems to argue, that, if one be made infinitely happy upon the balance, all will be made ſo. There are alſo many obvious and undeniable arguments, deduced from the relative attributes of God, which firſt exclude the eternal miſery of his creatures, and then eſtabliſh their ultimate happineſs by neceſſary, or, at leaſt, by probable conſequences. Then the whole tenor of nature repreſents God to us as our creator, preſerver, governor, friend, and father. Will a being, ſuſtaining theſe relations to mankind, perpetuate an exiſtence, which ceaſes to afford happineſs, and can only produce miſery without end? The governor and judge of the world will do right. But, in whatever manner ſin may be eſtimated, it muſt be finite, becauſe it is the work of a finite mind, of finite principles and paſſions: and, therefore, to ſuppoſe a ſinner to be abſolutely condemned to infinite irreverſible miſery, on account of the ſins of this life, ſeems highly injurious to the juſtice of God. And to ſay that this infinite irreverſible miſery is not merely the conſequence of the ſins of this life, but alſo of thoſe to be committed in another, is to give a power of repenting and becoming virtuous, as well as of ſinning, in another life; whence the ſentence might be reverſed, contrary to the ſuppoſition. Beſides, it ſeems to be inconſiſtent with the character of an infinitely merciful father to doom his children to eternal miſery, without farther trials than thoſe which this life affords. Do we not ſee numberleſs inſtances of perſons at preſent abandoned to vice, who, nevertheleſs, according to all probable appearances, might be reformed by a proper mixture of correction, inſtruction, hope, and fear? And what man is neither able nor willing to do, may and muſt, as it ſhould ſeem, be both poſſible to God, and actually effected by him. He muſt have future diſcipline of a ſeverer kind for thoſe whom the chaſtiſements of this life did not bring to themſelves: yet ſtill they will be all fatherly chaſtiſements, intended to amend and perfect, not to be final and vindictive. By ſuch reaſonings, purſued much farther than our limits will allow of our introducing them, has Dr. Hartley attempted to ſhew, that it is unſuitable to the benevolence of the Deity, or to the relations which he bears to us, according to the light of nature, to make infinite irreverſible miſery commencing at death, the puniſhment of the ſins of this life; and by a farther proſecution of the ſame method of reaſoning, he conceives, we ſhall be led firſt to exclude miſery upon the balance, and then to hope for the ultimate unlimited happineſs of all mankind.

This author next inveſtigates the doctrines of ſcripture on this ſubject; and in this inveſtigation he endeavours to ſhew, firſt, that the texts alleged to prove the abſolutely eternal and irreverſible miſery of the wicked in another life, may be juſtly interpreted in a different ſenſe; and, ſecondly, that other paſſages eſtabliſh the contrary doctrine of the ultimate happineſs of all mankind. He adds, in a more general way, that all the arguments for the ultimate happineſs of all mankind, taken from the relations which we bear to God, as our creator, preſerver, governor, father, friend, and God, are abundantly atteſted by the ſcriptures; and that the ſcriptures furniſh ſome arguments for the ultimate reſtoration and happineſs of all mankind, which now ſeem ſufficiently full and ſtrong, and which yet could not be underſtood in former ages, or, at leaſt, we ſee, in fact, they were not. Of this kind is the hiſtory of the Jewiſh ſtate, with the prophecies relating to it. The Jewiſh ſtate, Dr. Hartley conceives, as a type of each individual in particular, on one hand; and of mankind in general on the other. It is alſo foretold, that Chriſt will "ſubdue all things to himſelf;" and ſubjection to Chriſt, according to the figurative prophetic ſtyle of the ſcriptures, is happineſs, not merely ſubjection by compulſion, like that to an earthly conqueror. Similar paſſages occur in other parts of the Old and New Teſtaments, which the author adduces in ſupport of the general argument. Others, however, are of opinion, that the paſſages cited by Dr. Hartley in favour of the reſtoration of all mankind to happineſs, may be more ſatisfactorily interpreted in another way, ſo as to afford no ground for this ſentiment.

If we combine the two opinions above ſtated, the reſult may probably furniſh another ſcheme with regard to the future puniſhment of mankind, leſs liable to objection, more conformable to the ſuggeſtions of reaſon and experience, more conſiſtent with the rectitude and benevolence of the divine government, and more ſuitable to the general language and to particular paſſages of ſcripture, than either of the other opinions ſeparately conſidered. Whilſt ſome of the human race conſigned to merited puniſhment may be ultimately deſtroyed, others may be ultimately happy. Accordingly, vice or ſin, in its principles, diſpoſitions, and habits, is no leſs pernicious and fatal to the ſoul of man, than malignant diſorders are to his corporeal frame. It deranges his mental and moral powers; it vitiates their ſoundneſs and deadens their activity: and in its progreſs and prevalence tends to the death or deſtruction of the intelligent and immortal ſpirit. We may partly infer, from the preſent effects of human degeneracy, what may be its probable conſequences and iſſue in a future ſtate. As no preſent inſtruction or correction is ſufficient to reclaim the licentious and profligate, and to recover them to penitence and virtue, it is poſſible, and, indeed, not very unlikely, that the more ſevere diſcipline of a ſtate of retribution may prove ineffectual to reſtrain rooted diſpoſitions of vice, and to reform obſtinate and imperious habits, ſo that thoſe who indulge them ſhall proceed from one ſtage of moral depravity to another, till they become altogether irreclaimable. As ſome bodily diſorders advance from one ſtage of inveteracy to another till they are abſolutely irremediable, and muſt ultimately terminate in diſſolution, ſo vice, conſidered as a growing and deadly diſeaſe of the mental conſtitution, may end in its total derangement and final deſtruction. If ſuch caſes ſhould occur, it ſeems to be inconſiſtent neither with juſtice or benevolence, nor with any known meaſure of the divine adminiſtration, to expunge characters of this kind from the book of life, and to conſign the wicked, thus incapable of reformation, to utter annihilation. Others, whom the milder methods of perſuaſion and diſcipline, reſtricted to the preſent probationary ſtate, were inſufficient to preſerve from vice and to form for virtue and happineſs, may derive moral benefit from the penal effects of preſent miſconduct in a future world; the ſeverer diſcipline of a ſtate of anguiſh and miſery may recover them to a right mind; and the chaſtiſements of juſtice, inflicted in a leſs or greater degree and of ſhorter or longer duration, as their caſes may require, may fit them for being objects of benevolence, and for participating in various proportions, correſponding to their diſpoſitions and capacities, the bleſſedneſs of thoſe whom God approves and favours in the celeſtial manſions. Upon this ſcheme, none are excluded from happineſs, who are capable of enjoying it; nor are any doomed to extinction, who are not incapable of reformation by any of the milder or more awful diſpenſations of that righteous and benevolent providence, which extends its ſovereignty to this world and to that which is to come.

To all ſchemes, which ſuppoſe the termination of the future puniſhment of the wicked by annihilation, or the limitation of its continuance, and the ultimate happineſs of thoſe who are reformed by it, it has been objected by the advocates of its perpetuity and abſolute eternity, that, if they were true, it would not be expedient to promulgate them. Men, it has been ſaid, are very wicked, notwithſtanding the fear of eternal puniſhment; and therefore would probably be more wicked, if this fear were removed, and a hope given to the moſt licentious and profligate of altogether being deſtroyed, or of ultimately attaining everlaſting happineſs. Dr. Hartley, and his annotator Piſtorius, have anticipated, and endeavoured to obviate, this objection. The former obſerves, that this opinion is already publiſhed ſo far, that few irreligious perſons can be ſuppoſed to believe the contrary much longer; or, if they do believe abſolutely eternal puniſhment to be the doctrine of the ſcriptures, they will be much induced thereby to reject revealed religion itſelf. It ſeems, therefore, to be now a proper time to inquire candidly and impartially into the truth. Beſides, it does not ſeem, that even the motives of fear are leſſened to conſiderate perſons, by ſuppoſing the fire of hell to be only a purifying one; for it is clear, from the ſcriptures, that the puniſhment will be very dreadful and durable, inſomuch, that we can ſet no bounds either to the degree or duration of it: they are therefore practically infinite. Moreover, the motives of love are infinitely enhanced by ſuppoſing the ultimate unlimited happineſs of all, whilſt we pity the moſt wicked at preſent, as "veſſels of wrath," and yet live in certain hopes of rejoicing with them at laſt; labour to bring this to paſs, and to haſten it; and conſider, that every thing is good, and pure, and perfect, in the ſight of God. Piſtorius repreſents the caſe ſomewhat differently. Suppoſing, he ſays, it could be proved that the fire of hell is a purifying fire, would it be adviſable to advance this, and directly to maintain it, in mixed ſocieties? This queſtion he has weighty reaſons for anſwering in the negative. Our ſocieties, or the greater part of them at leaſt, may not be ſufficiently prepared for the reception and right application of this doctrine. The preacher, he thinks, takes the ſafeſt way, who, in his public diſcourſes on this ſubject, goes no farther than revelation itſelf, the words of which he undertakes to explain and enforce. It doth not behove him to diſpel that wiſe and ſalutary darkneſs with which ſcripture has enveloped the future ſtate of mankind. Hitherto, he adds, the torments of hell have ever been repreſented as eternal. Our auditors are ſo accuſtomed to this notion, that they have aſſociated the idea of eternity with that of hell-torments, in ſuch a manner as to conſider it an eſſential part of them. Many unthinking men, therefore, hearing that it is not impoſſible for them to be converted in eternity, and that probably in ſome period of it their torments would ceaſe, might imagine that the pains of hell themſelves may likewiſe be annihilated, or at leaſt no longer figure them of ſufficient weight to be affected by them; in the ſame manner as a man who is accuſtomed to ſee and to ſuffer ſevere puniſhment, little heeds a milder chaſtiſement, though it would be ſenſible and efficacious enough of itſelf, or in other circumſtances; or, as a man who has borne a very heavy burden, when a lighter is placed on his ſhoulders, is inſenſible of the load. But if it be admitted, on the other hand, that the ſcriptures do not clearly aſſert the impoſſibility of a converſion and alteration in eternity; we muſt go no further on that ſide than they do, and at leaſt avoid making it a point of our public duty to demonſtrate it to be impoſſible. Would it not be moſt adviſable to treat the ſubject with the ſame caution, and to paſs it over for the ſame reaſons, as a prudent and conſcientious preacher would treat cautiouſly, and perhaps wholly paſs over the ſimilar point, of the poſſibility of a death-bed converſion?

Hell, *Hades*, is ſometimes alſo uſed, in the ſcripture ſtyle for *death* and *burial*; becauſe the Hebrew and Greek names ſignify ſometimes the place of the damned, and ſometimes ſimply the grave. See Ades.

The word hell is of Saxon extraction, and ſignifies a *covered place*: and thence, by an eaſy tranſition, the place of the dead, or the inviſible ſtate into which death removes mankind. From the ſame original, we ſtill retain in our language the word *heal*, or *hele*, which ſignifies *to cover over*: and in this ſenſe lord King maintains that the word hell is uſed and ought to be underſtood in the Apoſtles' Creed: the meaning of the article relating to our Saviour's deſcent into hell being no other than this, that his ſoul, being ſeparated from his body by a real tranſition of local motion, went into an unſeen region of ſpirits, where, according to the laws of death, it remained among other pious departed ſouls till the reſurrection of his body. Others contend that he deſcended into the place of torment, where he triumphed over the devils, &c. Crit. Hiſt. of the Apoſtle's Creed, p. 181, &c. Pearſon on the Creed, p 225.

The Romaniſts add, that he there comforted the ſouls in purgatory, and brought away the ſpirits of the patriarchs, and other juſt perſons, departed till that time, carrying them with him into paradiſe.

In the Romiſh church, that part of hell, wherein thoſe were retained who died in the mercy and favour of God before our Saviour's ſufferings, is called limbus. See Limbus and Purgatory.

Hell-*gate*, in *Geography*, a ſtrait of America, near the W. end of Long iſland ſound, oppoſite to Harlem in York iſland, and about 8 miles N.E. of New York city, remarkable for its whirlpools, which make a tremendous roaring at certain times of the tide. Theſe whirlpools are occaſioned by the narrowneſs and crookedneſs of the paſſage, and a bed of rocks which extends quite acroſs it. A ſkilful pilot may conduct a ſhip of any burden, with ſafety, through this ſtrait, at high water with the tide, and at low water with a fair wind. The Indians have a tradition, that, in ſome remote period, their anceſtors could ſtep from rock to rock, and croſs this arm of the ſea on foot at Hell-gate.

Hell, *Valley of*, a dangerous defile, or paſs, from the Briſgaw, through the Black foreſt into Swabia, E. of Friburg.

Hell *Skerries*, a cluſter of ſmall iſlands of Scotland, near the weſtern coaſt; 10 miles W. of Rum iſland. N. lat. 57°. W. long. 6° 53′.

Hell-*weed*, in *Rural Economy*, a common name often employed provincially to ſignify bindweed.

HELLANA, in *Ancient Geography*, a town of Italy, in Etruria, S.E. of Piſtoria.

HELLAS, an appellation which is ſometimes uſed to comprehend the whole of Greece; but more commonly for that part of Theſſaly which was inhabited by the Hellenes, the ſons of Deucalion. According to Ariſtotle, in his Treatiſe of Meteors (l. i. c. 14.) the country, denominated Hellas, was, in ancient times, that which comprehended the environs of Dodona and the river Achelous.

Hellas, a town of Theſſaly, according to Strabo; who ſays, that the inhabitants of Melitæa ſuppoſed it to be at the diſtance of ten ſtadia from their city. Dicearchus ſays, that a town of this name was built by Hellen, father of Eolus, and that it was ſituated in Theſſaly, between Pharſalia and Melitæa. It is probable, that the name of Hellas commenced when the Pelaſgi united together and formed a claſs of people under the denomination of Hellenes. Accordingly the central part of Theſſaly was called Hellas, or the country of the Hellenes.

HELLCAR Sough, or *Hillcar Water-level*, in *Geography*, is one of the moſt conſiderable ſubterraneous paſſages in Derbyſhire, or perhaps in the kingdom, for diſcharging the waters of mines. It begins near to the Derwent river, at a place called Hellcar, almoſt oppoſite to Darley church, and proceeds about a mile in limeſtone-ſhale and ſhale-grit, when it croſſes (under Stanton Moor) a ridge of the firſt limeſtone, for about 200 yards, and then proceeds about $1\frac{5}{8}$ mile further in ſhale, when it again interſects the firſt limeſtone, and proceeds $\frac{1}{4}$ of a mile in it, along Black-ſhale-pits mine, and into Craſh-purſe and Bacon-cloſe mines, near to Yolgrave, in which two laſt mines, water-preſſure engines on a curious conſtruction, are worked by letting a part of the Lathkil river, fall 144 feet into this ſough. (See the Philoſophical Magazine, vol. xxxvii, p. 5, and Mr. Farey's Report on Derbyſhire).

This ſough is elliptical in its form, five feet wide, and ſeven or eight high, and has water ſufficient for long boats carrying 18 or 20 tons, which were uſed in bringing out the ſtuff excavated in the driving of it. The vaſt height of Stanton Moor prevented any air-ſhafts being ſunk, until, after a dreadful exploſion of fire, damp had happened, and killed the workmen. A ſhaft, ſunk on the N.W. corner of the moor, is about 360 feet deep, the ſough being about half that depth where it croſſes under Eccleſter Brook. The expence of driving this ſough is ſaid to have exceeded 50,000*l*. excluſive of a long branch from it into B. Thornhill's mines, in Stanton in the Peak.

HELLEBERG, a town of Sweden, in the province of Smaland; 23 miles N.W. of Calmar.

HELLEBORE, in *Botany*. See Helleborus.

Hellebore, *Baſtard*. See Serapias.

Hellebore, *with a globoſe flower*, or *globe ranunculus*. See Trollius.

Hellebore, *Black*. See Helleborus.

Hellebore, *Fennel-leaved black*. See Helleborus.

Hellebore, *White*. See Veratrum.

Hellebore, ΕΛΛΕΒΟΡΟΣ, or *Elleborus*, in the *Materia Medica*, a medicinal plant, reputed among the ancients a ſpecific for the cure of melancholy and madneſs.

There are two kinds of hellebore, the *black* and the *white*. For their reſpective botanical characters, ſee Helleborus and Veratrum.

The black hellebore, called alſo "Melampodium," and, becauſe in mild weather it flowers in January, Chriſtmas flower, is a native of Auſtria and Italy, and was unknown in this country till it was cultivated by Mr. John Gerard in 1596. The root, which is the part uſed in medicine, is perennial, rough, knotted, and externally of a black colour, internally whitiſh, and ſends off many ſtrong round long fibres. When freſh its taſte is bitteriſh, and ſomewhat acrid, and according to Grew, (Anatomy of Plants,) benumbs the tongue, when chewed and retained for ſome time upon it, and affects it with a kind of paralytic ſtupor, like the ſenſation produced by eating or ſupping any thing too hot. It has alſo a nauſeous acrid ſmell; but on being long kept, its ſenſible qualities and medicinal activity are much diminiſhed. Bergius diſtinguiſhes its virtues according to its different ſtates of dryneſs, thus: "virtus; *rec.* venenata, rubefaciens, veſicans; *recenter ſiccatæ;* emetica, purgans, emmenagoga, antiphthiriaca, ſternutatoria; *diu conſervatæ*; vix purgans, alterans, diuretica." Many proofs occur of the poiſonous effects of this root, and therefore it ſhould be uſed with caution. Among the ancients it was thought, principally from its purgative quality, to poſſeſs great efficacy in maniacal diſorders, and particularly with a view to the evacuation of the *atra bilis*, from which they ſuppoſed theſe mental diſeaſes to proceed. Accordingly they ſpeak of it in terms of high commendation, and in their familiar phraſes refer to its wonderful efficacy; *e. g.* "*caput* helleboro *dignum*;" Horace ſays, "Miſers need a double doſe of hellebore.

> "Danda eſt hellebori multo pars maxima avaris;
> Neſcio an Anticyram ratio illis deſtinet omnem."
> Hor. Sermon. l. ii. ſat. 3. v. 82.

The iſland of Anticyra, ſituated over-againſt mount Oeta, was famous for the growth of this plant as well as of the white hellebore; here it was found in its greateſt perfection, and uſed with the beſt effect; whence aroſe the proverb, "Naviget Anticyram," ſend him a voyage to Anticyra, ſpoken of a madman. It has been doubted, however, whether our hellebore be the ſame ſpecies with that which is ſaid to have grown in the iſland of Anticyra, and about mount Olympus. From the accounts of Tournefort and Bellonius, who botanized theſe places, a ſpecies of this plant was found in great plenty, which the former ſuppoſes to be the hellebore of Hippocrates. It differs indeed from the ſpecies figured by Woodville, by having a large branched ſtem, and alſo by its effects, for he found, that a ſcruple of the extract brought on violent ſpaſms and convulſions; but many plants are known to vary as much by a removal from their native ſoil and climate. As evacuations, which are often found neceſſary in various caſes of alienations of mind, may be procured with greater certainty and ſafety by other medicines, this catholicon of antiquity is almoſt univerſally abandoned in modern practice. It is now regarded chiefly as an alterative, and thus employed in ſmall doſes for attenuating viſcid humours, promoting the uterine and urinary diſcharges, and opening inveterate obſtructions of the remoter glands. In plethoric habits it often proves a very powerful emmenagogue, where ſteel is ineffectual or improper. It is alſo recommended in dropſies, and ſome cutaneous diſeaſes, by Avicenna, Geſner, Klein, Milman, and Bacher, whoſe famous tonic pills are thus prepared; ℞ Ext. Helleh. nig. Myrrhæ ſolutæ aa ʒj Pulv. Card. bened. ʒiij M. F. S. A. c. Maſſa aere ſicco exſiccanda, donec formandis pilulis apta ſit, ſingul. ad gran. Semiſs.

The watery extract of this root, made as directed in the pharmacopœias, is one of the beſt and ſafeſt preparations of it, when deſigned for a cathartic, as it contains both the purgative and diuretic parts of the hellebore; it may be given in a doſe from 10 grains to a ſcruple or more. The irritating power of its active matter is conſiderably abated by the boiling. (Lewis Mat. Med.) A tincture of this drug, prepared by macerating for 14 days, black hellebore root ſliced, 4 oz. in two pints of proof ſpirit, and ſtraining, is preferred for the purpoſes of an alterative and deobſtruent; of which a tea-ſpoonful twice a day may be conſidered as a common doſe.

The white hellebore, or "veratrum," is a native of Italy, Switzerland, Auſtria, and Ruſſia; it was cultivated in this country by Gerard, previouſly to the year 1596. The root is perennial, about an inch thick, externally brown, internally white, and beſet with many ſtrong fibres. It is not certain that our white hellebore is the Ελλεβορος λευκος of the Greek writers. Their identity is inferred more from the ſimilarity of their effects upon the body than from an agreement in their botanical characters. Hippocrates frequently mentions hellebore ſimply, or generically, by which it is ſaid, the white is to be underſtood, as he adds the words "black or purging" when the other ſpecies is meant; and as the purgative powers of veratrum are known to be weaker than thoſe of the black hellebore, the diſtinction is ſo far applicable to the effects now experienced of the roots of our hellebores.

Every part of the plant, as well as the root of white hellebore, is very acrid and poiſonous; ſo that its leaves and even ſeeds prove deleterious to different animals. The dried root has no peculiar ſmell, but a durable nauſeous acrid bitteriſh taſte, burning the mouth and fauces; when powdered and applied to iſſues or ulcers it produces griping and purging; if ſnuffed up the noſe it is a violent ſternutatory. Geſner made an infuſion of half an ounce of this root with two ounces of water; of this he took two drams, which produced great heat about the ſcapulæ, and in the face and head, as well as the tongue and throat, followed with ſingultus, which continued till vomiting was excited. The root, taken in large doſes, diſcovers ſuch acrimony, and operates upwards and downwards, with ſuch violence, that blood is uſually diſcharged; it likewiſe acts very powerfully upon the nervous ſyſtem, producing great anxiety, tremor, vertigo, ſyncope, loſs of voice, interrupted reſpiration, ſinking of the pulſe, convulſions, ſpaſms, cold ſweats, &c. Upon opening thoſe who have died by the effects of this poiſon, the ſtomach diſcovered marks of inflammation, with corroſions of its interior coat, and the lungs have been found inflamed, and their veſſels much diſtended with dark blood. The ancients, notwithſtanding the virulence of this drug, employed it internally in ſeveral diſeaſes, eſpecially thoſe of a chronic and obſtinate kind, as mania, melancholia, hydrops, elephantiaſis, epilepſia, vitiligo, lepra, rabies canina, &c.; conſidering it ſafer when it excited vomiting, which was the firſt effect Hippocrates wiſhed to perceive. To perſons of feeble conſtitutions, and to thoſe who laboured under pulmonary complaints, it was conſidered as unſafe. Mayerne gave from two to three grains of an extract of this root with conſiderable advantage in maniacal caſes, where no remarkable evacuation took place; and Con. Geſner, who made many experiments upon this drug, adminiſtered it, not as an evacuant but as an alterative. Greding, however, made the moſt ample trial of it, and he found that ſeveral maniacal and melancholic caſes were relieved by it, ſome were completely cured, and others derived no benefit. It was the bark of the root, collected in ſpring, which he gave in powder, beginning with one grain, and increaſing the doſe according to its effects. He ſometimes uſed the extract prepared after Stoerck's manner. In almoſt all caſes, the medicine acted more or leſs upon all the excretions; vomiting and purging were generally produced, and the matter expectorated was conſtantly mixed with bile; a florid redneſs often appeared in the face, with cutaneous effloreſcences on the body; and in ſome, pleuritic ſymptoms with fever ſupervened ſo as to require bleeding, and the more alarming affections of ſpaſms and convulſions were not unfrequent. Critical evacuations were often evident, many ſweated profuſely, in ſome the urine was conſiderably increaſed, and in others, the ſaliva and mucous diſcharges. Alſo uterine obſtructions, of long continuance, were often removed by this drug. White hellebore has alſo been found uſeful in epilepſy, and other convulſive complaints; but the diſeaſes in which its efficacy ſeems leaſt equivocal, are thoſe of the ſkin, as ſcabies and different prurient eruptions, herpes, morbus pediculoſus, lepra, ſcrophula, &c.; and in many of theſe it has been ſucceſsfully employed both internally and externally. As a powerful ſtimulant, and irritating medicine, its uſe has been recurred to only in deſperate caſes, and it has been adminiſtered in ſmall doſes, and in a diluted ſtate; the quantity being increaſed according to its effects.

The decoction of the pharmacopœia is prepared by boiling an ounce of white hellebore root powdered, in two pints of water down to a pint, ſtraining the decoction, and after it has cooled, adding two fluid-ounces of rectified ſpirit. An ointment is prepared by mixing two ounces of powdered root with eight ounces of prepared lard, and 20 minims of oil of lemons. N.B. The minim is the 61,440th part of the ſtandard wine gallon of the exchequer; or the 60th part of a fluid-drachm.

The fœtid hellebore, bear's foot, or helleboraſter, found wild in many parts of England, and flowering about February, has a ſmall root, beſet with a prodigious number of ſlender dark-coloured fibres. This plant has been lately introduced by the London college into the pharmacopœia, probably, it is ſaid, upon the authority of Dr. Biſſet, who recommends the leaves as poſſeſſing extraordinary anthelminthic powers. The ſmell of the plant, when recent, is very fœtid, the taſte is bitter, and remarkably acrid, ſo as to excoriate the mouth and fauces; it operates commonly as a cathartic, ſometimes as an emetic, and in large doſes it proves highly deleterious. The leaves, the only part noticed by the college, have been long domeſtically employed in this country for their vermifuge effects. Gerard mentions them in this reſpect; and Dr. Biſſet ſays "the great baſtard black hellebore, or bear's foot, is by far the moſt powerful vermifuge for long round worms, of any I have yet experienced." "The decoction of about a dram of the green leaves, or about 15 grains of the dried leaves in powder, is the uſual doſe adminiſtered to children betwixt four and ſeven years of age; a full or ſufficient doſe generally proves more or leſs emetic, and often looſes the belly a little. It is uſually repeated on two, and ſometimes three ſucceſſive mornings; the ſecond doſe has commonly a greater effect than the firſt, and never fails to expel round worms by ſtool, if there be any lodged in the alimentary tube."

"The juice of the green leaves," ſays he, "made into a ſyrup with coarſe ſugar, is almoſt the only vermifuge I have uſed againſt round worms for three years paſt." Before preſſing out the juice, I moiſten the bruiſed leaves, which are a little ſucculent, with ſome vinegar, which is a corrector of this medicine, and prevents it from inducing great ſickneſs or much vomiting. Of this ſyrup I give one tea-ſpoonful at bed-time, and one or two in the morning, on two or three ſucceſſive days, to children betwixt two and ſix years of age, increaſing or diminiſhing the doſe a little, according to the ſtrength of the patient." (Eſſay on the Medical Conſtitution of Great Britain.) When this does not open the body, an equal quantity of tincture of rhubarb is directed to be added. Dr. B. ſpeaks of this plant as uſeful alſo in ſome aſthmatic and hypochondriacal diſorders. We have tried, ſays Dr. Woodville, the authelminthic effects of this plant, upon a girl of twenty years of age, with conſiderable advantage. Woodv. Med. Bot.

HELLEBORE, in *Gardening*, the common name of a well-known plant. See HELLEBORUS.

HELLEBORINE, in *Botany*, ſo called on account of the reſemblance of its leaves to the *Helleborus albus* of the older botaniſts, *Veratrum album* of Linnæus. Bauh. Pin. 186. Tourn. Inſt. 436. t. 249. See EPIPACTIS.

HELLEBORUS, ελλεβορος μελας of Dioſcorides, or black hellebore. The name is, with moſt appearance of probability, derived from ἑλειν, *to kill*, and βορα, *food*, or *fodder*, in alluſion to the poiſonous qualities, for which it has been famous throughout all antiquity. Linn. Gen. 282. Schreb. 379. Willd. Sp. Pl. v. 2. 1335. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 272. Sm. Fl. Brit. 598. Prodr. Fl. Græc. v. 1. 386. Juſſ. 233. Tourn. t. 144. Lamarck. Illuſtr. t. 449. Gærtn. t. 65.—Claſs and order, *Polyandria Polygynia*. Nat. Ord. *Multiſiliquæ*, Linn. *Ranunculaceæ*, Juſſ.

Gen. Ch. *Cal.* none, (unleſs the corolla, which in ſome ſpecies is permanent, be taken for ſuch, with Juſſieu). *Cor.* Petals five or more, roundiſh, obtuſe, large. Nectaries ſeveral, very ſhort, placed circularly, of one leaf, tubular, contracted in their lower part; the orifice of two erect emarginate lips, of which the innermoſt is the ſhorteſt. (Theſe are the petals, according to Juſſieu). *Stam.* Filaments numerous, awl-ſhaped; anthers terminal, erect, compreſſed, narroweſt in their lower part. *Piſt.* Germens ſuperior, from three to ſix, compreſſed; ſtyles awl-ſhaped; ſtigmas thickiſh. *Peric.* Capſules compreſſed, with two keels; the lower, or outer one ſhorteſt; the upper, or inner one longeſt, at length burſting. *Seeds* ſeveral, round, affixed to the edges.

Eſſ. Ch. Calyx none. Petals five, or more. Nectaries tubular, two-lipped. Capſules compreſſed, nearly erect, with many ſeeds.

The following five are the only genuine ſpecies of this genus, as far as hitherto diſcovered.

1. H. *niger.* Linn. Sp. Pl. 783. Curt. Mag. t. 8. Woodv. Med. Bot. t. 18. Jacq. Auſtr. t. 201. (H. niger, flore roſeo; Bauh. Pin. 186. H. niger verus; Ger. Em. 976).—Leaves pedate. Flower-ſtalks radical, one or two-flowered. Bracteas ovate.—Native of rocky mountains in Auſtria, Italy, and Greece. In our gardens it is hardy, flowering in December or January if the weather be open, whence it has obtained the name of the Chriſtmas roſe. Few plants are more elegant. The large concave *flowers*, white, with a tinge of bluſh-colour, are finely contraſted with the ample dark and ſhining foliage. The *roots* are perennial, creeping, entangled, very black externally, with numerous, long, ſimple, perpendicular fibres. This ſpecies was univerſally taken for the true black hellebore of the ancients, till Tournefort found what he ſuſpected to be the true one. See *H. Officinalis.*

2. H. *viridis.* Linn. Sp. Pl. 784. Jacq. Auſtr. t. 106. Curt. Lond. faſc. 6. t. 34. Engl. Bot. t. 200. (Helleboraſtrum; Ger. Em. 976.)—Leaves fingered. Petals ſpreading. Flower-ſtalks radical, many-flowered. Bracteas deeply lobed, ſerrated. Native of ſtony, rather mountainous places in Auſtria, Stiria, Switzerland, &c. found occaſionally on a chalky ſoil in England. On reconſidering this plant, we are convinced that a real ſtem is erroneouſly attributed to it in *Fl. Brit.* and *Engliſh Botany.* The *leaves* are indeed all radical, much narrower than thoſe of the firſt ſpecies, digitate, ſcarcely pedate. The *flower-ſtalks* alſo radical, taller than the leaves, branched, bearing about three green expanded *flowers*, and ſeveral alternate, large, deeply lobed, ſometimes pedate, ſerrated, leafy *bracteas.* The *roots* are black, with numerous long fibres, but are rather tuberous than creeping. We learn from the *Flora Londinenſis*, that they are uſed in London for the true black hellebore; and probably their qualities are the ſame, for this ſpecies is even more nearly allied to the ancient Greek plant than the foregoing.

3. H. *officinalis.* Saliſ. Tr. of Linn. Soc. v. 8. 305. Sm. Prodr. Fl. Græc. v. 1. 386. (H. orientalis; Lamarck. Dict. v. 3. 96. Willd. Sp. Pl. n. 5. H. niger orientalis, ampliſſimo folio, caule prælalto, flore purpuraſcente; Tourn. Cor. 20.)—Leaves pedate. Flower-ſtalks radical, many-flowered. Bracteas deeply lobed, ſerrated. – Gathered on Mount Athos, Delphi, and the Bithynian Olympus, as well as on hills near Theſſalonica, and plentifully near Conſtantinople, by Dr. I. Sibthorp, who juſtly decided it to be the ελλεβορος μελας of Dioſcorides, conſequently the true plant which ought to be uſed in medicine. The modern Greeks name it σκάρφη; the Turks *Zopleme.* The *roots* are moſt like thoſe of the laſt, but the *leaves* are truly pedate, and their lobes elliptical, twice the breadth of that ſpecies. The *flower-ſtalks* do not riſe above the leaves, but are branched, bearing five or ſix drooping concave *flowers*, white, turning purpliſh as they fade, as if intermediate between the firſt and ſecond ſpecies. The numerous, fingered, ſerrated, leafy *bracteas* accord more with the latter. A moſt inimitable drawing of this plant, by Mr. Ferdinand Bauer, is deſtined for the *Flora Græca*, t. 523. The medical qualities of the root are acrid and violently purgative, and were ſuppoſed uſeful in maniacal caſes. As the true oriental plant may not be acceſſible to us, it is uſeful to know that the preceding is the ſafeſt ſubſtitute for it, though leſs active; while the following, which has ſometimes been uſed by fraud or miſtake, is more violent and dangerous.

4. H. *fœtidus.* Linn. Sp. 784. Bulliard. t. 71. Engl. Bot. t. 613. Woodv. Med. Bot. t. 19. (Helleboraſter maximus; Ger. Em. 1338.)—Stem leafy, many-flowered. Leaves pedate; lobes lanceolate. Bracteas ſimple, entire. Petals cloſed.—Native of Germany, Switzerland, France, and England. With us it prefers a chalky ſoil, among buſhes, in rather hilly places, flowering in February or March. It is the firſt harbinger of ſpring in ruſtic gardens. The *ſtem* is near two feet high, branched, round, many-flowered, enveloped in large rounded tufts of dark recurved evergreen *leaves.* The *bracteas* are pale, ovate, ſome of them three-lobed, with entire edges. *Flowers* cup-ſhaped, ſmaller than any of the former, green, acquiring a dark purpliſh edge in decay. Dr. Woodville ſtrongly recommends this plant to kill worms in children. The doſe is about 15 grains of the dried leaves in powder, for two or three ſucceſſive mornings, for a child between four or ſeven years of age, which proves gently emetic and purgative.

5. H. *lividus.* Ait. Hort. Kew. v. 2. 272. Curt. Mag.

t. 72. (H. fœtidus β; Linn. Sp. Pl. 784. H. niger trifoliatus; Ald. Hort. Farn. 93. t. 92.)—Stem leafy, many-flowered. Leaves ternate. Bracteas ſimple, ſerrated.—Firſt deſcribed by Aldinus amongſt his deſcriptions of rare plants cultivated in the Farneſe garden at Rome, in 1625. He received it from Henry Corvinus, a botaniſt and apothecary at Delft, and Lamarck, who in his Dictionary deſcribes it by the name of *triphyllus*, v. 3. 97, ſays he has ſeen it in the gardens at Vienna and Straſburg, yet its native country is unknown. With us it is rather rare, and not quite hardy. It flowers in winter time, or in the early ſpring. Linnæus, having never ſeen this plant, confounded it with the laſt, from which it is abundantly diſtinguiſhed by its glaucous livid hue, larger and more expanded *flowers*, but eſpecially by its ternate and more ovate *leaves*. The *ſtem* and *footſtalks* are purpliſh.

Three more ſpecies are found in Willdenow comprehended under this genus.

1. H. *hyemalis*. Linn. Sp. Pl. 783. Jacq. Auſtr. t. 202. Bulliard. t. 35. Curt. Mag. t. 3. Native of the mountains of Germany, Switzerland, France, and Italy; common in our gardens in ſpring, where it comes forth with the Snowdrop and Crocus. This is a little herbaceous plant, with a yellow flower, whoſe petals are, as Linnæus obſerves, deciduous. For this reaſon, Mr. Saliſbury has made it a diſtinct genus, in Tr. of Linn. Soc. v. 8. 303. by the name of *Eranthis*, from εραω, *to love*, and ανθος, *a flower*, and its habit, ſo widely different from *Helleborus*, ſtrongly juſtifies the meaſure.

2. H. *ranunculinus*. Sm. Pl. Ic. t. 37. (H. niger orientalis, ranunculi folio, flore nequaquam globoſo; Tourn. Cor. 20. Trollius humilis, flore patulo; Buxb. Cent. 1. t. 22. T. patulus; Saliſ. Tr. of L. Soc. v. 8. 303.)—Native of Cappadocia. When firſt deſcribed from Tournefort's herbarium, it was referred to *Helleborus*, becauſe of its affinity to the *hyemalis*, but it has perhaps more the habit of *Trollius*. The nectaries, however, do not agree with this latter, being tubular.

3. H. *trifolius*. Linn. Sp. Pl. 784. Am. Acad. v. 2. 356. t. 4. f. 18. Fl. Dan. t. 566. Michaux Boreal. Am. v. 1. 325.—Native of Siberia, Iceland, Labradore, Canada;—found from Hudſon's Bay to Pennſylvania, in Cypreſswoods, growing amongſt bog-moſs, according to Michaux. This has alſo a deciduous corolla, and its habit is totally wide of *Helleborus*. Mr. Saliſbury calls it *Coptis*, from κοπτω, *to cut*, and ranges with it, as another ſpecies, a very pretty plant with twice ternate *leaves* and green *flowers*, found by Mr. Menzies on the north-weſt coaſt of America, from whom we have ſpecimens and a coloured drawing. We ſhould rather perhaps refer both ſpecies to *Iſopyrum*, for want of a ſufficiently decided character in the fructification.

Helleborus, in *Gardening*, comprehends plants of the herbaceous perennial kind; of which the ſpecies moſt generally cultivated are, the winter hellebore, or yellow winter aconite (H. hyemalis); the black hellebore, or Chriſtmas roſe (H. niger); the green hellebore (H. viridis); the ſtinking hellebore, or bear's foot (H. fœtidus), and the livid purple, or great three-flowered black hellebore (H. lividus.)

Method of Culture.—The firſt ſpecies may be increaſed by planting off-ſets from the roots as ſoon as the leaves are decayed, towards the end of the ſummer ſeaſon, in the ſituations in which they are to grow and flower, in ſpots of ſeveral together. They have a very good effect when intermixed with the ſnow-drop, from their being of a ſimilar habit of growth, and their flowers appearing nearly about the ſame period. Off-ſets are capable of being ſeparated from the old plants every third or fourth year.

The ſecond ſpecies may be multiplied by dividing the roots in the autumnal ſeaſon, and planting them out in ſuch places as are moiſt, warm, and ſheltered in the different clumps, borders, and other parts where the ſoil is freſh, and not impregnated with manure. But that it may flower in perfection it ſhould have the protection of glaſſes during the winter. And in this view a few of the plants may be placed in pots, which will afford great convenience for the purpoſe.

In the third and fourth ſpecies the increaſe may be readily effected by ſowing the ſeeds, either in the ſituations where the plants are to grow, or in beds formed for the purpoſe, in the autumn or ſpring months, thinning the young plants out afterwards to a few, or tranſplanting them into other beds, to be placed in rows at the diſtance of a foot from each other.

They often come up well from ſelf-ſown ſeed, and ſucceed perfectly in ſhady places.

And the laſt ſpecies is capable of being increaſed either by ſowing the ſeeds or dividing the roots. The well ripened ſeeds ſhould be put into the ground, or the parted roots planted out, during the autumn, either in pots of light freſh mould, or in warm protected parts of the clumps and borders. The plants ſhould, in their after treatment, be protected in the green-houſe, or in the ground by the uſe of hand glaſſes, during the winter ſeaſon. But they are far from increaſing faſt in either of theſe modes.

All theſe plants are of the ornamental claſs, the firſt ſort adorning the fore parts of the beds, clumps, and borders, while the third and fourth ſpecies contribute their effects to the larger compartments, and the wilderneſs quarters, and the ſecond and laſt diſplay themſelves among the potted collections.

HELLEH, Hellah, or *Hillah*, in *Geography*, a town of the Arabian Irak, ſituated on both ſides of the Euphrates with a bridge of communication, ſuppoſed to have been built on the ſcite of the ancient Babylon. The gardens are covered with fruit-trees, particularly palms, ſo that the town appears as ſituated in a wood; 60 miles S. of Bagdad. N. lat. 32° 20′. W. long. 43° 45′.

HELLEFORS, a town of Sweden, in Nericia; 40 miles N.N.W. of Orebro.

HELLELANDS, a town of Norway, in the dioceſe of Chriſtianſand; 26 miles S. of Stavanger.

HELLENES, in *Ancient Hiſtory*. See Græcia.

HELLENIA, in *Botany*, ſo named by Willdenow in honour of Charles Nicholas Hellenius, profeſſor of philoſophy at Abo in Finland, under whoſe preſidency numerous botanical diſſertations, in Latin or Swediſh, have been publiſhed. Willd. Sp. Pl. v. 1. 4. Brown. Prodr. Nov. Holl. 307. (Heriticra; Retz. Obſ. faſc. 6. 17. Alpiniæ ſpecies; Roſcoe Tr. of Linn. Soc. v. 8. 346.)—Claſs and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Linn. *Cannæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, tubular. *Cor.* of one petal; tube the length of the calyx; outer limb in three deep ſegments, the upper one largeſt and pointed; inner of one lip, longer, with a little tooth at the baſe on each ſide. *Stam.* Filament one, linear, ſhorter than the inner lip, extended a little beyond the anther, in a ſmall rounded, very ſhort lobe, either entire or cloven; anther attached by its back, of two elliptical lobes, with a channel between them. *Piſt.* Germen inferior, roundiſh, with three furrows; ſtyle thread-ſhaped, a little longer than the ſtamen; ſtigma obtuſe. *Peric.* Capſule roundiſh, three-lobed, cruſtaceous, brittle, three-celled. *Seeds* ſeveral in each cell, nearly kidney-ſhaped, each inveſted with a ſoft arillus.

Eſſ. Ch. Anther two-lobed, embracing the ſtyle, with a very ſhort, rounded, terminal appendage. Inner limb of the corolla a ſimple lip. with a tooth on each ſide at the baſe. Capſule cruſtaceous, brittle ſeeds with an arillus.

This genus, eſtabliſhed by Retzius and Willdenow on no ſolid principles, the only clue to the diſtinction of Scitaminean genera, ſince publiſhed by Mr. Roſcoe, and founded on the form of the filament, being then unknown, was by the ingenious writer laſt named referred to *Alpinia*. He had not ſeen it alive, and therefore had not detected the ſmall appendage to the filament, beyond the anther; which Mr. Brown has pointed out, as well as other marks, indicated above, all together ſufficient to ſtamp it as a good genus. The original ſpecies is,

1. *H. Allughas*. Retz. Obſ. faſc. 6. 17. t. 1. (Alughas; Linn. Zeyl. 207.)—Lip cloven. Leaves entire, ſmooth. Capſule downy. Style ſmooth.—Native of Ceylon. About two feet high, with elliptic-oblong, ſmooth, entire *leaves*, a foot long or more; their ſtalks ſheathing. *Panicle* terminal, branched, many-flowered, downy, with ſmall downy *bracteas* at its ſub-diviſions. *Calyx* downy, cloven. *Corolla* red, about an inch long, its lip divided half way down, obtuſe, and ſomewhat crenate. *Fruit* downy and brittle.

To this Mr. Brown has added the following.

2. H. *cærulea*. Br. Prodr. 308.—"Lip emarginate. Leaves entire, ſmooth. Capſule ſmooth. Style hairy."—Native of New Holland within the tropics, and even of the country near Port Jackſon.

Retzius and Willdenow enumerate three other ſpecies, *alba*, *chinenſis*, and *aquatica*, which, not having ſeen, we cannot certainly tell how correctly they are referred hither.

HELLENISM, a ſort of Greciſm: or a phraſe peculiarly accommodated to the genius and conſtruction of the Greek tongue.

Helleniſm is diſtinguiſhed from Greciſm, in that the former is not applied to authors who have written in Greek; their language, it is evident, ſhould be a continual helleniſm; but it is applied to authors who, writing in ſome other language, uſe terms and expreſſions peculiar to the Greek.

There are abundance of helleniſms in the vulgate verſion of the ſcriptures.

Hellenism is alſo uſed in the ſame ſenſe with Heatheniſm or Gentiliſm. And Heathens are called Hellenes, and Helleniſts, by our eccleſiaſtical hiſtorians, Socrates, Sozomen, and Theodoret eſpecially, in their hiſtory of Julian's reign. We may alſo obſerve, that Gentile Greeks are invariably called in ſcripture 'Ελληνες, *Hellenes*, in contradiſtinction to Ελληνιϛαι, or *Helleniſts*; which ſee.

HELLENISTIC, or Hellenistic *language*, that uſed among the Helleniſts.

The critics are divided as to this language. Several of them, and among the reſt Druſius and Scaliger, take it to be the language uſed among the Grecian Jews. They add, that it is in this language the Greek tranſlation of the Septuagint was written, and even the books of the New Teſtament compoſed. M. Simon calls it the *language of the ſynagogue*.

It muſt not be imagined that this was any peculiar language diſtinct from all others, or even any peculiar dialect of the Greek; in the ſame ſenſe as the Attic, the Ionic, and the Doric, are called different dialects, for there are in it no peculiarities in the inflexions of either nouns or verbs. It was thus denominated to ſhew that it was Greek, mixed with Hebraiſms and Syriaciſms; or that the phraſeology is Hebrew, whilſt the words are Greek. This ſingular manner in the ancient tranſlators is to be conſidered as partly intentional and partly accidental;—partly intentional, becauſe, from the ſcrupulous, and even ſuperſtitious, attachment of the Jews, not only to the words, but to the letters and ſyllables, to every jot and tittle of the original, they would be led to attempt a manner of tranſlating ſo ſervilely literal as is always incompatible with purity in the language into which the tranſlation is made;—partly accidental, becauſe, even without deſign, a perſon ſpeaking or writing a foreign language, frequently mingles in his ſpeech the idioms of his native tongue. One ſource of the peculiarities in idioms may have ariſen from this circumſtance, that the tranſlators of the Septuagint, though Jews, were Alexandrians: and moreover the habit which the apoſtles and evangeliſts had of reading the ſcriptures and hearing them read, whether in the original or in the ancient verſion, would, by infecting their ſtyle, cooperate with the tendency which, as natives of Paleſtine, they would derive from converſation, to intermix Hebraiſms and Chaldaiſms in their writings. Hence we may infer that the writings of the New Teſtament carry, in the very expreſſion and idiom, an intrinſic and irreſiſtible evidence of their authenticity. They are ſuch as, in reſpect of ſtyle, could not have been written but by Jews, and hardly even by Jews ſuperior in rank and education to thoſe whoſe names they bear.

Salmaſius rejects the common opinion of the learned touching the Helleniſtic language, and has written two volumes on the ſubject, in which there is not a little logomachia.

HELLENISTS, Hellenistæ, a term occurring in the Greek text of the New Teſtament, and which in the Engliſh verſion is rendered *Grecians*.

This term Grecians occurs only thrice in our Engliſh verſion of the New Teſtament, *viz*. Acts, vi. 1. ch. ix. 29. and xi. 20. But it is well known to the learned, that in the ſecond of theſe paſſages the Alexandrian manuſcript has Greeks; which is alſo the reading in the third text, not only in the Alexandrian manuſcript, but likewiſe in the Latin vulgate, and ſeveral other verſions, whence it is concluded by Dr. Lardner, that the ſame perſons are not intended in the third and laſt texts, as in the two former. The critics have been much divided as to the ſignification of the term. Some learned writers have enumerated no leſs than ſeven different opinions. (See Fabr. Bib. Græc. l. iv. c. 6. t. iii. p. 226. Wolfii Curæ ad act. vi. 1) The moſt prevailing opinions, however, are theſe two. Some by this appellation underſtand Jews born out of Judea, who ſpake Greek, and uſed the Greek verſion of the Old Teſtament in their ſynagogues. Oecumenius, in his ſcholia in Acts, vi. 1. obſerves, that it is not to be underſtod as ſignifying thoſe of the religion of the Greeks, but thoſe who ſpoke Greek, τȣς ἑλληνιϛι φθεγγομενȣς. The authors of the vulgate verſion, indeed, render it like ours "Græci;" but Meſſrs. Du Port Royal, "Juifs Grecs," *i. e.* Greek or Grecian Jews: ſuppoſing that the term refers to the Jews who ſpoke in Greek, and who are thus diſtinguiſhed from the Jews called "Hebrews," *i. e.* thoſe who ſpoke the Hebrew tongue of that time. Theſe Grecian Jews, or Helleniſts, it is ſaid, were thoſe who lived in Egypt and other parts, where the Greek tongue prevailed; and to whom we owe the Greek verſion of the Old Teſtament, called the *Septuagint*; which ſee. See alſo the preceding article.

Salmaſius and Voſſius are of a different ſentiment with regard to the Helleniſts. The latter will only have them to be thoſe who adhered to the Grecian intereſts.

Scaliger is repreſented, in the Scaligerana, as aſſerting the Helleniſts to be the Jews who lived in Greece and other places, and who read the Greek bible in their ſynagogue, and uſed the Greek language, *in ſacris*: and thus they were oppoſed to the Hebrew Jews, who performed their public worſhip in the Hebrew tongue; and in this ſenſe (he ſays) St. Paul ſpeaks of himſelf as a Hebrew of the Hebrews, Phil. iii. 5. *i. e.* a Hebrew both by nation and language. The Helleniſts are thus properly diſtinguiſhed from the Hellenes or Greeks, mentioned John, xii. 20. who were Greeks by birth and nation, and yet proſelytes to the Jewiſh religion.

Dr. Campbell, in his "Preliminary Diſſertations," is of opinion, that there was in the time of the apoſtles a diſtinction made between thoſe Jews who uſed the Greek language, and the Hebrews, or thoſe who ſpoke the language of Paleſtine, and of the territory of Babylon, which they affected to call Hebrew. Accordingly he ſuppoſes that thoſe called Grecians in Acts, vi. 1. were Jews: and this he infers from the hiſtory. Thus he ſays that this event happened before Peter was ſpecially called to preach the goſpel to Cornelius and his family, who were the firſt fruits of the Gentiles to Chriſt. Beſides, ſays this writer, though the word "Grecian," made uſe of in our tranſlation is ſynonymous with "Greek," yet the term employed in the original is never applied in the New Teſtament to Pagan Greeks, but ſolely to thoſe Jews who had reſided always or moſtly in Grecian cities, and conſequently whoſe common tongue was Greek. The Gentile Greeks are invariably called in ſcripture 'Ελληνες (ſee Hellenes), whereas the term uſed in the place quoted is "Ελληνιϛαι, a word which even in claſſical authors does not mean Greeks, but "imitators of the Greeks," or "thoſe who write or ſpeak Greek;" being a derivation from the word 'ελληνιζειν, to ſpeak Greek, or imitate the Greeks.

The ſecond opinion with regard to the Grecians, or Helleniſts, is that advanced by Beza, and adopted by Baſnage, Pearſon, Lardner, and others, which ſuppoſes that they were proſelytes, or men of other nations, who had embraced the Jewiſh religion, or, in other words, proſelytes to Judaiſm. Accordingly, in Acts, vi. 1. they are contraſted with the Hebrews, by whom are meant native Jews, deſcendants of Abraham and Iſrael. Hebrews was a very honourable, and the moſt ancient denomination of the Jewiſh people. It ſeems to have been peculiar to Abraham and his deſcendants by Iſaac and Jacob, when Moſes was ſent to conduct the people of Iſrael out of the land of Egypt. (Exod. iii. 6. 15. 16. 18. iv. 5.) It was a common denomination of the children of Iſrael during their abode in Egypt; and in the firſt book of Samuel, it is often uſed as equivalent to Iſraelites, or the people of Iſrael; but it is ſeldom found in the later books of the Old Teſtament. In the laws, recorded in the books of Moſes, (ſee Exod. xxi. 2. Deut. xv. 12. Lev. xxv. 44—46.); three ſorts of perſons are clearly diſtinguiſhed, *viz.* *Hebrews*, or children of Iſrael, that is, native Jews; then *ſtrangers ſojourning among them*, or proſelytes; and laſtly, *Heathens*, that is, the nations, or Gentiles. Indeed, the denomination Hebrew was peculiar to the deſcendants of the ancient patriarchs; nor were the people of Iſrael called Jews, till about the time of the Babyloniſh captivity. In the New Teſtament there are three places where this title is found, *viz.* 2 Cor. xi. 22. Philip. iii. 5. and Acts, vi. 1. As Paul was a Hebrew, though born out of Judea, at Tarſus in Cilicia, where the Greek tongue was uſed, we are fully aſſured, that by the Grecians cannot be meant Jews, who uſed the Greek language. From all the texts, alleged from the Old and New Teſtament, it appears, ſays Dr. Lardner, that the denomination or character of Hebrew, is the privilege of birth, not of choice, or acquiſition, or accidental circumſtance. All deſcendents of Abraham by Iſaac and Jacob, wherever they are born, and whatever language they uſe, are Hebrews; nor can any other men be Hebrews, but thoſe only who are deſcended from Abraham. This is the firſt conſideration, tending to determine, who theſe Grecians were. That they were proſelytes may be further argued from the neglect with which they were treated. Their widows were diſregarded, no allowances or diſtributions were made to them. For this neglect two reaſons are alleged: they were few in number, and they were deſpiſed. Native Jews, deſcendants of Abraham and the patriarchs, would of courſe have been preferred to proſelytes; but there is no reaſon why any Jews ſhould have been neglected, merely becauſe they were born out of Judea, and uſed the Greek language. But proſelytes might be overlooked, becauſe they were reckoned much inferior to Iſraelites. Theſe were far from enjoying equal civil privileges with the children of Iſrael. (See Jerem. ch. xxxiv. and the laws above referred to in the books of Moſes.) Who theſe proſelytes mentioned Acts, vi. 1. and ix. 29. were, it is not eaſy to aſcertain. There might be many ſuch perſons in Judea, and in other countries all over the world where the Jewiſh people reſided; ſome of them might have been deſcendants of thoſe who had joined themſelves to the people of Iſrael in former times; and others might have been new converts to the Jewiſh religion; ſome of thoſe, who at the time when the event above mentioned occurred, lived in Judea, were poor, and were poſſibly the ſervants of the Roman governor, or of their officers, who coming to Judea with their maſters, might have been converted to the Jewiſh religion. There were others who had ſerved Jews out of Judea, and who, unwilling to ſerve heathens, might ſeek ſubſiſtence in Judea. It is farther urged in ſupport of the opinion, that theſe Grecians were proſelytes, that upon their complaints, a proſelyte was choſen to be one of the ſeven, to preſide in the daily miniſtration, even Nicholas of Antioch. Dr. Lardner thinks, there is great propriety in St. Luke's ſtyle, calling the Jews, who were of the ſeed of Iſrael, Hebrews, and proſelytes, Helleniſts, Grecians, or perhaps Hellenes, Greeks, from their origin; the latter being, perhaps, the true reading, as the former appellation is uſed only by St. Luke in this book, and is thought not to occur in any other writer ſo ancient, and, therefore, might have been the invention of ſome Chriſtians. A Hebrew, denoting a Jew by ancient deſcent, muſt be fitly oppoſed to Grecians, thereby underſtanding proſelytes, who were Jews by religion only, and not by birth. Lardner's Works, vol. xi. Campbell's Prelim. Diſſ. p. 5—10.

HELLENODICÆ, Ελληνοδικαι, in *Antiquity*, the directors or preſidents of the Olympian games. At firſt this office was exerciſed by Iphitus alone, and it continued for 200 years to be executed by a ſingle perſon; but in the 50th Olympiad the number increaſed to two, who were choſen by lot out of the whole body of the Elæans, and in the 75th Olympiad it was increaſed to nine; three of whom had the direction of the equeſtrian exerciſes, three preſided at the Pentathlon, and the remaining three had the inſpection of the other games. Two Olympiads after a tenth was added; and in the 103d Olympiad, the college of Hellenodics conſiſted of twelve, anſwering to the tribes of the Elæans, out of each of which was choſen one Hellenodic. The number of Elæan tribes, and of courſe that of the Hellenodics, was afterwards reduced to eight; but in the 108th Olympiad, they returned to the former number of ten, and ſo continued. They aſſembled in a place called 'Ελληνοδικαιον, in the Elæan forum, where they were obliged to reſide ten months before the celebration of the games, to take care that ſuch as offered themſelves to contend, performed their προγυμνασματα, or preparatory exerciſes, and to be inſtructed in all the laws of games by certain men called νομοφυλακες, *i. e.* keepers of the laws. And the better to prevent all unjuſt practices, they were farther obliged to take an oath that they would act impartially, would take no bribes, nor diſcover the reaſon for which they diſliked or approved of any of the contenders. At the ſolemnity they ſat naked, having before them the victorial crown till the exerciſes were finiſhed, and then it was preſented to whomſoever they adjudged it. Nevertheleſs, there lay an appeal from the Hellenodicæ to the Olympian ſenate. The direction and arrangement of all matters belonging to the Olympic feſtival, the proclaiming of the ceſſation of arms, the excluding from the ſacrifices thoſe who had incurred the penalty of excommunication by refuſing to ſubmit to their cenſures, the increaſing or diminiſhing of the number of the exerciſes, &c. belonged to the Hellenodics as well as the ſuperintendence of the games, and the beſtowment of the olive-crown. This power of excommunicating thoſe who were refractory or contumacious, which ſeems to have been exerciſed upon whole nations, rather than particular perſons, gave the Hellenodics great dignity and authority among the ſeveral people of Greece; as the corporal puniſhment and pecuniary penalties inflicted by their orders upon private offenders, held even the greateſt in dread of infringing the Olympic laws, and kept in order that vaſt aſſembly, which was compoſed of men of all ranks and degrees, and of every region and colony of Greece. In the public execution of their office, the Hellenodics were clothed in purple robes, and carried in their hands that uſual enſign of magiſtracy, a wand or ſceptre; and it ſeems probable alſo, that all the Grecians who aſſiſted at the Olympic games were adorned with crowns or garlands. The Hellenodics took their ſtations at different parts of the ſtadium, and the ſenior had the precedency of the reſt. In the exerciſe of the power of excommunication, they were ſupported by the joint concurrence of the gods, as well as the men of Greece. Weſt's Diſſertation on the Olympic Games, § 5. Pott. Archæol. Græc. lib. ii. cap. 22. tom. i. p. 448.

HELLENODICÆUM, Ελληνοδικαιον, the place where the hellenodicæ were uſed to aſſemble.

HELLENOTAMIÆ, Ελληνοταμιαι, Athenian officers appointed to receive the money due from the tributary cities.

They were alſo called *hellenotamiæi.*

HELLESPONT, in *Ancient Geography*, the name of the ſtrait which formed a communication between the Ægean ſea in the Archipelago and the Propontis, or the ſea of Marmara. Thoſe geographers who have moſt accurately ſurveyed the form and extent of this ſtrait, aſſign about ſixty miles to its winding courſe, and about three miles to its ordinary breadth. The narroweſt part of the channel is found to the northward of the old Turkiſh caſtles, between the cities of Ceſtus or Seſtus, and Abydus. It was in this part that Leander braved the paſſage of the flood for the poſſeſſion of his miſtreſs. Here it was likewiſe, in a place, where the diſtance between the oppoſite banks cannot exceed 500 paces, that Xerxes impoſed a ſtupendous bridge of boats, for the purpoſe of tranſporting into Europe 170 myriads of barbarians. (See Constantinople.) This ſtrait is ſuppoſed to have derived its name from the "Hellenes," and to have been called the "Sea of the Hellenes," becauſe on the banks of this ſtrait they began to form their Greek eſtabliſhments. The poets, however, diſſatisfied with this ſimple etymology, have ſought its name in the event that gave occaſion to the Argonautic expedition, which ſee.

Hellespont was alſo the name of a province of Aſia Minor, being that which had been called Myſia, and which was one of the ten provinces of the dioceſe of Aſia, in the Notitia Imperii.

HELLIN, in *Geography*, a town of Spain, in the province of Murcia; 17 miles S. of Chinchilla.

HELLO, a town of Pruſſia, at the eaſtern extremity of the Hohe Nerang; 12 miles N. of Dantzic.

HELLOT, John, in *Biography*, was born in 1686, and deſtined by his friends for the profeſſion of theology, but, accidentally meeting with a book of chemiſtry, he made that ſcience the principal purſuit of his life. From the year 1718 to 1732, he was employed as the compiler of the "Gazette de France." He tranſlated Schlutter's work on the "Fuſions of Ores, and on Founderies," and inſerted his own notes and remarks. He publiſhed a work, entitled "L'Art de la Teinture des Laines et Etoffes de Laines," which is reckoned a very valuable treatiſe, and is the firſt in which chemical principles are applied to the practice of the art. He furniſhed many articles to the "Memoirs of the Academy of Sciences," and ſome to the Royal Society of London, of which he was a member. He died at Paris in 1766.

HELLOTIA, 'Ελλωτια, in *Antiquity*, two feſtivals, one of which was celebrated in Crete, in honour of Europa, called hellotia; the other was celebrated by the Corinthians, with ſolemn games and races, wherein young men contended, running with lighted torches in their hands. See a farther account of theſe feſtivals in Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 393.

HELLOTIS, Ελλωτις, a myrtle garland, carried in proceſſion with Europa's bones at the feſtival called Hellotia.

This garland was no leſs than twenty cubits in circumference.

Hells, in the *Iron Manufacture*, are ſmall blaſt furnaces uſed for the re-melting of iron for caſting at the founderies.

HELM, in *Sea Language*, is a long and flat piece of timber, or an aſſemblage of ſeveral pieces, ſuſpended along the hind-part of a ſhip's ſtern-poſt, where it turns upon hinges to the right or left, ſerving to direct the courſe of the veſſel. The helm is uſually compoſed of three parts, *viz.* the rudder, the tiller, and the wheel, except in ſmall veſſels, where the wheel is unneceſſary.

Helm, *a-lee the.* See A-lee.
Helm, *bear up the.* See Bearing.
Helm, *eaſe the.* See Ease.
Helm, *port the.* See Port.
Helm, *right the,* or *helm the midſhip.* See Right.
Helm, *ſhifting the.* See Shifting.
Helm, *ſtarboard the.* See Starboard.

Helm, in *Chemiſtry*, is the head of a ſtill or alembic; thus called, becauſe in figure it ſometimes reſembles a helm or helmet.

Hence, to bring the thing *over* the helm is the ſame as to force it by fire up to the top of the veſſel, that it may diſtil down into the receiver by the beak of the head.

And when they ſay, ſuch a thing cannot be brought over the helm, they mean that it is of too fixed a nature to be raiſed into vapour by the force of fire.

Helm, in *Rural Economy*, a term occaſionally employed to denote a hovel. It is likewiſe ſometimes made uſe of to ſignify ſtraw prepared for the purpoſe of thatch. See Thatch.

HELMSTADT, in *Geography*, a town of Germany, in the principality of Wolfenbuttle, containing two fauxbourgs, three churches, and an univerſity founded by duke Julius, in 1576, an anatomical theatre, and a public library, and having near it a medicinal ſpring; 17 miles E. of Wolfenbuttle. N. lat. 52° 15′. E. long. 11° 8′.

HELMET, or Helm, an ancient armour of defence, worn by the cavaliers, both in war and in tournaments, as a cover and defence of the head; and ſtill uſed by way of a creſt or ornament over the ſhield or coat of arms, or at the top of the eſcutcheon.

The helmet is known by divers other names, as the *head-piece*, *ſteel cap*, &c. The Germans call it *helen* or *hellem*; the Italians *elmo*, the French *caſque*, as did alſo the ancient Engliſh.

The helmet covered the head and face, only leaving an aperture about the eyes, ſecured by bars, which ſerved as a viſor.

Helmets have varied in different ages and countries, in reſpect both of their form and the materials of which they are made, and as the heralds of ancient times have uſed them both as charges within, and ornaments without the ſhield, they are variouſly repreſented in ancient heraldic drawings. The matter of which helmets, as repreſented in heraldry, are ſuppoſed to be made, according to the doctrine laid down by the Germans, is gold, ſilver, and ſteel; which, as they ſay, ſhew three degrees of dignity, *viz.* thoſe of ſovereign princes are of gold, thoſe of the nobility are of ſilver, and thoſe of gentlemen are of poliſhed ſteel.

In France, whence all our heraldry originally came, the following rules obtained:

A perſon newly ennobled, or made a gentleman, bears over his eſcutcheon a helmet of bright iron or ſteel, in profile, or ſtanding ſideways; the viſor quite cloſe.

A gentleman of three deſcents bears it a little open, but ſtill in profile, ſhewing three bars of the viſor.

Ancient knights, &c. have it in profile, but ſhewing five bars; the edges of ſilver.

A baron's helmet is of ſilver; the edges gold, with ſeven bars neither quite in profile, nor yet in front, with a coronet over it adorned with pearls.

Viſcounts and earls formerly bore a ſilver helmet, with gold edges, its poſition like the former; but now they bear it quite fronting, with a coronet over it.

Marquiſes bear a ſilver helmet, damaſked, fronting, with eleven bars, and their coronet.

Dukes and princes have their helmet, damaſked, fronting, the viſor almoſt open, and without bars, with their coronets over them.

Laſtly, the helmets of kings and princes are all of gold, damaſked full fronting, and the viſor quite open, and without bars.

The helmets of baſtards are to be turned to the left, to denote their baſtardy.

Our ancient Engliſh heralds allotted many degrees to theſe ornamental helmets; but at preſent we retain only the following five: *viz.* 1. The full-faced helmet, with ſix bars, all of gold damaſked, for the ſovereign, and princes of the blood. 2. The full-faced helmet, with five bars; the helmet ſteel, and the bars and breaſt-part gold, for dukes and marquiſes. 3. A profile or ſide-ſtanding helmet of ſteel, the bars, bailes, orgriels, and ornaments gold, for earls, viſcounts, and barons. 4. A full-faced helmet of ſteel, with its beaver or viſor open, for baronets and knights. 5. A profile or ſide-ſtanding ſteel helmet, with the viſor ſhut, for an eſquire. (See *Plate of Heraldry.*) Thoſe turned ſideways are ſuppoſed to be giving ear to the command of their ſuperiors; and thoſe right forwards to be giving orders with abſolute authority.

When helmets appear as bearings in arms, which is frequently the caſe, they are always to be repreſented in painting like thoſe adopted for eſquires, unleſs in their original blazon, they are expreſſed to be otherwiſe circumſtanced. If two helmets are placed on one ſhield, they are uſually ſet face to face, in imitation of the method practiſed by the Germans, who ſometimes place ten or more helmets on a ſhield; and in ſuch caſe, they ſet the centre helmet *affrontée*, and thoſe on each ſide looking towards that in the centre.

Helmet-*fiſh*, in *Natural Hiſtory*, the ſcolopendrites or echinus ſpatagus, or foſſil echinus of Dr. Grew, "Rarities," p. 259.

Helmet *flower*, in *Botany*. See Aconitum.

Helmet *pigeon*, the name given to a particular ſpecies of pigeon, called by Moore the *columba galeata*. It has its name from its having its head covered with a plumage of a diſtinct colour from that of the reſt of the body, and appearing ſomewhat like a helmet covering the head. It is a moderate-ſized pigeon, a little bigger than the ſpecies called the nun. The head, tail, and flight-feathers of the wings, are always of the ſame colour, which is either black, red, or yellow, and ſometimes, though rarely, blue; the reſt of the body is all white. They are red-eyed, and have no hood like that of the nun, otherwiſe they approach much to that ſpecies. Moore's Columbarium, p. 48.

Helmet-*ſtone*, in *Natural Hiſtory*, is a name which Dr. Grew has applied to ſeveral ſpecies of echinites, or foſſil echinus, of which he diſtinguiſhes four kinds, the ſoft-oval, the hard-oval, the blunt-conic, and the ſharp-conic, and figures and deſcribes ſeveral varieties of each, p. 259. and 60 of his "Rarities of Greſham College." See Galea.

HELMINTHAGOGA, of ελμινς, *worm*, and αγω, *I expel*, medicines contrived to deſtroy and expel worms.

HELMINTHOLITHUS, of ελμινς, *worm*, and λιθος, *ſtone*, in *Natural Hiſtory*, a name given by Linnæus to petrified bodies reſembling worms. Of theſe he enumerates 24 different genera.

Helmintholithus, is the ſixth of the eighth genera into which the late Mr. William Martin divided the reliquia or foſſil organic remains (Outlines, p. 186.), and includes therein the ſeparated parts of worms, which are not fabricated by ſuch worms. Of this genera four ſpecies were diſcovered by the author in the ſtrata of Derbyſhire, called entrochites, and are figured in his "Petrificata Derbienſia," *viz.* E. lævis, or even-jointed entrochite, tab. 2, 3, and 24; E. prominens, or convex-jointed entrochite; E. verrucoſus, or warted entrochite; and the E. annulatus, or ring-jointed entrochite. See Entrochus.

HELMINTHOTHECA, in *Botany*, a name given by Vaillant to a genus of plants, ſince deſcribed by Linnæus under the name of *picris*.

HELMINTIA, is derived from ἑλμινς, ινθος, *a worm*, or *maggot*, becauſe its rugoſe ſeed ſomewhat reſembles the figure and attitude of ſuch animals.—Willd. Sp. Pl. v. 3. 1607. Juſſ. 170. Gærtn. t. 159.—Claſs and order, *Syngeneſia Polygamia Æqualis.* Nat. Ord. *Compoſitæ Semifloſculoſæ*, Linn. *Cichoraceæ*, Juſſ.—This genus, which is comprehended in the *Picris* of Linnæus, was originally ſeparated by Vaillant, who called it *Helmintotheca*, but we have given the name adopted by Juſſieu and Gærtner, though we are of opinion that it is too nearly allied to *Picris* to be decidedly ſeparated from that genus. The moſt important mark of diſtinction between *Picris* and *Helmintia* conſiſts in the former having the crown of its ſeed ſeſſile, whereas in the latter it ſtands upon a ſtalk. The only ſpecies of this ſuppoſed genus, according to Willdenow and Juſſieu, is *Picris echioides.* Linn. Sp. Pl. 1114. Sm. Fl. Brit. 814. Engl. Bot. t. 972. Curt. Lond. faſc. 3. t. 51.

HELMONT, John Baptist Van, in *Biography*, a diſtinguiſhed leader in the chemical ſchool of medicine, was born of a noble family at Bruſſels in the year 1577. He exhibited very early proofs of ſuperior abilities, and had finiſhed the uſual courſes of philoſophy at the ſchools of Louvain, in his ſeventeenth year. Before this time he ſeems to have diſcovered, that much of what was called ſcience and philoſophy in books, was a frivolous parade of hypotheſis, and contained very little of certainty or truth: and ſuch was his ardour for real knowledge, that before his twentieth year was completed, he is ſaid to have peruſed the works of Galen twice, thoſe of Hippocrates once, as well as thoſe of almoſt all the Greek and Arabian writers, and to have made a great collection of obſervations from them. He ſeemed to have gained an indiſtinct notion of the neceſſity of experiment and induction, in order to gain actual information; but never ſufficiently methodized his ideas on the ſubject, to be able to purſue that plan with its full advantage. Diſguſted with books, he quitted his native country, after taking the degree of M. D. at Louvain, and commenced a courſe of rambling, which continued during ten years; in which he attended with equal zeal, the profeſſors of magic and philoſophy; and he alſo learned ſome practical chemiſtry from an illiterate man, whom he met by accident. In 1609 he married a noble lady, of large fortune, with whom he retired to Vilforde, where, being likely to meet with few interruptions, he might proſecute his inveſtigation of the three kingdoms of nature with unceaſing diligence. The empirical knowledge, which he had gained, of the uſe of certain chemical remedies, re-called his attention to medicine; and although he deſiſted from viſiting the ſick, or receiving money for his aſſiſtance, great numbers frequented his houſe, and he boaſts in his writings of having cured ſeveral thouſands of people annually. For a period of thirty years he purſued his reſearches into the products of nature, with a perſeverance and induſtry that almoſt exceed belief, and left few of the known animal, vegetable, and mineral bodies unexamined. In the courſe of theſe inveſtigations in his laboratory at Vilforde, he neceſſarily fell upon the diſcovery of ſeveral of the products of decompoſition, and of new combination, which chemiſtry affords: among theſe he ſeems to have been the firſt to notice the ſpirit of hartſhorn, the ſpirit of ſulphur *per campanam*, as it was called, and the aërial part of the ſpa-waters, which he firſt denominated *gas*, (from the German *geiſt*, ghoſt, or ſpirit,) and ſeveral other ſubſtances. Among theſe were many articles poſſeſſing conſiderable influence upon the living body, which, being contraſted with the inertneſs of the ſimples of the Galenical practice, rouſed and confirmed his former opinions againſt the doctrines of that ſchool; which he now attacked with great ardour and ſtrength of argument, and which he greatly contributed to overthrow. He ſhewed the abſurdity of the Galenical hypotheſis of the four elements, the four qualities, the four degrees of theſe, and the four humours, all equally gratuitous; and pointed out the conſequent falſe and erroneous practice deduced from ſuch an hypotheſes. (See GALEN.) But partly in imitation of Paracelſus, whom he greatly admired, and partly from an attempt to generalize the confuſed maſs of new facts, which he had acquired, he attempted to reduce the whole ſyſtem of medicine to the principles of chemiſtry, and ſubſtituted a jargon as unintelligible, and hypotheſes as gratuitous as thoſe which he had attempted to refute. He publiſhed from time to time a variety of works, by which he obtained conſiderable reputation. The elector of Cologne, who was himſelf attached to chemical inquiries, held him in great eſteem; and he received from the emperor Rodolph II., and his two ſucceſſors, invitations to the court of Vienna; but he preferred his laboratory and cabinet to theſe proffered honours. He died on the 30th of December, 1644, in the ſixty-eighth year of his age.

His firſt work was entitled "De Magnetica Vulnerum Naturali et Legitima Curatione, contra Johannem Roberti Soc. Jeſu Theologum," Paris, 1621, 8vo. His next publication was relative to the waters of the Spa, "De Spadanis Fontibus," Liege, 1624, 8vo. Next followed, after a long interval, "Febrium Doctrina inaudita," Antwerp, 1642, 12mo.; and "Opuſcula Medica inaudita, 1. De Lithiaſi; 2. De Febribus; 3. De Humoribus Galeni; 4. De Peſte," Cologne, 1644, 8vo. On his death he requeſted his ſon to collect his papers, as well the incomplete as the finiſhed ones, and to publiſh them in the way which he thought the beſt. They were ſent to the printer, without correction, and without any regard to connection or arrangement, and publiſhed at Amſterdam in 1648, in 4to., under the title of "Ortus Medicinæ, id eſt, initia Phyſicæ inaudita, progreſſus Medicinæ Novus in Morborum ultionem ad Vitam longam." Under the title of "Opera omnia," theſe works have been reprinted at various times and places, and in various languages: the moſt correct edition is that of Amſterdam, in 1652, by Elzevir. They are now conſulted only as curioſities; but, with much error and jargon, they contain many ſhrewd remarks, and curious ſpeculations, and many facts which were at that time new. He anticipated, in obſcure glimpſes, as it were, ſeveral of the important diſcoveries, as well as the hypotheſes of later times: his *Archæus* has been ſoftened down into the *vis medicatrix naturæ* of Hoffmann and Cullen; his doctrine of ferments was adopted by Silvius and his followers; and he greatly cleared the way to chemical diſcoveries. Eloy. Dict. Hiſt. Hutchinſon, Med. Biog. Gen. Biog.

HELMONT, JAQUES VAN, was an hiſtorical painter of conſiderable repute among the Flemings. He was ſon and diſciple of Matthew Van Helmont, a painter of merry-makings, fairs, &c. who practiſed his art with much ſucceſs, though of no great weight of talent. Loſing his father at an early period of his ſtudies, he was indebted chiefly to his own exertions and perſeverance for the ſucceſs he enjoyed.

His aim appears to have been the grand ſtyle of compoſition and deſign; aided by the true natural feeling for colouring, which his countrymen have almoſt all exhibited. Many of the churches, convents, and public buildings in the Low Countries were adorned with his works, ſome of which have been tranſplanted to the gallery of the Louvre. He died in 1726, aged 43.

HELMONT, in *Geography*, a town of Brabant, on the Aa, with an old caſtle; 13 miles S.E. of Bois le Duc.

HELMONTII LUDUS. See LUDUS *Helmontii*.

HELMSLEY, or HELMSLEY-BLACKWOOD, in *Geography*, a market-town and pariſh in the wapentake of Rydall and North Riding of the county of York, England. It is ſeated in the valley called Rye-dale, through which the river Rye meanders. In the year 1801, the town contained 249 houſes, and 1449 inhabitants, many of whom are employed in the manufactory of cottons and linens. Here was formerly a caſtle, ſome remains of which are ſtill ſtanding. In the time of the civil wars, general Fairfax attacked the caſtle, and battered it. The walls of the keep are ten feet in thickneſs, and other parts of proportionate ſolidity. This caſtle is ſaid to have been built by Robert de Roſs, called lord Roſs, of Hamlake. The ſcite and remains belong to Robert Duncombe, eſq. who has a handſome ſeat, called Duncombe Park, at the diſtance of about a quarter of a mile from Helmſley. The houſe was built by ſir John Vanburgh, in the Doric ſtyle of architecture, and is an intereſting ſpecimen of that artiſt's ſkill. The ſaloon diſplays peculiar magnificence; and the whole edifice, with its valuable collection of works of art, are entitled to admiration and praiſe. For an account of which the reader is referred to "the works of the late Edward Dayes," 8vo. 1805. In a deep and well-wooded dale, about three miles from Helmſley, are the remains of Rye-Vale abbey, commonly called Rivaulx-abbey. The ruins are ſcattered over a conſiderable extent of ground, and ſtill diſplay many intereſting fragments of architecture; but the chief attraction and beauty of this place is its ſcenery. On each ſide of the vale the hills riſe to a conſiderable height, and are finely adorned with hanging woods. In the work already referred to is an intereſting deſcription of the ruins and the contiguous ſcenery.

HELMSTADT, a town of Germany, in the county of Wertheim; 9 miles S.E. of Wertheim.

HELMSTATT, a town of Germany, in the palatinate of the Rhine; 14 miles S.E. of Heidelberg.

HELNAS, a ſmall iſland of Denmark, in the Little Belt. N. lat. 55 9′. E. long. 10° 2′.

HELODES, formed of ελο, *marſh*, in *Natural Hiſtory*, a term applied to certain plants, to ſignify their place of growth to be in fens, bogs, or marſhy places; thus a kind of St. Peter's wort, which is diſtinguiſhed from the others by being hairy, and growing always in boggy places, is called by Ray and others, *aſcyrum villoſum helodes*.

Helodes, in *Medicine*. See Elodes.

HELOISE, in *Biography*, was born about the year 1101 or 1102, and is thought to have been the natural daughter of a prieſt, but was brought up by Fulbert, a canon of Paris, who was deſirous of giving her an education ſuitable to the uncommon talents which ſhe exhibited while very young. Abelard, as we have ſeen, (ſee the article Abelard,) was appointed her tutor, who abuſed the confidence repoſed in him; and then, as the beſt means of repairing the injury, offered to marry her. This ſhe refuſed, although an illegitimate child had been the conſequence of their intimacy: her affection for her lover ſubdued the regard which ſhe had for her own honour. His urgent entreaties on this head were of no avail; ſhe repreſented to him the degradation which, as a philoſopher, he would incur by the low cares of domeſtic life, and the inconſiſtency of wedlock wih the clerical duties, a circumſtance noticed by Bayle to ſhew, that, at this period of the church, the clergy were not prohibited from entering the marriage ſtate. Heloiſe declared ſhe would eſteem it a greater glory to be regarded the miſtreſs of her lover than the wife of an emperor. The conſequences of this refuſal have been already related. It is ſufficient to obſerve, that before ſhe was twenty years of age ſhe devoted herſelf to the auſterities of a convent, the duties of which ſhe performed with ſo much aſſiduity, that ſhe at length became prioreſs. At the diſſolution of the convent by Suger, Heloiſe and her companions retired to an oratory founded by Abelard, then an abbot in the foreſt of Champagne. She ſurvived her former lover about twenty years, and, as ſhe advanced in age, is ſaid to have acquired the auſterity of manners which is natural to one who had relinquiſhed the world, as the conſtitutions which ſhe drew up for the rule of her convent are in the extreme of rigour. She died in May 1163, and by her direction was laid by the ſide of Abelard. Bayle.

HELONIAS, in *Botany*, of which name no explanation is given, nor does any thing ſatisfactory occur to us Linn. Gen. 180. Schreb. 241. Willd. Sp. Pl. v. 2. 273. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 1. 491. Juſſ. 47. Lamarck Illuſtr. t. 268. Claſs and order, *Hexandria Trigynia*. Nat. Ord. *Coronariæ*, Linn. *Junci*, Juſſ.

Gen. Ch. *Cal.* none. *Cor.* inferior, of ſix oblong equal petals, permanent. *Stam.* Filaments ſix, awl-ſhaped, a little longer than the petals; anthers incumbent. *Piſt.* Germen ſuperior, roundiſh, with three angles; ſtyles three, ſhort, reflexed; ſtigmas obtuſe. *Peric.* Capſule roundiſh, membranous, of three cells. *Seeds* ſeveral, roundiſh.

Eſſ. Ch. Corolla of ſix equal petals. Calyx none. Capſule of three cells, with many ſeeds.

Obſ. Juſſieu ſuggeſts that the fruit may, perhaps, more properly be conſidered as three capſules united; this is rendered probable by its affinity to *Veratrum*.

1. H. *bullata*. Linn. Sp. Pl. 485. Curt. Mag. t. 747. Andr. Repoſ. t. 352. Redout. Liliac. t. 13. H. latifolia; Michaux. Boreal. Amer. v. 1. 212. Veratrum ſcapo fiſtuloſo ſquamoſo, ſpicâ ſtrictâ; Trew. Ehret. 41. t. 77. V. racemo ſimpliciſſimo, corollis patentibus, ſtaminibus longioribus; Mill. Ic. 181. t. 272.)—Leaves elliptic-lanceolate, ſomewhat ſpatulate, ribbed. Stalk radical, ſcaly. Cluſter denſe, ovate. Native of bogs in Pennſylvania and Maryland, common in the European gardens, where it bloſſoms in March or April. The *root* is perennial, with long ſimple fibres. *Leaves* radical, numerous, ſpreading, ſmooth, concave, of an obovate or ſpatulate form, with recurved points, and tapering at the baſe. *Flower-ſtalk* about a foot high, ſolitary, ſimple, round, ſmooth, browniſh, bearing ſeveral ſcattered cloſe-preſſed ſcales. *Flowers* many, in a denſe, nearly ovate cluſter, dulliſh crimſon, with blue anthers, inodorous. The plant, at a diſtance, has the aſpect of an Orchis. The ſpecific name *bullata*, taken from a ſynonym of Plukenet's erroneouſly applied, ought, we think, to have been changed. Michaux's, which Mr. Gawler, now Ker, in the Botanical Magazine, cites by miſtake *lanceolata*, is infinitely preferable.

2. H. *aſphodeloides*. Linn. Sp. Pl. 485. Curt. Mag. t. 748. (Xerophyllum fetifolium; Michaux. Boreal. Amer. v. 1. 211.)—Leaves linear-awl-ſhaped, rough-edged. Stalk leafy.—Native of Pennſylvania, where the venerable John Bartram firſt found it, and of Virginia. *Root* fibrous, perennial. *Leaves* very numerous, both at the root and on the ſtem, long, narrow, and acute, their edges rough, with minute ſharp ſaw-like teeth. *Cluſter* of innumerable white *flowers*, with yellow *anthers*. This ſpecies is ſaid to bloſſom but rarely in England.

3. H. *pumila*. Jacq. Ic. Rar. t. 453. H. lutea; Curt. Mag. t. 1062. Veratrum luteum; Linn. Sp. Pl. 1479.) Radical leaves obovate; thoſe on the ſtem lanceolate. Cluſter cylindrical. Petals linear.—Native of Virginia, Canada, Pennſylvania, and Carolina. *Root* tuberous, with long fibres. Radical *leaves* numerous, obovate, ribbed, ſmooth, three or four inches long, tapering down into the foot-ſtalk; thoſe on the ſtem much ſmaller, ſcattered, lanceolate. *Cluſter* ſolitary, very long, of innumerable *flowers*, with narrow white petals and yellow anthers. *Germen* certainly ſuperior, though Jacquin, from a poor ill-grown ſpecimen, took it to be inferior, and hence juſtly excited in Willdenow a doubt concerning the genus. Its form is elliptical, three-lobed at the top; colour green. *Styles* ſpreading, recurved, with downy ſtigmas. No one has ſuſpected this plant of Jacquin to be Linnæus's *Veratrum luteum*, which we have proved from his herbarium, nor could its genus have been ſettled without ſpecimens in fruit, ſuch as we have received from the Rev. Dr. Muhlenberg. We cannot refer it to any thing in Michaux.—Its habit cloſely accords with the firſt ſpecies. The *corolla* is permanent.

Michaux defines three other ſpecies, *erythroſperma*, *anguſtifolia* and *dubia*, all with long narrow leaves, of which we can determine nothing.—Willdenow removes hither the

Anthericum calyculatum of Linnæus, *Tofieldia paluſtris*, Sm. Fl. Brit. 397. Eng. Bot. t. 536; but its having a real calyx, and the ſhort ſtyles with blunt terminal ſtigmas, which in the American ſpecies, confounded with our's, are almoſt capitate, rather diſcountenance its union with *Helonias*, however ſimilar they may be in habit and fruit.

HELOPODIUM, from ἧλος, *a wart*, or *tubercle*, and πȣς, *a foot*, becauſe the tubercles, or fructification, are elevated on ſtalks; a tribe of Lichens, diſtinguiſhed in the *Prodromus* of Acharius, p. 198, but ſubſequently ſunk in his *Methodus*, in his genus *Bæomyces*. It is, however, adopted by Michaux, Boreal. Amer. v. 2. 329, who deſcribes one ſpecies, H. *capitatum*, found in Carolina, growing on the earth.

HELOPS, in *Entomology*, a Fabrician genus of coleoptera. See Pimelia.

Helops, in *Ichthyology*, the name of a fiſh which often occurs in the old Greek and Latin writers. Ariſtotle, Ælian, Ovid, and others, mention it. It ſeems to have been the ſame with their oniſcus, and accipeſius, which was our ſturgeon. Pliny's account of the helops countenances this opinion.

HELORUS, in *Ancient Geography*, a town of Sicily, near the mouth of a river of the ſame name.

HELOS, a town of Greece, in Laconia. See Helots.

HELOSIS, from εἱλέω, *to turn*, in *Surgery*, a turning out of the eye-lids. See Ectropium.

HELOTIS, a name given by ſome authors to a diſeaſe called plica polonica.

HELOTIUM, in *Botany*, from ἧλος, *an excreſcence* or *fungus*. Perſ. Syn. 677. A genus of the natural order of *Fungi*, of which Perſoon gives the following character. *Receptacle* a convex hemiſpherical head, ſmooth on both ſides, elevated on a ſtalk.—He enumerates ſix ſpecies, of which the firſt will ſerve as an example.

H. *aciculare*. (Leotia acicularis; Perſ. Obſ. Mycol. v. 2. 20. t. 5. f. 1. t. 6. f. 1, 2. Helvella agariciformis; Sowerb. Fung. t. 57.)—Gregarious, white, permanent. Head rather concave when young.—Found on the rotten trunks of oaks in autumn. The whole fungus is white. *Stalk* from a line to half an inch in height, ſometimes divided. *Head* ſmaller than half a ſplit pea, ſometimes convex, ſometimes concave with a recurved edge, the whole reſembling a little Agaric, but without gills, and Perſoon has ſhewn, in his exquiſite figures, that the upper ſurface, or diſk, conſiſts of cloſe vertical cells, in each of which numerous concatenated elliptical minute ſeeds are lodged.

HELOTS, in *Antiquity*, a kind of ſlaves, among the Lacedæmonians, occupying a kind of middle ſtate between ſlaves and free citizens, ſo named from Helos, a Laconian town, conquered by the Spartans, who made all the inhabitants priſoners of war, and reduced them and their poſterity to the condition of ſlavery.

On theſe ſlaves lay the whole care of ſupplying the city with proviſions; the ground was tilled, and all manner of trades managed by them; whilſt their maſters ſpent all their time in dancing and feaſting, in their exerciſes, hunting-matches, and the λέσχαι, or places where good company uſed to meet. Theſe Helots farmed the lands of the Spartans; and in order to attach them to the ſervice of their maſters by the allurement of gain, they only paid a fixed rent, inferior to the produce, and which it would be diſgraceful in any proprietor of land to advance. They were alſo ſkilful mechanics; in time of war they ſerved as ſailors on board the fleet, and in the army, every oplites, or heavy armed ſoldier, was accompanied by one or more of them. Notwithſtanding the great uſefulneſs of the Helots, they were treated in a moſt barbarous manner, and often murdered without committing any fault, and without any ſhew of juſtice. Many of them have occaſionally been emancipated in recompence of their ſervices to the ſtate. But this benefit they could receive only from the ſtate; becauſe they belonged more to that than to the citizens whoſe land they cultivated; and on this account their maſters could neither give them their freedom, nor ſell them to foreign countries. Their enfranchiſement was performed by a public ceremony, in which they were led from one temple to another, crowned with flowers, and expoſed to the ſight of the people. They were afterwards permitted to dreſs as they pleaſed, and by new ſervices might be advanced to the rank of citizens.

As an apology for the ſeverity with which they were treated, it is ſaid, that many were governed with great difficulty; their number, their courage, and their riches rendered them daring and inſolent. However, the barbarity which was exerciſed towards them was ſo execrable as to have given occaſion to the proverb, that "at Sparta, the free man is the freeſt of all men, and the ſlave the greateſt of ſlaves." Pott. Archæol. Græc. lib. i. cap. 10. Travels of Anacharſis, vol. iv.

HELPITCH, in *Geography*, a town of the iſland of Ceylon; eight miles S. of Candy.

HELPS, in the *Manege*. To teach a horſe his leſſons, there are ſeven *helps* or aids to be known: theſe are, the *voice*, *rod*, *bit* or *ſnaffle*; the *calves* of the legs, the *ſtirrups*, the *ſpur*, and the *ground*. See Aids.

The helps are occaſionally turned into corrections.

HELSINGBORG, in *Geography*, a ſea-port-town of Sweden, in the province of Schonen, on the coaſt of the Sound, oppoſite to Helſingoer. It was formerly fortified, but is now defenceleſs and has little commerce. Its manufactures are ribbons, hats, and boots. Here is a ferry acroſs the Sound to Denmark; 28 miles N.W. of Lund. N. lat. 56° 5′. E. long. 12 30′.

HELSINGFORS, a ſea-port town of Sweden, in the province of Nyland, on the N. coaſt of the gulf of Finland, built by Guſtavus I. Its ſituation is romantic, on a riſing ſhore, near ſeveral rocks and huge fragments of granite. This is one of the beſt towns in the province, and is defended by ſeveral forts; particularly that called Ulricaberg, capable of containing 200 men, and another named Seatander-tyg, which can accommodate 400 ſoldiers; 140 miles E.S.E. of Abo. N. lat 60° 11′. E. long. 24 56′.

HELSINGIC Character, a character inſcribed on ſome ſtones found in Helſingland, in the north parts of Sweden. It differs from the Runic; though one of theſe characters may eaſily be transformed into the other. See Runic.

HELSINGLAND, in *Geography*, a province of Sweden, in Norland, bounded on the N. by Jamtland and Medelpad, on the E. by the gulf of Bothnia, on the S. by Geſtricia, and on the S.W. and W. by Dalecarlia; about 120 miles long and 90 broad. It has but a ſmall portion of arable land, but it is fertile, and its paſtures feed a great number of cattle; flax is a principal article of cultivation: and the rivers and lakes abound with fiſh. The foreſts are extenſive, and furniſh a good ſupply of wood, for timber and for the uſe of the iron mines of the province. Its chief articles of commerce are iron, flax, linen, tallow, butter, tar, deals, timber, &c. The principal town is Hudwickſwall.

HELSINGO, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 63° 46′. E. long. 22° 30′.

HELSINGOER, a town of Denmark, on the E. coaſt of the iſland of Zealand, built on the ſide of a mountain, near the ſound, and next to Copenhagen, the richeſt and moſt beautiful town of the iſland. At this place all merchant

chant veſſels paſſing the Sound pay a duty, and therefore every nation that trades to the Baltic has its conſul here. This town has no harbour, but its road is ſafe and good; 20 miles N. of Copenhagen. N. lat. 55° 58′. E. long. 12° 37′.

HELST, Bartholomew Vander, in *Biography*, an excellent portrait painter, who was born at Haerlem in 1613. His pictures have the air of correct reſemblances, with great richneſs and truth of colouring and firmneſs of execution; their great defect is want of taſte and variety, and they appear laboured in their effect although clear in tone.

His chef d'œuvre is, or was, in the Chamber of Juſtice in the Town-houſe at Amſterdam. It repreſents the principal officers of the trained-bands of that city as large as life, well deſigned and executed with ornamental ſcenery, and vaſes of gold and ſilver. Sir Joſ. Reynolds, in his notes made during his journey in Flanders, ſpeaks in the higheſt terms of it, and gives the following account concerning it: "The beſt picture in the Stadthouſe is painted by Vander Helſt. It repreſents a company of trained-bands, about thirty figures whole length; among which the Spaniſh ambaſſador is introduced ſhaking hands with one of the principal figures. This is perhaps the firſt picture of portraits in the world, comprehending more of thoſe qualities which make a perfect portrait, than any other I have ever ſeen: they are correctly drawn, both head and figures, and well coloured; and have great variety of action, characters, and countenances; and thoſe ſo truly and lively expreſſive of what they are about, that the ſpectator has nothing to wiſh for. Of this picture I had before heard great commendations, but it far exceeded my expectation." Vander Helſt died in 1670, at the age of 57.

HELSTON, in *Geography*, is a large and populous borough and market-town in the hundred of Kerriar, and county of Cornwall, England, ſituated on the ſide of a hill, which ſlopes gradually to the little river Cober. The houſes are chiefly diſpoſed in four ſtreets, which meet near the centre and form a croſs: near the middle of the principal ſtreet are the market-houſe and town-hall. On an eminence to the north ſtands the church, which was erected about the year 1762, and from its elevated ſituation, and lofty pinnacled tower, forms a very fine object from many parts of the valley which lies between it and the ſea. Though this is one of the ſtannary towns, very little tin is now coined here. The old Coinage-hall is inhabited by an officer of the duchy, to which the manor originally belonged. The manor was ſold to redeem the land-tax in the year 1798, and was purchaſed by John Rogers, eſq. recorder of the borough. Leland mentions ſome veſtiges of a caſtle to be ſeen here in his time, but no part of it is now remaining.

Helſton has at different times received no leſs than fourteen charters. The firſt was beſtowed by king John, who made it a free borough, and granted it a guild mercatory. The privileges of holding a market and four annual fairs, and of returning two burgeſſes to parliament, were granted by Edward III., who alſo confirmed the former charters. The borough was originally incorporated by queen Elizabeth, and its government veſted in a mayor, four aldermen, and twenty-four freemen or aſſiſtants: but this number being reduced to one alderman and eight freemen, a new charter was granted in the year 1774, which determined the corporation to conſiſt of a mayor, five aldermen, a recorder, and an indefinite number of freemen. This charter met with great oppoſition from the remaining members of the old corporation, and occaſioned very ſingular law-proceedings; but is now conſidered as the only charter in force. Helſton is 276 miles diſtant from London. The population under the late return was 2248 perſons, inhabiting 313 houſes. At St. John's village, adjoining to the town, there was formerly a priory of knights of St. John of Jeruſalem; the remains of building were deſtroyed ſome years paſt, and a Methodiſt meeting-houſe erected on the ſcite.

About two miles from Helſton is Penroſe, the ſeat of John Rogers, eſq. This eſtate formerly belonged to the Penroſe family, from whom it deſcended to the preſent proprietor, who has made conſiderable additions to the old manſion, and planted and improved the grounds. A peculiar characteriſtic of the place is a large piece of water, called the Loe-pool, which forms one of the moſt extenſive lakes in the county, and is conſtituted ſuch by a ſingular operation of nature. The continual rolling of the waves of the Britiſh channel forces in a vaſt quantity of ſand and pebbles, which, by conſtantly accumulating, forms a very thick and high bank or dam, extending acroſs the valley, and by cloſing the mouth of the channel, occaſions the river to ſpread over a ſpace nearly ſeven miles in circumference. The waters being thus obſtructed, at length threaten to overflow the mills, and the whole of the lowlands. To prevent which the proprietors, ſanctioned by the mayor of the town, petitioned the lord of the manor for permiſſion to open a paſſage through the pebbly embankment: and having effected this the freſh-water ruſhes into the ocean with amazing force. Its effect is ſingular, and preſents an intereſting ſpectacle. The combination of rocks and woods around this lake is peculiarly pictureſque and grand.

In the pariſh of Sithney, about four miles N.W. of Helſton, is a large pile of ſtones, the uppermoſt of which has long been known by the name of Mên-Amber, and was formerly a logan, or rocking ſtone. Borlaſe's Antiquities of Cornwall, folio; Polwhele's Hiſtory and Antiquities of Cornwall, 3 vols. 4to. and Beauties of England and Wales, vol. ii.

HELVE, the handle of a hatchet, pick-ax, mattock, &c. and to helve theſe is to put handles to them.

HELVELLA, in *Botany*, a word uſed by Cicero for ſome ſort of plant, capable of being dreſſed for the table, of which he ſpeaks in the ſame ſentence with *fungi* and herbs. Some have thought it a ſmall kind of cabbage, or pot-herb; Linnæus ſuppoſed it a fungus, akin perhaps to the morel; and in this ſenſe has made it the name of a genus; ſometimes he writes it *Elvela*, after the Italian authors.—Linn. Gen 568. Schreb. 769. Mart. Mill. Dict. v. 2. Perſ. Syn. Fung. 614. Hudſ Angl. 632. Juſſ. 4. Lamarck. Illuſtr. t. 885.—Claſs and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi*.

Eſſ. Ch. Cap membranous, inflated, rather deformed, deflexed at each margin, ſmooth on both ſides.

Perſoon in his Synopſis enumerates but nine ſpecies of *Helvella*; one without any ſtalk; three with a furrowed ſtalk; and five with a ſmooth or even one.

1. H. *acaulis*, figured in Schæffer's Fungi, t. 153.—Seſſile, waved, expanded, reddiſh brown; paler and fibrous underneath. Found on the ground in fir foreſts. It grows either ſolitary or aggregate, one inch in diameter, or three or four. This is different from *H. acaulis* of Hudſon, which is an *Auricularia*; and we preſume alſo from *H. pineti* of Linnæus, which he ſays is frequent *on the ſtems* of firs, but of the latter we have not been able to come to any certain concluſion.

2. H. *Mitra*. Linn. Sp. Pl. 1649. Schæff. t. 154.—Cap tumid, many-lobed, of a blackiſh livid hue. Stalk furrowed and cellular, whitiſh.—This may ſerve for a ſpecimen of the ſecond ſection. It is not uncommon, growing

on the ground, and is eatable like the Morel, with which it is often confounded.—Sowerby's *H. Mitra*, t. 39, is by Perſoon made a diſtinct ſpecies, under the name of *H. leucophæa*.

3. H. *eſculenta* (Schæff. t. 160.) belongs to the third ſection.—Stalk ſmooth. Cap red-brown, roundiſh; its ſurface crumpled and cellular. Perſoon ſays this is collected and confounded with the true Morel, his *Morchella eſculenta*.

HELVETIC, ſomething that has a relation to the Switzers or inhabitants of the Swiſs cantons, who were anciently called *Helvetii*.

The Helvetic body comprehends the republic of Switzerland, conſiſting of thirteen cantons, which make ſo many particular commonwealths.

By the laws and cuſtoms of the Helvetic body, all differences between the ſeveral ſtates and republics are to be decided within themſelves, without the intervention of any foreign power.

The government of this body is chiefly democratic, with ſome mixture of the ariſtocratic.

When the Swiſs cantons fell under the dominion of the French, they were formed into the Helvetic republic, the independence of which was guaranteed by the treaty of Luneville in the year 1801, and by that of Preſburg in 1809; for an account of which, ſee SWITZERLAND.

HELVETII, in *Ancient Geography*, a people who inhabited that part of Gaul, which was called Helvetia (now Switzerland), ſeparated, according to Cæſar (l i. c. 2.) from the Germans by the wide and deep Rhine, from the Sequani by the lofty mount Jura, and from our province, ſays Cæſar, by the Leman lake and the river Rhone. But we have reaſon to believe, that the Helvetians extended beyond theſe boundaries. In Cæſar's time this country contained of every age and ſex 368,000 perſons. The territory of the Helvetii, containing 12 towns, was divided into four cantons, of which Cæſar mentions only two, *viz.* Tigurinum and Urbigenum; the other two have not been aſcertained. The Helvetii were not always confined within the ſame limits. Tacitus (de Mor. Germ.) deſcribes them thus; "inter Hercyniam Sylvam, Rhenumque et Mœnum omnes Helvetii." Upon the diviſion of the empire under Auguſtus, they were not compriſed within the Lyonneſe province, but ſome of them were intermixed with the Sequani in the Belgic province. Thus Pliny and Ptolemy deſcribe them. In their attempts to extend their territory, they they were twice repulſed and defeated by Cæſar: and he reduced their country to ſubjection, ſo that it remained under the dominion of the Romans, till the empire was ſeparated into new kingdoms by the irruption of the northern Barbarians. Towards the beginning of the fifth century they were united to the kingdom of Burgundy. See SWITZERLAND.

HELVETIUS, JOHN FREDERIC, in *Biography*, a phyſician, was born of a noble family in the principality of Anhalt, about the year 1625. He obtained at an early age a conſiderable reputation for his knowledge of medicine and chemiſtry; and having ſettled in Holland about the year 1649, he practiſed his profeſſion at the Hague with ſo much ſucceſs, that he was appointed to the honourable offices of firſt phyſician to the States-general, and to the prince of Orange. He had been engaged in the practice of phyſic in that country about ſixty years, when he died on the 20th of Auguſt 1709. His works ſerve, however, rather to prove his devotion to the abſurdities of the alchemiſts, phyſiognomiſts, and ſuch viſionaries of his time, than his advancement in true ſcience. Theſe are the titles: "De Alchymia Opuſcula complura veterum philoſophorum," 1652. "Mors Morborum," 1661. "Microſcopium Phyſiognomiæ Medicum, id eſt, Tractatus de Phyſiognomia, cujus ope non ſolum animi motus, ſimul ac corporis defectus interni, ſed et congrua iis remedia naſcuntur per externorum lineamentorum, formarum, colorum, &c., intuitum, qui harmonicam hominis conſtitutionem et medicandi notitiam ex ſimplicibus indicat." 1664, &c. "Vitulus aureus, quem mundus adorat et orat, in quo tractatur de rariſſimo naturæ miraculo tranſmutandi metalla, &c." 1667. "Diribitorium medicum de omnium morborum, &c., definitionibus ac curationibus, ex ſaporibus, odoribus, &c. &c." 1670.

HELVETIUS, JOHN ADRIAN, ſon of the preceding, was born in Holland, it is believed at the Hague, about the year 1661. He had no ſooner completed his courſe of education at Leyden, than he was ſent by his father to Paris, in order to vend certain powders, which, in a country where new remedies were in the higheſt requeſt, he conceived might enable him to make his fortune. He could not, however, obtain a livelihood by his father's powders. But through his acquaintance with a wealthy druggiſt, to whom a quantity of a root had been ſent from the Brazils, ſaid to be poſſeſſed of valuable medicinal properties, he obtained ſome of the root, and he immediately commenced a ſeries of experiments, in order to aſcertain the nature of thoſe properties. At length he diſcovered that the root, the *ipecacuanha*, was extremely beneficial, if not actually a ſpecific remedy, for the dyſentery. He announced his diſcovery of this ſpecific, by poſting bills throughout Paris; and it became the ſubject of general intereſt, even at the court; and ſucceſs having confirmed the correctneſs of the report, M. Colbert took Helvetius under his patronage. About this time the dauphin was attacked with dyſentery, and Helvetius was ſent for by Daquin, then firſt phyſician to his highneſs, in order to aſcertain the nature of the medicine, before it was adminiſtered. Soon afterwards Louis XIV. commanded him to publiſh the ſecret of his remedy, for which a thouſand *louis d'or* were given him. Henceforth his reputation extended, and he was honoured with the titles of eſquire, of counſellor of his moſt Chriſtian majeſty, inſpector general of hoſpitals in French Flanders, and phyſician to the duke of Orleans. He died at Paris on the 20th of February 1727, aged ſixty-five. He wrote ſeveral works, of little value, being intent rather on finding ſpecific remedies for particular diſeaſes, than on ſtudying the varieties of thoſe diſeaſes, and the neceſſary variation of treatment which they require. See the titles of his works in Eloy's Dict. Hiſtorique de la Medicine.

HELVETIUS, JOHN CLAUDE ADRIAN, ſon of the preceding John Adrian, a phyſician of eminence, was born at Paris on the 18th of July 1685. He was educated at the college of the Four Nations, and afterwards entered of the faculty of medicine in his native city, in which he took the degree of M.D. in 1708. By the intereſt of his father, he was made known to the perſons about the court, and when the young king, Louis XV., was attacked with an acute and dangerous diſeaſe in 1719, his advice was followed by the moſt marked ſucceſs. From this time the duke of Orleans conceived ſuch an eſteem for his talents, that he wiſhed him to continue near the perſon of the king; and when the court was removed to Verſailles, the duke-regent engaged him to reſide there, with a penſion of ten thouſand livres. Helvetius afterwards became counſellor of ſtate, phyſician to the queen, and inſpector general of military hoſpitals, as well as a member of moſt of the learned ſocieties of Europe.

This able phyſician well merited the public eſtimation in which he was held, for he was not leſs diſtinguiſhed by the probity of his heart, than by his ſuperiority of talent. He died on the 17th of July 1755, having completed his 70th year within one day. He bequeathed to the library of the faculty of Paris, all thoſe books in his own library of which they were not poſſeſſed. He wrote a ſmall number of works on phyſiology, which the ſubſequent diſcoveries in chemiſtry, &c., have rendered obſolete; and a ſyſtem of medicine under the title of "Principia Phyſico-medica in tyronum Medicinæ gratiam conſcripta," 1752, in two vols. 8vo. He alſo publiſhed ſome papers in the Memoirs of the Academy of Sciences, for 1718, 1719, and 1721; in the firſt, propoſing an hypotheſis concerning the utility of reſpiration, which he ſuppoſed to conſiſt in the compreſſion of the blood; and in the others, deſcribing the ſtomach of man and the ruminant animals, and the ſtructure of the inteſtines. See Eloy. Dict. Hiſt. Gen. Biog.

Helvetius, Claude-Adrian, ſon of the preceding, was born at Paris in the year 1715, and received the early part of his education in his father's houſe, under the inſtruction of an intelligent tutor. He went to the college of Lewis the Great to complete his ſtudies, where he exhibited ſtrong powers of underſtanding, and obtained the particular regards of the profeſſors in that inſtitution. When he arrived at manhood he became a great favourite with the fair ſex, and indulged in the amuſements of the age; at length he ſeems to have been ſuddenly led to a train of ſerious reflections, and he laid aſide what he eſteemed the frivolities of youth, and turned his thoughts to ſerious and important ſtudies. By the progreſs which he made in ſcience, by his wit, and the urbanity of his manners, he became aſſociated with ſome of the moſt diſtinguiſhed characters of his time, among theſe were Voltaire and the preſident de Monteſquieu. With the latter he contracted an intimate friendſhip. He enjoyed ſome time the lucrative office of a farmer-general in the government, but finding that the duties connected with this office interfered with the courſe of ſtudies which he had preſcribed, he reſigned its advantages, retired to his eſtate in the country, and ſpent the greater part of ten years on the compoſition of his great work "De l'Eſprit," or "Eſſays on the Mind and its ſeveral Faculties." This was given to the world in the year 1758. Scarcely had it iſſued from the hands of the author, when it was condemned by the parliament of Paris, as derogatory to the nature of man, by confining his faculties to animal ſenſibility, and having a direct tendency to deſtroy the diſtinctions between virtue and vice. So obnoxious was M. Helvetius now to the generality of his countrymen, that it was thought neceſſary to remove him from the poſt which he held as Maître d'Hôtel to the queen, and it was with the utmoſt difficulty that he eſcaped proſecution for hereſy or even blaſphemy. While the ſtorm was raging he thought it right to ſeek a ſhelter from its fury, and viſited England, and afterwards he went to Pruſſia, where he was received with particular attention by the king, lodged in his palace, and admitted into his familiar parties. On his return to France, he ſpent the greater part of his time in the country, in ſtudy, in the enjoyment of domeſtic happineſs, and in the exerciſe of benevolence towards his tenants and dependants. His heart and hand were ever open to relieve diſtreſs; he is ſaid to have derived much of his pleaſure in ſearching out and rendering every aſſiſtance in his power to indigent perſons of merit. An anecdote is mentioned highly to his praiſe: having been told that ſome part of his bounty was beſtowed on perſons undeſerving of his liberality, and who, under the ſemblance of virtue, were really characters of an oppoſite deſcription, he replied, "If I were a king, I would correct them, but as I am only a rich man, and they are poor, I did my duty in relieving them." He died in December 1771 of an attack of the gout in his ſtomach. After his deceaſe his firſt literary production was given to the public, entitled "Epiſtles on Happineſs." They had, many years before, been read by Voltaire and his other literary friends, and by them highly applauded, but during his life were concealed in his own library. His work "De l'Eſprit," he extended under the title of "A treatiſe on Man, his intellectual Faculties and his Education," which was not publiſhed during his life, as he ſaw it would expoſe him to proſecution without the chance of any advantage reſulting from it. Of the author, the very judicious writer of the article Helvetius, in the General Biography, obſerves, "He has introduced notions relative to the foundations of morality, and the nature of virtue, which we conceive calculated to produce injurious effects on ſuperficial and unthinking readers. With much force and wit, he expoſes credulity in the abſurdities of falſe religion, while he diſclaims every intention of offending againſt any of the truths of Chriſtianity; but it will be difficult to reconcile his ſincerity in ſuch a diſavowal, with his frequent inſinuations that the principles of religion are inadequate to the purpoſes of morality." In his "Eſſays on Happineſs," he makes it to depend on the cultivation of literature and the arts, rather than the reſult of virtue. Wretched, indeed, would be the ſtate of the great maſs of mankind if this were the caſe, but it is not ſo: "God is good to all, and his tender mercies are over all his works." In his private character, Helvetius is repreſented to have been a dutiful ſon, a tender father, an affectionate huſband, a ſincere open-hearted friend, and in every relation of life, generous, diſintereſted, and benevolent. Gen. Biog.

HELVICUS, Christopher, in *Biography*, was born at Heſſe in 1581; he was educated at Marpurg, and made ſo great a progreſs in early life, that he was appointed, in 1605, to teach the Greek and Hebrew languages at the univerſity of Gieſſen, and in 1610 he was raiſed to the profeſſorſhip of theology in the ſame ſeminary. He was under the immediate patronage of the landgrave of Heſſe, and by him he was ſent to Francfort, to examine the libraries of the Jews who had been expelled from that city. While engaged in ſome important literary undertaking, he died in 1617. Though taken off in the thirty-ſeventh year of his age, he left ſeveral works which have rendered his name illuſtrious in the learned world. He was a profound grammarian, and is ſaid to have poſſeſſed a happy method of teaching young people the rudiments of the languages. He compoſed various grammars and lexicons, and a book of rules for writing Greek verſe. He publiſhed ſeveral tracts on the controverſies between the Jews and Chriſtians, but he is beſt known for his Chronological Tables, publiſhed in 1609 under the title of "Theatrum Hiſtoricum, ſive Chronologiæ Syſtema novum." Helvicus was likewiſe author of a Synopſis of Univerſal Hiſtory, down to the year 1616; alſo a "Chronological Diſſertation on the ſeventy weeks of Daniel," and other tracts. Bayle.

HELVIDIANS, in *Eccleſiaſtical Hiſtory*, a ſect of ancient heretics, denominated from their leader Helvidius, a diſciple of Auxentius the Arian, whoſe diſtinguiſhed principle was, that Mary, the mother of Jeſus, did not continue a virgin, but had other children by Joſeph.

The Helvidians are called, by the Greeks, Antidicomarianites.

HELVII, in *Ancient Geography*, a people of Gallia Narbonnenſis, at a ſmall diſtance to the right of the Rhone.

Their capital was called *Albe*, according to Pliny. Their country correſponded to the preſent Vivarais.

HELVIR, in *Geography*, a town of Curdiſtan; 10 miles N. of Amadié.

HELVOETSLUYS, in *Geography*, a ſea-port town of Holland, on the S. ſide of the iſland of Voorn, with a good harbour, about 12 miles from the open ſea, in the middle of a large bay, capable of holding the whole fleet of the country; the town is ſmall but well fortified. This is the general port for packets from England, chiefly from the port of Harwich. In 1795, it was taken by the French; 15 miles S.W. of Rotterdam. N. lat. 52° 4'. E. long. 3° 58'.

HELWELLYN, or HELVELLYN, a mountain of England, in Cumberland; the height of which is eſtimated at 3324 feet above the level of the ſea. See MOUNTAIN.

HELWICK-HEAD, a cape of Ireland, in the county of Waterford, on the ſouth point of the entrance into Dungarvan bay. N. lat. 52° 2'. W. long. 7° 33' from Greenwich.

HELXINE, in *Botany*, a name uſed by ſome authors for the parietaria, or pellitory of the wall.

HELXINE, ἑλξινη of Dioſcorides, of which he deſcribes two kinds in his fourth book. The firſt, chapter 39, a twining plant, with leaves like ivy, but ſmaller, whoſe juice is of a purgative quality, is ſaid to grow in hedges, vineyards, and corn fields. This has been taken for *Polygonum Convolvulus*, or *P. dumetorum*, and may perhaps be ſome ſpecies of *Convolvulus*. The ſecond, chapter 86, anſwers very well to *Parietaria officinalis*, for which it is generally taken, and which Dr. Sibthorp obſerved to be common throughout Greece and the Archipelago. Dioſcorides juſtly ſays that it grows on banks and walls; that the ſtems are ſlender and reddiſh; leaves like Mercury, hairy; and the little ſeeds, about the ſtem, rough, adhering to people's cloaths."

Linnæus in his earlier editions had a genus *Helxine*, which comprehended the *Fagopyrum* of Tournefort; but he afterwards, with unqueſtionable propriety, reduced it to his very natural genus *Polygonum*.

HELYOT, PETER, in *Biography*, a French friar, of the third order of St. Francis, was born at Paris in the year 1660. He embraced the eccleſiaſtical life in 1683, when he took the name of father Hippolytus. In the courſe of his miſſions he made two journeys to Rome, and travelled over the whole of Italy. In that country he projected, and made progreſs in a conſiderable work, entitled "A Hiſtory of the Monaſtic Orders, religious and military, and of the ſecular congregations of both ſexes, which have been eſtabliſhed to the preſent time, containing an account of their origin, foundation, progreſs, principal events, declenſion, ſuppreſſion, or reformation, and the lives of their founders or reformers, illuſtrated with engravings of their different habits." He was elected to ſeveral important poſts of his order, ſome of which gave him a good opportunity of collecting additional materials from the different inſtitutions which he viſited, and of finiſhing the compoſition of his work. In 1714 he began to print his hiſtory, which he did not live to ſee finiſhed. He died in 1716, when the fifth volume was in the preſs. Four other volumes were afterwards printed under the ſuperintendance of father Bullot, a member of the ſame ſociety. The whole work is held in conſiderable eſtimation, and an abridgment of it was publiſhed at Amſterdam in 1721, in four volumes, 8vo. Helyot was author of ſome devotional pieces, of which the moſt known is entitled "A View of the dying Chriſtian." Moreri.

HEM, a partition in the ovens, wherein the *lapis calaminaris*, or *calamine*, is baked. Theſe ovens have a hearth made on one ſide, divided from the oven itſelf by a partition, or hem, open at the top, by which the flame paſſes over, and ſo heats and bakes the calamine.

HEMARTHRIA, in *Botany*, ſo named by Mr. R. Brown, from ἡμισυς, *half*, and αρθρον, *a joint*; a genus eſtabliſhed by that ingenious writer in his Prodromus Nov. Holl. v. 1. 207, and conſiſting of ſuch ſpecies of *Rottbollia*, as have the *rachis* or common ſtalk of their ſpike but imperfectly jointed, ſo as ſcarcely to fall aſunder when ripe. One ſpecies is *R. Compreſſa*, Linn. Suppl. 114; another, found in Van Diemen's land, is named by him *H. uncinata*, from its inner glume being hooked.

HEMATITE *Red*, *Brown*. See IRONSTONE, *red*, *brown*.

HEMDA, in *Geography*, a town of Perſia, in the province of Irak; 80 miles E. of Iſpahan.

HEMELAR, JOHN, in *Biography*, was born at the Hague, and brought up to the church. In this he obtained preferment, and became canon in the cathedral of Antwerp. He is known for his Commentaries on the Imperial Medals from Julius Cæſar to Juſtinian. He died in 1640. Moreri.

HEMEL-HEMSTED, in *Geography*, is a reſpectable market town and pariſh in the hundred of Dacorum, Hertfordſhire, England. It is ſituated at a ſhort diſtance from the river Gade. The church, which ſtands in a ſpacious cemetery adjoining to the town on the weſtern ſide, appears to have been erected in the Norman era; but has been much altered and enlarged at ſubſequent periods. The weſtern entrance diſplays a finely ornamented receſſed arch, with two columns, and a half column on each ſide, ſupporting various mouldings, charged with diamonds, lozenges, roſes, and trefoils. The nave is ſeparated from the aiſles by a range of five maſſive columns on each ſide, and two half-columns, with ſquare capitals, variouſly ſculptured, and ſupporting round arches, having plain, zig-zag, and billetted mouldings. The town was incorporated by Henry VIII. who granted it a common ſeal and a pie-powder court during its market and fair. The market, which is held on Thurſday, is one of the moſt conſiderable in the county for grain; the market-houſe is a plain edifice of wood. The contiguity of the town to the Grand Junction Canal has already a beneficial effect on its trade. Among the charitable eſtabliſhments, the principal is the bequeſt of Mr. Thomas Warren, who, by will, dated December 2, 1796, provided for the ſupport of 50 poor widows, and for the endowment of two free-ſchools, one for 13 boys, the other for 15 girls. Hemel-Hemſted is 23 miles diſtant from London. Its population, as aſcertained under the late act, amounted to 2722; the number of houſes to 497.

Hemſted-Bury, or the Bury-houſe, at the bottom of the town, is a neat modern building, now the property of —— Hilton, eſq. a deſcendant from the ancient and noble family of Hilton, of Hilton Caſtle, in the biſhopric of Durham. Chauncy's Hiſtory, &c. of Hertfordſhire, and Beauties of England and Wales.

HEMERALOPIA, in *Medicine*, ſignifies, in the writings of the beſt ancient authors, *day-blindneſs*; that is, a diſeaſe of the eyes, which renders viſion extremely imperfect during the day, although after ſun-ſet that ſenſe becomes tolerably perfect.

This affection of the ſight, which is of very rare occurrence, ſtands in oppoſition to the *nyctalopia* of the ancients, or *night-blindneſs*, which appears to be a very common diſorder in warm climates. Modern writers in general, however, have uſed theſe terms in the contrary ſenſe; conſidering the *hemeralopia*

meralopia as denoting ſight during the day, and blindneſs in the night (*viſus diurnus*, in the tranſlation of Boerhaave); and *nyctalopia*, as expreſſing night-ſeeing, owl-ſight, as the French call it, and blindneſs during the day-time. Accordingly the derivation of the term, as ſtated by the latter, is from ἡμέρα, *the day*, and ὤψ, *the eye*, which they conceive to ſettle the meaning of the word as *day-ſight*; and in the ſame way nyctalopia is deduced from νύξ, *the night*, and ὤψ, which coincides with the interpretation of *night-ſeeing*, or *viſus nocturnus*, as Boerhaave calls it. (De Morbis Oculorum, p. 161.) Some of the commentators and interpreters of Hippocrates have adopted the ſame view of the ſubject, and confounded the nyctalopia with the day-blindneſs (hemeralopia). See Foëſius in Œcon. Hippocrat. But Galen, the beſt interpreter of ſome difficult paſſages in Hippocrates, calls the nyctalopia "night-blindneſs;" and Aëtius, Paulus Ægineta, Actuarius, Pliny, and Celſus follow the ſame interpretation. Monſ. Dujardin, who adopts the ſame ſignication of the term, ſays that "Hemeralopia is derived from three Greek words, ἡμέρα, *the day*, ἀλως, *blind*, and ὤψ, *the eye*, meaning therefore *diurna cæcitudo*, or *diurnal blindneſs*; and in like manner nyctalopia, deduced from νύξ, and the two other words, denotes *nocturnal* blindneſs." (See Journal de Medecine, tom. xix. p. 348.) In the ſame ſenſe Dr. Hillary (Obſ. on the Diſeaſes of Barbadoes, p. 298. ſecond edit.), Dr. Heberden (Medical Tranſactions, vol. i. art. 5), and ſome other learned modern phyſicians, have employed the term. Indeed the true derivation of theſe terms ſeems to be from ἡμέρα and νύξ reſpectively, with ἀλωψ, which conſiſts of ὤψ with the primitive α, and the λ introduced for euphony.

Dr. Hillary remarks that "the hemeralopia is a diſeaſe which is very ſeldom ſeen; they (the patients) ſee pretty well in the night, but very little in the day, and cannot ſee any thing when the ſun ſhines bright. It proceeds from a different and direct contrary cauſe of the other (nyctalopia), *viz.* from too great a tenderneſs and ſenſibility of the iris and retina; for they cannot bear any degree of light from the ſun to fall upon their eyes, but are obliged to ſhut their eyelids cloſe, and ſo near cloſed from the light of the day, when the ſun does not ſhine out, as not to be able to ſee; as we ſometimes ſee in an inflammation of the iris or retina, though no inflammation is preſent here, but too great a ſenſibility of thoſe parts, ſo that they cannot bear the light of the day, but can dilate the pupil of the eye, and ſee very well in the night. I have but had an opportunity of ſeeing two perſons who laboured under this diſeaſe." Little or nothing has been recorded reſpecting the means of curing this very rare diſorder. Dr. Hillary obſerves, that it has been ſaid that there are a people in Siam, in the Eaſt Indies, and alſo in Africa, who are all of this cat-eyed ſpecies, or ſubject to the diſeaſe of being blind in the day-time, and ſeeing well by night. (Mod. Univ. Hiſt. vol. vii.)

Sauvages affirms that the hemeralopia (in his nomenclature, called Amblyopia crepuſcularis) had, about two years before, been in ſome degree epidemic in the neighbourhood of Montpellier, in the villages in damp ſituations adjoining the rivers, and particularly affecting the ſoldiers, who ſlept in the open damp air. They were cured, he ſays, by bliſtering, together with emetics and cathartics, and other evacuants. (Noſol. Method. Claſs VI. Gen. III. Spec. I.)

Boerhaave has mentioned a variety of this diſeaſe, occaſioned by an immoveable contraction of the pupil; for which, however, he could not ſuggeſt any ſafe or probable remedy, eſpecially as the diſeaſe occurred principally in old people.

Profeſſor Scarpa, who has a chapter on the ſubject of hemeralopia, which he conſiders as a partial amauroſis, has fallen into the common error of confounding it with night-blindneſs. (Obſervations on Diſ. of the Eyes, tranſlated by Briggs, p. 499.) See NYCTALOPIA.

HEMEROBAPTISTS, a ſect among the ancient Jews, thus called from their waſhing and bathing every day, in all ſeaſons; and performing this cuſtom with the greateſt ſolemnity, as a religious rite neceſſary to ſalvation. Epiphanius, who mentions this as the fourth hereſy among the Jews, obſerves that in other points theſe heretics had much the ſame opinions as the Scribes and Phariſees; only that they denied the reſurrection of the dead, in common with the Sadducees, and retained a few other of the improprieties of theſe laſt.

The ſects who paſs in the Eaſt under the denomination of Sabians, calling themſelves *Mendai Iihai*, or the diſciples of John, and whom the Europeans entitle the Chriſtians of St. John, becauſe they yet retain ſome knowledge of the Goſpel, are probably of Jewiſh origin, and ſeem to have been derived from the ancient Hemerobaptiſts; at leaſt it is certain, that John, whom they conſider as the founder of their ſect, bears no ſort of ſimilitude to John the Baptiſt, but rather reſembles the perſon of that name, whom the ancient writers repreſent as the chief of the Jewiſh Hemerobaptiſts. Theſe ambiguous Chriſtians dwell in Perſia and Arabia, and principally at Baſſora; and their religion conſiſts in bodily waſhings, performed frequently, and with great ſolemnity, and attended with certain ceremonies, which the prieſts mingle with this ſuperſtitious ſervice. Moſheim's Eccl. Hiſt. vol. iii.

HEMEROBIUS, in *Entomology*, a genus of Neuroptera. The mouth is armed with a ſhort horny mandible; the jaw cylindrical, ſtraight, and cleft; feelers four, unequal, and filiform; ſtemmata generally none; wings deflected and not folded; antennæ ſetaceous, projecting, and longer than the thorax, which is convex.

Fabricius divides the Linnæan genus Hemerobii into two genera, Hemerobius and Semblis; and by ſome late writers they are again ſeparated into a greater number, as Hemerobius, Oſmylus, Corydalis, Chauliodes, and Sialis. The true Hemerobius has no diſtinct ſtemmata; and this, in addition to the general character of the Hemerobini appears very characteriſtic. This genus is well exemplified in the Linnæan ſpecies Hemerobius perla. The Fabrician Hemerobius maculatus, a ſpecies in which the ſtemmata are very diſtinct, Latreille calls Oſmylus. In Corydalis (Hemerobius cornutus of Fabricius) the wings reſt horizontally; the antennæ are ſimple; and the mandibles very long, and advanced forward. The wings likewiſe reſt in a horizontal poſition in Chauliodes, but in this the antennæ are pectinated inſtead of ſimple, and the mandibles are neither very long, nor advanced forward; and, laſtly, in Sialis the wings, when at reſt, are diſpoſed in a roof-like form, the wings being deflected, expanding a little beneath, and meeting together in a longitudinal line at the dorſal future; the antennæ are ſimple, and the laſt joint but one of the feet bilobate. Schæffer had long before obſerved that in the genus Hemerobius the abdomen grows ſlender towards its extremity, that the wings are in ſome ſubjects incumbent, and in others deflected, and the feet compoſed of five joints.

Many of the inſects referred to the above-mentioned tribes occur in marſhy places near ſtanding pools of water, and ſometimes in woods, or, more frequently, in fields and gardens. Theſe inſects have a very remarkable and unpleaſant ſmell, as we find in the ſpecies *perla*, a kind of Hemerobius called in England the "thunder fly," from the powerful ſcent it emits, and, as it is vulgarly ſuppoſed, at the approach of a thunder ſtorm. The term of their exiſtence is very ſhort, and in every ſtate of life they prey with unceaſing avidity on plant lice, for which reaſon they are beneficial to horticulture; they alſo ſubſiſt on other inſects, and not unfrequently devour one another. The larvæ are generally ovate and hairy, and are furniſhed with ſix feet; the pupa moſtly folliculate. The eggs are depoſited each upon a diſtinct gummy pedicle, in cluſters upon the leaves of plants. The ſpecies deſcribed below are Hemerobii of Gmelin, including the two Fabrician genera, Hemerobius and Semblis, and are diſtributed nearly in the order in which they are placed by Fabricius.

Species.

Grandis. Wings ſomewhat equal and reticulated with veins, and marked with two yellowiſh ſpots. Thunb.

Native of Japan; the body oblong and yellowiſh; antennæ and jaws black.

Cornutus. Mandibles projecting, and horn-ſhaped. Fabr. *Raphidia cornuta*, Linn.

Inhabits North America; very large; body ferruginous.

Perla. Wings hyaline with green veins; body yellowiſh-green; eyes golden. Geoffr. Linn. &c. *Golden-eye, or thunder-fly*, Donov. Br. Inſ.

Common in gardens during ſummer, and is a very delicate and elegant little inſect; the head and body, with the legs, pea-green, the eyes brilliant, and reſembling dots of molten gold, and the wings the texture of fine gauze. The length, when the wings are cloſed, about an inch. The bite of this ſpecies is acute.

Filosus. Cinereous; wings whitiſh; antennæ very long. Fabr.

Native of the iſland of Otaheite, deſcribed from the Bankſian cabinet. Its ſize rather larger than the laſt; antennæ ſetaceous and twice the length of the body; body and wings without ſpots.

Albus. White; wings hyaline; eyes braſſy. Linn.

According to Linnæus this is allied to Hemerobius perla, and is found on plants in Sweden.

Capitatus. Fuſcous; head and forepart of the thorax teſtaceous; wings white, with reticulated nerves. Fabr. *Hemerobius flavus*, Scop.?

Native of Germany; wings ſhaded greeniſh, and a common elongated brown ſpot.

Chrysops. Wings hyaline with green veins, and brown ſpots; body variegated black and green. Linn. *Spotted hemerobius*, Donov. Br. Inſ.

Inhabits woods in Europe, a rare ſpecies.

Maculatus. Wings white, upper-pair ſpotted with black; body black. Fabr.

Native of France. Head and legs ſomewhat teſtaceous.

Nitidulus. Wings ſtriated and cinereous; body teſtaceous; legs pale. Fabr.

Antennæ brown; eyes black. The ſpecies inhabits Germany.

Phalænoides. Wings mucronate at the baſe, and cut behind. Linn.

Wings teſtaceous, with an oblique brown ſtreak and dot. Found in Europe.

Hirtus. Wings hairy, reticulated with brown; lower ones with a terminal band. Degeer, &c. *Hairy hemorobius*, Donov. Br. Inſ.

Native of Europe; ſize moderate.

Fuscatus. Wings ſtriated, brown, hyaline; body black; legs teſtaceous. Fabr.

Rather ſmaller than the laſt, and inhabits Denmark and France.

Lutescens. Wings white with brown ſtreaks; body yellowiſh. Degeer.

Inhabits Kiel.

Humuli. Wings white, with ſcattered brown dots; antennæ annulated with white and black. Linn.

Found in the hop plantations at Upſal.

Longicornis. Black, mouth and legs pale, antennæ brown and long. Fabr.

Inhabits Holſace.

Striatulus. Wings ſtriated with brown; lower ones immaculate; body brown and yellow. Fabr.

Found in gardens in Europe. The head is yellow; mouth and eyes brown; thorax brown; breaſt and legs yellow; abdomen brown with the ſides yellow.

8-Punctatus. Wings white, with two brown dots on each. Fabr.

Native of Cochinchina. Body yellowiſh.

Fasciatus. Wings white, with three bands and numerous ſpecks of black. Fabr.

Inhabits Kiel. The antennæ are black; head and thorax yellow with brown marks; abdomen black; lower wings white and immaculate.

Nervosus. Fuſcous; crown of the head and thorax at the back yellowiſh; wings variegated, the nerves dotted with white. Fabr.

Native of France.

Size of H. hirtus; antennæ yellowiſh, with black rings; head black except the yellowiſh crown; abdomen black; legs yellowiſh.

Variegatus. Wings white with black ſpots, the nerves dotted; body brown. Fabr.

Inhabits France.

6-Punctatus. Wings white with fuſcous ſpots, and ſix diſtinct dots behind; antennæ brown. Linn.

Inhabits Europe in gardens.

Picicornis. Black; upper wings white and fuſcous varied; antennæ long and hairy. Fabr.

A ſmall ſpecies found in Denmark. The body is black and without ſpots; lower wings white and without ſpots, and the legs pale.

Flavicans. Black, thorax and abdomen yellow.

An European ſpecies.

2-Punctatus. Wings with two black dots; body varied with brown and yellow. Linn.

Found in gardens in Europe.

4-Punctatus. Wings white with four black dots at the baſe, the tip radiated with brown. Fabr.

A ſmall ſpecies found at Kiel.

Abdominalis. Fuſcous with yellow abdomen; vent black. Fabr.

Taken by Fabricius in the month of Auguſt in Norway. The ſpecies alſo inhabits England. Its ſize is ſmaller than that of a flea.

Testaceus. Wings black, thrice as long as the body; body brown, beneath teſtaceous. Degeer, &c.

Native of America.

Paganus. Wings white; upper-pair with faint duſky bands; antennæ white. Linn.

Inhabits Upſal.

Flavus. Yellow; mouth blood-red each ſide. Linn.

This and the two following are European ſpecies.

Melanosticos. Yellowiſh; wings hyaline, varied with blue and golden, the nerves whitiſh dotted with black, the margins with minute black dots. Linn.

Versicolor. Yellow; wings hyaline, varied with blue and golden, baſe of the abdomen beneath and tail black; antennæ yellow. Linn.

The ſucceeding ſpecies belong to the Fabrician genus Semblis.

PECTINICORNIS. Antennæ pectinated; wings white with brown marks, and nerves ſomewhat articulated with white. Degeer.

Native of South America.

GRISEUS. Wings grey ſpotted with white. Fabr.

Inhabits Africa. The head and thorax ferruginous varied with black; lower wings black at the baſe.

ATRATUS. Wings whitiſh; upper pair ſpotted with black; body black. Fabr.

Native of Africa. The head black; front covered with cinereous hair; thorax black and hairy, with a cinereous line each ſide; abdomen black, with an oblong teſtaceous ſpot towards the tip.

PUNCTATUS. Brown; wings white ſpotted with brown; the nerves dotted with white and black. Fabr.

Country unknown.

FUSCATUS. Wings brown ſpotted with white; poſterior ones black at the baſe. Fabr.

Inhabits the Eaſt Indies. The head ferruginous; mouth black; thorax duſky.

LUTARIUS. Black; wings ſtriated whitiſh ſpotted with white. Degeer.

Native of Europe.

HEMEROCALLIDEÆ, in *Botany*, a natural order of plants eſtabliſhed by Mr. R. Brown, Prod. Nov. Holl. v. 1. 295, and named from the *Hemerocallis*, which makes one of them. It conſiſts of the 1ſt ſection of Juſſieu's *Narciſſi*, except *Gethyllis*, and ſome of his *Aſphodeli* with a tubular corolla; or perianthium, as both theſe writers eſteem it. The characters are

Perianth (rather corolla) tubular, coloured, its limb in ſix diviſions. Stamens ſix, inſerted either into the tube, or the baſe of the ſegments. Germen ſuperior, of three cells, with many ſeeds. Style one. Stigma either three-lobed or ſimple. Capſule, (rarely a berry,) of three cells and three valves. Seeds with their outer coat neither of an opaque black nor cruſtaceous, but often ſpongy and dilated or winged. Albumen fleſhy.

The author ſuggeſts that perhaps the plants in queſtion ought rather to form a ſection of the *Liliaceæ*, than a diſtinct order, and that they ſcarcely differ from what are ſtrictly ſo called, the *Lilia* of Juſſieu, except in their tubular flowers.

The only New-Holland genus of this order or ſection is *Blandfordia*, Sm. Exot. Bot. v. 1. 5. t. 4, confounded with *Aletris* by La Billardiere, in his Nov. Holl. v. 1. 85. and in his voyage, Engliſh ed. v. 1. 160.

HEMEROCALLIS, from ἡμερα, *a day*, and καλλος, *beauty*, *a beauty of a day*, expreſſive of the ſhort duration of the flowers. This is correctly applicable to the Linnæan genus, of which we are to treat, but the ἡμεροκαλλις of Dioſcorides is a bulbous plant, and his deſcription anſwers rather to ſome ſpecies of *Lilium*; we ſhould think the *bulbiferum*, or orange lily, if that were a native of Greece. Dr. Sibthorp took the plant of Dioſcorides to be *L. calcedonicum*, the ſcarlet martagon, found wild in the woods of Mount Parnaſſus; but this does not appear quite ſatisfactory.—Linn. Gen. 172. Schreb. 228. Willd. Sp. Pl. v. 2. 197. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 1. 473. Juſſ. 54. Lamarck. Illuſtr. t. 234. Gærtn. t. 83, but not t. 179.—Claſs and order, *Hexandria Monogynia*. Nat. Ord. *Coronariæ*, Linn. *Narciſſi*, Juſſ.—See HEMEROCALLIDEÆ.

Gen. Ch. *Cal.* none. *Cor.* in ſix deep ſegments, between bell and funnel-ſhaped; tube ſhort; limb ſpreading, the upper ſide moſt reflexed. *Stam.* Filaments ſix, awl ſhaped, the length of the corolla, declining, the upper ones ſhorteſt; anthers turned upwards, oblong, incumbent. *Piſt.* Germen ſuperior, roundiſh, furrowed; ſtyle thread-ſhaped, of the length and poſition of the ſtamens; ſtigma turned upwards, bluntly triangular. *Peric.* Capſule triangular, ſwelling, ſomewhat three-lobed, of three cells, and three valves. *Seeds* numerous, roundiſh, without wings, ſmooth, and of a ſhining black.

Eſſ. Ch. Corolla funnel-ſhaped, with a cylindrical tube. Stamens declining. Capſule of three cells. Seeds numerous, roundiſh, poliſhed, without wings.

Obſ. From this genus muſt certainly be ſeparated the *H. lancifolia* and *japonica* of Thunberg and Willdenow; the former of which is *H. alba*, Andr. Repoſ. t. 194, and the latter *H. cærulea*, t. 6. Curt. Mag. t. 894. Theſe form a moſt diſtinct genus, with broad and ribbed leaves, very different in habit from *Hemerocallis*; the limb of its corolla more bell-ſhaped than funnel-ſhaped, and the ſeeds affording an excellent eſſential character, being winged. See Sm. Intr. to Bot. 362; and Gærtner, t. 179, *Hemerocallis cordata*, which is the above *cærulea*, a plant whoſe nomenclature has been remarkably multiplied and confuſed, and that of the *alba* ſtill more, by Thunberg himſelf. Mr. Saliſbury has propoſed, in Tr. of Linn. Soc. v. 8. 11, to call this new genus *Sauſſurea*, to which there can be no poſſible objection. The fine ſpirial veſſels, as he tacitly indicates, render it peculiarly proper to commemorate M. de Sauſſure, ſo eminent a writer on the anatomy and phyſiology of plants.

The real ſpecies of *Hemerocallis* are

1. H. *flava*. Yellow Day-lily. Linn. Sp. Pl. 462. Curt. Mag. t. 19. Jacq. Hort. Vind. t. 139. Redout. Liliac. t. 15. (Lilium non bulboſum; Ger. Em. 98.)—Leaves linear, keeled. Segments of the corolla flat, acute, with unbranched ribs.—Native of open fields in Dalmatia, Hungary, and Switzerland; hardy and very common in our gardens, where it bloſſoms in June, and is eſteemed for its ſweet and rich fragrance, as well as beauty.

The *root* is perennial, furniſhed with ſtalked ovate knobs, and thrives beſt in a rather moiſt ſoil. *Leaves* ſeveral, radical, a foot or more in length, nearly erect, of a deep graſs-green, ſmooth, linear, acute, nearly flat, except the keel. *Flower-ſtalks* taller than the leaves, erect, round, panicled in a corymboſe manner at the top, with alternate, long, lanceolate, pale *bracteas*. *Flowers* of a golden yellow, funnel-ſhaped; their ſegments acute, recurved; the three inner ones broadeſt, but ſcarcely at all waved or uneven, the ribs of all ſimple to the end. Linnæus could find no ſpecific difference betwixt this and *fulva* but the colour of their flowers, at leaſt when he wrote his *Species Plantarum*. Willdenow has been far more ſucceſsful, and we have adopted his definition above.

2. H. *graminea*. Narrow-leaved Day-lily. Andr. Repoſ. t. 244 Curt. Mag. t. 873. (H. flava β; Willd. Sp. Pl. v. 2. 197. H. minor; Mill. Dict. ed. 8.)—Leaves channelled, nearly triangular. Bracteas ſhort and membranous. Corolla rather ſwelling at the baſe; its inner ſegments criſped at the edge. Stigma three-lobed.—Native of Siberia, from whence Mr. Loddige obtained the ſeeds. It is hardy with us, but the flowers being ſcarcely fragrant, though of a richer yellow than the foregoing, render it not on the whole ſo deſirable. The *leaves* are narrower, ſhorter and darker, their edges more raiſed, ſo as to form a channel. *Stalk* much leſs branched; *flowers* rather larger, and *ſtyle* much longer. Other differences are noted in the ſpecific character. Parkinſon in his *Paradiſus*, 149, draws the yellow Day-lily with tumid flowers, like this, but the broad leaves, even ſegments of the corolla, long ſtyle, and nume-

rous flowers, ſurely agree beſt with the former. We obſerve alſo ſome ambiguity in Redoutè's figure of the *flava*, but have no doubt of his ſpecies.

3. H. *fulva*. Tawny Day-lily. Linn. Sp. Pl. 462. Curt. Mag. t. 64. Redout. Liliac. t. 16. (Lilium non bulboſum phœniceum; Ger. Em. 98.)—Leaves linear, keeled. Three inner ſegments of the corolla obtuſe, waved; their ribs branched at the margin. – Suppoſed by Linnæus to be a native of China. It is an old and very hardy inhabitant of our gardens, flowering in July and Auguſt, and is larger in every part than the firſt ſpecies, without any ſcent in the flowers, which continue but a few hours, and are of a tawny or orange hue. The *leaves* are rather broad, of a fine green, particularly pale and delicate in the ſpring. *Capſules* ſcarcely ever ripened in England, but the roots form large faſt-encreaſing tufts, calculated for large gardens or ſhrubberies, eſpecially where the ſoil is rather moiſt.

We apprehend a great miſtake in the report of this ſpecies having ever changed to *flava*; ſee Tr. of the Linn. Soc. v. 2. 353.

Hemerocallis, in *Gardening*, comprehends plants of the herbaceous, flowering, perennial kinds, of which the ſpecies principally cultivated are, the yellow day-lily (H. flava); and the copper-coloured day-lily (H. fulva.)

The firſt of theſe ſpecies has a variety with ſmaller roots, ſhorter and more narrow leaves, which are of a dark green colour, and ſomewhat bell-ſhaped yellow flowers.

Method of Culture.—Theſe hardy plants are increaſed with little difficulty, by means of planting the root off-ſets in the autumn in almoſt any ſituation. Afterwards, they ſtand in need of no other ſort of cultivation but that of keeping them quite free from weeds, and letting them have ſufficient room for their roots to extend themſelves in.

The firſt ſpecies is alſo capable of being multiplied by the ſeeds, which ſhould be put into the ground in the autumn. In the following ſpring the young plants preſent themſelves, and become capable of flowering in the courſe of two years.

The moſt ſuitable ſoil for the different ſorts is that which is inclined to be a little moiſt, and where the ſituation is of a ſhady nature. In conſequence of their ſize, and the rapid increaſe of their roots, eſpecially in the latter kind, they become beſt adapted to large pleaſure-grounds and gardens, in which they afford conſiderable variety and effect.

HEMERODROMI, compounded of ἡμερα, *day*, and δρομο, *courſe*, &c. among the *Ancients*, were centinels, or guards, appointed for the ſecurity and preſervation of cities, and other places.

They went out of the city every morning, as ſoon as the gates were opened, and kept all day patrolling round the place; ſometimes, alſo, making farther excurſions into the country, to ſee that there were no enemies lying in wait to ſurpriſe them.

Hemerodromi were alſo a ſort of couriers, who only travelled one day, and then delivered their packets, or diſpatches, to a freſh man, who run his day, and ſo on, to the end of the journey.

The Greeks had this ſort of couriers, which they derived from the Perſians, who were the inventors thereof, as appears from Herodotus. Auguſtus had the ſame; at leaſt, he eſtabliſhed couriers, who, if they did not relieve each other from day to day, yet did it from ſpace to ſpace, and that ſpace was not very great.

HEMEROTROPHIS, in *Antiquity*, a meaſure of capacity, the ſame with the chœnix. It was ſo called from its holding one day's food.

The word is compounded of ἡμερα, *a day*, and τροφη, *food*.

HEMI, a word uſed in the compoſition of divers terms. It ſignifies the ſame with *ſemi* or *demi*, viz. *half*; being an abbreviature of ἡμισυς, *hemiſys*, which ſignifies the ſame. The Greeks retrenched the laſt ſyllable of the word ἡμισυς, in the compoſition of words; and, after their example, we have done ſo too, in moſt of the compounds borrowed from them.

Hemi, a Greek word much uſed in *Muſic*, implying *half*. See Semi and Demi.

HEMIANDRA, in *Botany*, from ἡμισυς, *half*, and ανηρ, *a man*, becauſe the anthers have only one perfect or polliniferous lobe. Brown. Prodr. Nov. Holl. v. 1. 502 – Claſs and order, *Didynamia Gymnoſpermia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juſſ.

Eſſ. Ch. Calyx compreſſed, two-lipped; the upper lip undivided; the lower cloven half way down. Corolla two-lipped; the upper lip flat and cloven; lower in three deep ſegments, the middle one cloven. Stamens aſcending. Anthers each with one empty deſcending lobe. *Brown.*

1. H. *pungens*, the only ſpecies. Found by Mr. Brown on the ſouth coaſt of New Holland. A humble decumbent *ſhrub*, with oppoſite, entire, ribbed, pointed *leaves*. *Flowers* axillary, ſolitary, their ſtalks with a pair of bracteas at the top. Lips of the *calyx* ribbed, their ſegments pointed. *Corolla* white, ſtained or dotted with purple.

HEMICHROA, (ἡμιχροα, *half-green*,) ſo called becauſe the calyx, uſually quite green in the natural order to which this plant belongs, is here coloured on the inſide. Brown. Prodr. Nov. Holl. v. 1. 409.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Holeraceæ*, Linn. *Atriplices*, Juſſ. *Chenopodeæ*, Decandolle, Brown.

Eſſ. Ch. Calyx inferior, deeply five-cleft, coloured on the inſide; unchanged in the fruit. Stamens five or fewer, united at the baſe. Seed compreſſed, encloſed in a membranous cover. Embryo ſemi-lunar. Radicle inferior, aſcending.

1. H. *pentandra*. Stamens five. Bracteas but half the length of the calyx. Native of the ſea-ſhore, on the ſouth coaſt of New Holland, and in Van Diemen's land.

2. H. *diandra*. Stamens two. Bracteas but little ſhorter than the calyx.—Found on the ſea-ſhore, on the ſouth coaſt of New Holland.

Theſe are ſhrubby plants, with alternate, ſemi-cylindrical *leaves*. *Flowers* axillary, ſolitary, ſeſſile, with a pair of bracteas to each. The genus is much allied to *Polycnemum*.

HEMICRANIA, in *Medicine*, from ἡμισυ, *half*, and κρανιον, the *cranium* or *ſkull*, ſignifies that form of head-ache which is confined to one ſide of the head.

The term, however, is not excluſively applied to affections of the whole, or even the greater part, of the ſide of the head; but includes thoſe ſpecies of head-ache which are often confined to one ſmall and circumſcribed ſpot, but which conſtitute perhaps the moſt ſevere and painful forms of the diſeaſe; ſuch are the *clavis hyſterica*, the *tic douloureux*, the *megrim*, &c. Theſe modifications of head-ache, and eſpecially the laſt-mentioned, are often periodical in their returns; whence they have been called intermittent head-aches and *agues in the head*. Hemicrania is thus defined by Sauvages: "Eſt morbus cujus præcipuum ſymptoma dolor eſt in alterutro capitis latere potiſſimum ad tempora, frontem juxta oculos, iſque vehemens, ſæpe periodicus." (Noſol. Method. Claſs 7. Gen. 13.)

One of the common forms of hemicrania is the attack of rheumatiſm in the face and head, which is often called the face ache. This complaint appears to commence ſometimes in the gums, ſometimes in the muſcles of the face and neck, and ſometimes in the integuments of the ſide of the cranium, which is affected. It is attended with ſome ſwelling of the cheek or gums; with extreme ſoreneſs of theſe parts and of the ſcalp, ſo that even the operation of a comb is ſcarcely tolerable upon the ſurface of the latter; and with exquiſite ſenſibility to the impreſſion of cold. Some febrile heat, increaſed quickneſs of the pulſe, foulneſs of the tongue, thirſt, and other ſymptoms of pyrexia, accompany the diſorder; and the ſleep is greatly diſturbed by the violence of the pain, which, as in other forms of rheumatiſm, is generally moſt ſevere in the night. This appears to be the hemicrania *odontalgica* (ſpec. 2.) of Sauvages. The pain, in fact, is frequently referred by the patients themſelves to ſome ſuppoſed diſeaſe of the teeth; and very often one tooth after another has been drawn in the hope of alleviating the diſorder of the head; but too often without any beneficial effect. At the ſame time, the nature of the complaint frequently is elucidated by the occurrence of rheumatic pains and ſwellings in the limbs or joints, which are the ordinary ſeat of rheumatiſm.

This variety of hemicrania, like the other modifications of rheumatiſm, is often extremely obſtinate, and reſiſts the influence of medicine for a conſiderable length of time. It is ultimately, however, relieved by the remedies which are beneficial in that diſeaſe; and it is likewiſe aggravated by the ſame treatment, which has been found to be injurious in other febrile rheumatic attacks. (See Rheumatism.) It may be ſufficient to mention here, that a free uſe of diaphoretics, with gentle laxatives of the ſaline claſs, appears to be the moſt advantageous method of treatment in the early ſtages of the rheumatic hemicrania. The moſt effectual diaphoretics are opium combined with antimony, or with ipecacuanha and a neutral ſalt, as in that very uſeful formula deviſed by Dr. Dover; and the conſtipation, which in many conſtitutions concurs with the taking of theſe medicines, may be advantageouſly obviated by the ſulphate of magneſia, with or without a ſmall quantity of the ſubmuriate of mercury or calomel. Nothing is more common, than to reſort to warm fomentations of the part affected, with a view to relieve the violence of the pain; but we believe, the diſappointment is invariable, as we have never ſeen any local inflammatory rheumatiſm alleviated by ſuch applications; on the contrary, it is uſually aggravated by them. Nor is the employment of ſtimulant frictions, ſuggeſted perhaps on the falſe analogy of chronic rheumatiſm, more beneficial. When the febrile irritation begins to ſubſide, the cinchona, caſcarilla, or other aromatic bitter ſubſtance, will contribute to accelerate the amendment of the patient.

Another variety of hemicrania, which is much leſs frequent, is occaſioned by ſome diſeaſe or irritation in the ſmall cavities, or *ſinuſes*, as they are technically called, in the ſkull, and which communicate with the paſſages of the noſtrils. Theſe are principally four; two in the projecting portion of the forehead, above the inner angles of the eyes, called the frontal ſinuſes; and one in each cheek-bone or upper-jaw, termed the *antrum* of Highmore. (See Cranium.) Theſe little cavities are liable to become the ſeat of inflammation and ſuppuration from various cauſes, like other parts of the body; eſpecially, 1ſt. From the extenſion of inflammation from the lining membrane of the noſe to that of theſe cavities, as in *coryza* or *catarrh*, (the hemicrania *coryzæ*, ſpec. 4, of Sauvages,) in which they become infarcted with a thick mucus; 2dly. From external violence, as from blows or wounds upon the head near theſe cavities, (the H. purulenta, ſpec. 7 of the ſame noſologiſt); and, 3dly. From the preſence of inſects or their *larvæ* in the cavities, (H. *ab* inſectis, ſpec. 8.—and H. *ſinûs*, ſpecies 3.) of which there are many examples on record.

It is well known that there are ſome inſects for which no other nidus appears to have been provided by nature, than the cavities and canals in the bodies of more perfect animals. Of theſe the *æſtrus* is a common example; and of the five ſpecies enumerated by Linnæus, three are hatched and nurtured in the ſtomach and rectum of the horſe and cow, and in the frontal and maxillary ſinuſes of the horſe and ſheep. The larvæ of theſe flies are called Botts, of which an ample account has already been given under that head. In the human ſubject the æſtrus has alſo been known to inſinuate its eggs; and one of the moſt excruciating attacks of head-ache that has been recorded, originated in a woman, from the preſence of two or three botts in the *antrum* of the cheek. (See a caſe by Dr. Heyſham, Med. Communications, vol. i. p. 430.) Various *erucæ*, or caterpillars, have been occaſionally found in, and diſcharged from, the ſinuſes. (See Fernelius, 5. Patholog. cap. 7. Rolfinc. de capit. dolore, &c.) The larvæ of the common houſe-fly, and of the black beetle, have alſo been inmates of the human body, and occaſionally have been diſcharged from the noſtrils. (See a paper by Dr. Bateman, in the Edin. Med. and Surg. Journal for 1811, with the references there mentioned.) In theſe caſes there is a conſtant fixed pain in the inferior part of the forehead, over the eye, or in the cheek, the ſeat of which may be covered with the finger, and which is occaſionally aggravated to an extreme degree by various cauſes, ſuch as heat and cold, ſudden motion, eating, ſpeaking loud, &c. The eyes, eſpecially that of the ſide affected, are often inflamed, and diſcharge tears, particularly during the paroxyſms of increaſed pain. The paſſages of the noſe are ſometimes dry, and there is frequent ſneezing; but ſometimes there is an increaſed diſcharge of mucus. When theſe morbid conditions of the ſinuſes continue very long, as is uſual, the conſtitution is greatly injured by the inceſſant ſuffering, and great failure of ſtrength and emaciation ſometimes enſue.

It is obvious, however, that the diagnoſis of theſe caſes, in which the preſence of inſects in the cavities alluded to occaſions the diſeaſe, muſt be extremely difficult and obſcure; and, eſpecially when the frontal ſinuſes ſuffer, the means of relief are ſcarcely within our power. The acts of ſneezing and of vomiting have ſometimes produced the diſcharge of the inſects, and errhines and emetics have been adminiſtered with ſuch a view; but often theſe acts, and particularly that of ſneezing, have greatly augmented the ſufferings of the patient. In caſe the maxillary ſinus ſhould be the ſeat of the diſeaſe, which the ſeat of the pain may lead us to preſume, that cavity may be pierced from the alveolum of a tooth, and its contents evacuated. In this way the botts were diſcharged, in the caſe detailed by Dr. Heyſham.

There is a third form of hemicrania, which is not an unfrequent occurrence, and which is popularly known by the appellation of *megrim*. This word, however different it may appear at firſt ſight, is doubtleſs derived from the word *hemicrania*, through the medium of the French; who of *hemicraine* have formed *migraine*, whence our *megrim*. This diſeaſe, though ſlightly mentioned by ſeveral writers, has not been generally deſcribed; ſome obſervations made by the writer of this article, from experience of the affection in his own perſon, as well as in others, were publiſhed in the Edinburgh Medical and Surgical Journal for July 1809, (ſee vol. v. p. 381,) and which he will take the liberty of quoting. This very painful affection, although not uncommon, has ſeldom been mentioned by medical writers, or has been confounded with the *tic douleureux*. It conſiſts of a pain near the inner angle of the orbit of the eye, beginning in the point of the ſupra-orbital foramen, (through which the firſt branch of the fifth pair of nerves paſſes out,) and extending a little way on the ſide of the noſe, affecting alſo the eye of the ſame ſide, which becomes red, painful, and more ſenſible to light during the paroxyſm. This pain is exceedingly acute, and each pulſation of the ſupra-orbital twig of the artery is painfully felt. The ſeat of the pain may be generally covered with the point of the finger, and preſſure gives momentary relief; the throbbing pain, however, becomes ſpeedily more ſevere under the preſſure. The integuments become tender during the paroxyſm, and remain ſo in ſome degree during the intermiſſion; indeed, when the diſorder has continued ſeveral days, the ſkin of all that ſide of the forehead, which is ſupplied by the ſupra-orbital nerve, becomes tender to the touch. This pain is perfectly intermittent. After a duration of two or three hours, ſometimes much longer when the diſeaſe is of conſiderable ſtanding, the pain gradually diminiſhes, and ſoon ceaſes; but it returns again, ſometimes moſt exactly at the ſame hour on the ſucceeding day. The moſt uſual period of the paroxyſm is in the morning; but we have ſometimes obſerved it to recur in the evening. Dr. Darwin ſays that the periods ſometimes correſpond with alternate lunar or ſolar days, like tertian agues; and that at other times they obſerve the monthly lunation, and ſeem to be induced by the debility which attends menſtruation. But all the caſes that we have ſeen have been quotidian.

In ſome inſtances, this hemicrania is obviouſly connected with dyſpepſia, or a diſordered ſtate of the digeſtive organs; in others it has occurred along with catarrh; and in others again it has been produced by fatigue, watching, intenſe ſtudy, or ſome other cauſe of debility. Dr. Darwin conſiders it as ſometimes occaſioned by a decaying tooth, eſpecially the dens ſapientiæ, or laſt tooth of the upper jaw, which frequently decays firſt. (See Zoonomia, claſs 4. 2. 2.) And he adds, that the firſt or ſecond grinder of the under-jaw is liable to give violent pain about the middle of the parietal bone, or ſide of the head, on the ſame ſide, which is generally called the *clavus hyſtericus*. It more commonly, we believe, produces the ear-ache.

This diſeaſe differs altogether from the *tic douleureux*, in the regularity of its diurnal periods and intermiſſions, and in the length of both. In the *tic*, "the pain comes on ſuddenly and is excruciating; it laſts but a ſhort time, perhaps a quarter or half a minute, and then goes off; it returns at irregular intervals, ſometimes in half an hour, ſometimes there are two or three repetitions in a few minutes." Dr. Fothergill, from whom theſe remarks are quoted, adds, that "eating will bring it on in ſome perſons; talking, or the leaſt motion of the face, affects others, &c." (See a paper on "a painful affection of the face," in the Med. Obſ. and Inquiries, vol. v. page 131.) In theſe points the two diſorders are perfectly diſtinct; not to mention the obſtinacy and permanency of the *tic douleureux*, and the general facility of curing the *megrim*, or intermittent hemicrania.

In the treatment of this diſeaſe, the bark of cinchona has ſuggeſted itſelf by the analogy of the intermiſſions with thoſe of ague, to moſt practitioners, and is perhaps often adequate to the cure of the periodic hemicrania. Morton affirms, that he had cured the diſorder in two days by means of the bark, although it had reſiſted bliſters, emetics, cathartics, and other remedies for ſeveral weeks; he uſed one bleeding previouſly. (See his Phthiſiologia, ex. 1. cap. 9.) Darwin recommends the cinchona in combination with opium, after an evacuation by purging, or ſlight blood-letting. A remedy was propoſed by Mr. Davidſon, which we have ſometimes found to ſucceed in preventing the acceſſion, and in curing the diſeaſe; namely, a large doſe of æther taken at the very commencement, or immediately previous to the expected paroxyſm. (See Medical Facts and Obſervations, vol. v.) But the moſt decidedly active remedy, according to our obſervation, is the one recommended by the late Dr. Fowler of York; *viz.* four or five drops of the ſolution of arſenic, prepared according to that phyſician's formula, taken twice or three times a day. The efficacy of this remedy has appeared to be ſuch, as almoſt to entitle it to the appellation of a *ſpecific* againſt this diſeaſe. The ſevere meaſure of dividing the affected nerve, as it paſſes through the foramen, has been recommended and occaſionally executed, we believe, with precarious ſucceſs; but the expedients abovementioned ſuperſede the neceſſity of the knife. We have not ſeen the *megrim* affecting the ſecond, or infra-orbital branch of the fifth pair of nerves, which is occaſionally the ſeat of *tic douleureux*. See Tic *Douleureux*.

HEMICYCLE, Hemicyclium, compounded of ἡμισυς, *half*, and κυκλος, *circle*, a *ſemicircle*.

Hemicycle is particularly applied, in *Architecture*, to vaults in the cradle form; and arches, or ſweeps, of vaults, conſtituting a perfect ſemircircle.

To conſtruct an arch of hewn ſtone, they divide the hemicycle into ſo many vouſſoirs; taking care to make them an uneven number, that there be no joint in the middle, where the key-ſtone ſhould be. See Key and Bridge.

Hemicyclium was alſo a part of the orcheſtra in the ancient theatre. Scaliger, however, obſerves, it was no ſtanding part of the orcheſtra; being only uſed in dramatic pieces, where ſome perſon was ſuppoſed to be arrived from ſea, as in Plautus's Rudens.

The ancients had alſo a ſort of ſun-dial, called *hemicyclium*. It was a concave ſemicircle, the upper end, or cuſp, whereof looked to the north.

There was a ſtyle, or gnomon, iſſuing from the middle of the hemicycle, whereof that point, correſponding to the centre of the hemicycle, repreſented the centre of the earth; and its ſhadow projected on the concavity of the hemicycle, which repreſented the ſpace between one tropic and another, the ſun's declination, the day of the month, hour of the day, &c.

HEMIDESMUS, in *Botany*, from ἡμισυς, *half*, and δεσμος, *a tie* or *attachment*, on account of the filaments being united in their lower part, though ſeparate in the upper. Brown. Aſclep. from the Tranſactions of the Wernerian Society at Edinburgh, 45.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juſſ.

Eſſ. Ch. Corolla wheel-ſhaped, with five obtuſe ſcales at its ſinuſes. Filaments united at the baſe, ſeparate above. Anthers cohering, beardleſs, ſimple at the ſummit, unconnected with the ſtigma. Maſſes of pollen 20. Stigma pointleſs. Follicles cylindrical, widely ſpreading, ſmooth. Seeds crowned with hair.

This genus, ſeparated by Mr. Brown from *Periploca*, to which it is very nearly akin, conſiſts of *P. indica* of Linnæus, and two other ſpecies hitherto undeſcribed, cloſely related to each other. They are ſmooth twining *ſhrubs*, with oppoſite ſhining *leaves* and ſmall *flowers*, which ſpring in denſe tufts from between the footſtalks; all natives of the Eaſt Indies.

HEMIDIAPENTE, in *Muſic*, ſemi-diapente or falſe, flat, or imperfect fifth, is an interval whoſe ratio is $\frac{45}{64} = 311\,\Sigma + 6f + 27m$. See *Flat* Fifth.

HEMIDITONE, ſemiditone, or demiditone, ſeſquitone, trihemitone, minor tierce, or leſſer or minor third, is an interval whoſe ratio is $\frac{5}{6} = 161\,\Sigma + 3f + 14m$. See *Minor* Third.

HEMIGENIA, in *Botany*, from ἡμισυς, *half*, and γενειας, *hairineſs* or *beard*, from the peculiar pubeſcence of two out of the four anthers. Brown. Prodr. Nov. Holl. v. 1. 502.—Claſs and order, *Didynamia Gymnoſpermia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juſſ.

Eſſ. Ch. Calyx with five ſegments, and five angles. Corolla ringent; its upper lip ſhort; middle ſegment of the lower one divided half way down. Stamens aſcending under the upper lip. Anthers each with one empty deſcending lobe, which in the upper pair only is bearded.

1. H. *purpurea*. Native of Port Jackſon, New South Wales. A little ſmooth *ſhrub*. *Leaves* ternate, nearly cylindrical. *Flowers* blueiſh-purple, axillary, ſolitary, with a pair of *bracteas* to each. *Brown*.

HEMIMERIS, from ἡμισυς, *half*, and μερις, *a part* or *fragment*, alluding to the corolla being, as it were, cut away on one ſide, and eſpecially wanting the ſpur obſervable in *Antirrhinum*, from which the plants which compoſe the genus of *Hemimeris* were originally ſeparated by Linnæus, on that very account. This however is not explained by him, nor ſcarcely to be gathered from his deſcription; and therefore profeſſor Martyn has left the word unexplained.—Linn. Pl. Rar. Afric. 8. Suppl. 45. Thunb. Nov. Gen. 74. Schreb. 409. Willd. Sp. Pl. v. 3. 282. Sm. Tr. of Linn. Soc. v. 6. 96. Mart. Mill. Dict. v. 2. Juſſ. 120. Lamarck. Illuſtr. t. 532. (Pæderota; Am. Acad. v. 6. 83. Linn. Gen. 12, excluding Micheli's ſynonym.)—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Perſonatæ*, Linn. *Scrophulariæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, divided almoſt to the baſe into five unequal, ovate, permanent ſegments, much ſhorter than the corolla. *Cor.* of one petal, reverſed, ſomewhat wheel-ſhaped, without any tube, in five very unequal rounded lobes, with a nectariferous ſhallow pouch at their baſe; the largeſt lobe uppermoſt; the two ſmalleſt lowermoſt, ſeparate to the very bottom. *Stam.* Filaments four, ſometimes only two, ſhorter than the corolla, inſerted into its baſe, declining, ſmooth, the upper pair arched and rather the ſhorteſt; anthers heart-ſhaped, approximated, of two valves. *Piſt.* Germen ſuperior, ovate, compreſſed; ſtyle declining, thread-ſhaped, longer than the ſtamens; ſtigma obtuſe, downy. *Peric.* Capſule ovate, compreſſed, of two cells, one generally more tumid than the other. *Seeds* numerous, roundiſh.

Eſſ. Ch. Calyx in five deep ſegments. Corolla wheel-ſhaped, reverſed, gibbous at the baſe, divided on one ſide. Filaments ſmooth. Capſule of two cells.

Obſ. Linnæus having firſt eſtabliſhed this genus, by the above name, from a Cape ſpecimen lent him by Burmann, afterwards confounded with it the *Buonarotta* of Micheli, under the appellation of *Pæderota*. But the plants on which Micheli founded his genus, ſtrictly agree with the *Wulfenia* of Jacquin, to which they are referred in the Tranſactions of the Linn. Soc. v. 6. 96, the latter name being, on every poſſible account, preferred to *Pæderota*, which now therefore is laid aſide, *Hemimeris* having no leſs decided a right to claim a preference on the other hand, for the genus which originally bore it. With regard to the ſpecies of this genus, profeſſor Willdenow and the author of the preſent article, labouring independent of each other, have come, as nearly as poſſible, to the ſame concluſion.

1. H. *ſabuloſa*. Linn. Suppl. 280. Thunb. Prodr. 105.—Stamens two. Leaves oppoſite, pinnatifid. Stem proſtrate. Calyx acute, fringed.—Native of the Cape of Good Hope, gathered by Thunberg, from whom there are many fine ſpecimens in the Linnæan herbarium. The *root* is annual, compoſed of numerous long fibres. *Stem* two or three inches high, more or leſs branched in an oppoſite manner from the very bottom, ſmooth, leafy. *Leaves* oppoſite, ſtalked, ſmooth, not an inch long, regularly and deeply pinnatifid; the ſegments obtuſe and entire. *Flower-ſtalks* axillary, ſolitary, twice as long as the leaves, ſimple, naked, ſmooth, ſingle-flowered. *Flowers* about the ſize of *Anagallis arvenſis*, yellow or purpliſh.

2. H. *diffuſa*. Linn. Suppl. 280. Thunb. Prodr. 105. (Pæderota Bonæ ſpei; Linn. Sp. Pl. 20.)—Stamens four. Leaves alternate or oppoſite, pinnatifid. Stem ſpreading. Calyx acute, fringed. Native of the Cape of Good Hope. This has the habit of the former, of which the younger Linnæus ſuſpected it might be a variety, but to this we cannot aſſent. The preſent is in every part a much larger plant. The *leaves* vary conſiderably in the depth of their ſegments, which are ſometimes notched. The *corolla* is purple. The *filaments* are four, approaching each other at the top, their *anthers* ſlightly cohering. Plukenet's t. 320. f. 5. is quoted for this, but can only ſerve to miſlead, if it be intended for the ſame, which we can ſcarcely believe. We can hardly doubt that the original *Hemimeris* (afterwards called *Pæderota*,) *bonæ ſpei* is this ſpecies, though it was at firſt deſcribed as diandrous.

3. H. *unilabiata*. Thunb. Prodr. 105. Nov. Gen. 78. (Antirrhinum unilabiatum; Linn. Suppl. 279. Willd. Sp. Pl. v. 3. 259.)—Stamens four. Leaves oppoſite, pinnatifid. Calyx obtuſe, hairy.—Native of ſandy ground at the Cape, flowering in October. *Root* tapering, annual. *Stem* with long ſpreading branches from its very baſe. *Leaves* an inch long, ſtalked, oppoſite, pinnatifid, their ſegments alternate, linear, obtuſe, entire. *Flower-ſtalks* about half an inch long, alternate, ſimple, rather hairy, with a linear, obtuſe, ſmooth *bractea*, not ſo long as itſelf, at the baſe of each. Segments of the *calyx* lanceolate, obtuſe, hairy, a line long, much ſhorter than the corolla, ſpreading, the two hindermoſt reflexed. *Corolla* crimſon, violet at the lower part, the nectariferous pouch at its baſe lengthened out into two yellowiſh horns, ſhorter than the calyx. *Filaments* four, their *anthers* hairy at the ſummit. *Capſule* ovate, ſquariſh, compreſſed and emarginate at the top.—We know nothing of this but from Thunberg's ample deſcription, from which we have extracted the above. It is remarkable that, in this and other ſpecies, he deſcribes the capſule as "*crowned* with the permanent calyx and ſtyle," a thing truly paradoxical in a genus, whoſe calyx is inferior!

4. H. *ſinuata*.—Stamens .... Leaves oppoſite, oblong, ſinuated, ſomewhat pinnatifid. Calyx obtuſe, ſmooth.—Gathered by Sparrmann at the Cape of Good Hope. The younger Linnæus confounded his ſpecimens with *H. diffuſa*, from which they are unqueſtionably different. The *leaves* are ſinuated at their edges, not deeply pinnatifid. The *corolla* is externally hairy. Of the *ſtamens* we can determine nothing. The *calyx* however removes every difficulty, being totally unlike that of all the foregoing, neither hairy nor fringed; its ſegments are elliptical and obtuſe, all ſlightly ſpreading, none of them reflexed. The *capſule* is ſcarcely more gibbous on one ſide than the other.

5. H. *montana*. Linn. Suppl. 280. Thunb. Prodr. 105.—Stamens two. Leaves ovate, bluntiſh, ſerrated. Stem erect. Flower-ſtalks compreſſed.—Native of the Cape. Differs from the four preceding in having broad, ovate, many-ribbed, ſerrated *leaves*, ſometimes ſlightly hairy; and compreſſed *flower-ſtalks*. The *calyx* is reflexed and acute.

Corolla large, yellow, externally downy. Plukenet's t. 331. f. 3. is too unlike this plant in the flowers to merit citation.

6. H. *macrophylla.* Thunb. Prodr. 105. Nov. Gen. 76.—Stamens four. Leaves oppoſite, ovate, ſomewhat heart-ſhaped, toothed. Flower-ſtalks capillary.—Gathered by Thunberg at the Cape, between Boekland and Hantum, near the ſhore. By his deſcription, which is all we know concerning this ſpecies, it ſeems moſt akin to the laſt, but differing in the characters given above, as well as in the violet colour of its *corolla.*

7. H. *urticifolia.* (Celſia urticæfolia; Curt. Mag. t. 417.)—Stamens four. Leaves ovate, or ſomewhat lanceolate, ſerrated; the floral ones alternate. Capſule abrupt.—Brought by Mr. A. Menzies from Peru. It flowered beautifully at Kew in May 1797, and is now common in every greenhouſe and parlour window. We have had the ſeeds remain latent for ſeven years in a garden, and then ſpringing up in the autumn, they have produced fine flowering plants by the end of February, in a room with a fire. The *ſtem* is from three to five feet high, branched, leafy, ſquare, ſcarcely ſhrubby, though exiſting for three or four years with care in a ſtove. *Leaves* oppoſite, ſtalked, much reſembling *Urtica urens*, but ſmooth and ſhining, fœtid when bruiſed. *Flowers* ſtalked, axillary, from the upper and ſmaller leaves, of a moſt vivid ſcarlet, greeniſh and purpliſh at the bottom, with yellow anthers. The *ſtamens* are ſometimes five. *Capſule* compreſſed and abrupt at the extremity, not taper-pointed, by which it is eſſentially diſtinguiſhed from the following, though their leaves, however different in general, ſometimes nearly approach each other.

8. H. *linearis.* Sm. Tr. of Linn. Soc. v. 6. 97. Tour on the Continent, ed. 2. v. 3. 209. (H. coccinea; Willd. Sp. Pl. v. 3. 283. Celſia linearis; Jacq. Coll. v. 2. 270. Ic. Rar. t. 497. Curt. Mag. t. 210.)—Stamens four. Leaves linear-lanceolate, ſomewhat ſerrated, three in a whorl; the floral ones alternate, entire. Capſule pointed.—Brought from Lima by the unfortunate Dombey, though "the illuſtrious Ortega" made no mention of him when he ſent the ſeeds to Jacquin. We ſaw it in flower at Paris in 1786, and it was ſoon after brought from thence to England. This ſeems more tender than the laſt, being now far leſs common here. Their *flowers* nearly agree. The *leaves* of the preſent grow three together, and are commonly very narrow and acute, but we have gathered them almoſt as broad as in the laſt; while, on the other hand, we have often ſeen, on old plants, the leaves of that as narrow as in this. The *capſule* however of *H. linearis* proves it a very diſtinct ſpecies, being elongated into an acute point, by no means abrupt or compreſſed. The hue of the *corolla* has alſo rather more of the red-lead caſt, and the ſtem is a little more ſhrubby, with axillary tufts of copious little linear leaves.

The error of *Ortega*, in taking this for a *Celſia*, having been adopted blindly by Jacquin, and far too ſervilely, though not blindly, by Curtis, has cauſed the wide propagation of a wrong generic name for theſe two very popular plants. Such miſtakes are difficult to remove, and thoſe who correct them run the riſque of being blamed for changing names among the vulgar; a cenſure only deſerved by ſuch as alter names only, even though poſſibly for the better, without furniſhing any new information in that inſtance, or leading to any new truth. Of ſimilar alterations there is no end, either with reſpect to their difficulty or their miſchief, and we hope there is no danger of their being encouraged, either by the learned or the unlearned. S.

HEMIMEROPTERA, in *Entomology*, an order of inſects in the new arrangement of Clairville, author of "Entomologia Helvetica," exactly correſponding with the Hemiptera of other entomologiſts. See Hemiptera.

HEMINA, formed of ἥμισυς, *half*, a veſſel uſed as a meaſure among the ancient Romans, containing half the ſextary. The hemina, called alſo *cotyla*, and *acetabulum*, contained eight ounces of liquor; and was the twelfth part of the congius.

Several authors have written expreſs treatiſes on the Roman hemina; particularly Meſſ. Arnaud, and Pelletier.

St. Benedict preſcribes the hemina as the portion or quantity of wine to be allowed the religious of his order at each meal. F. Mabillon, who has wrote on the ſubject, ſhews, that this hemina was a meaſure peculiar to the Benedictines, as well as the pound of bread allowed the ſame religious, which only conſiſted of fifteen ounces. F. Lancelot has a diſſertation to prove, that the hemina of wine, preſcribed by St. Benedict, only amounts to a demi-ſeptier of Paris meaſure; but others make it two ſeptiers; and others three.

HEMIOBOLON, a weight often mentioned by the ancient writers in medicine, and expreſſing the half of their obolus, or the twelfth part of a dram, that is, five grains.

HEMIOLIUS, or Hemiolia, compounded of ἥμισυς, *half*, and ὅλος, *whole*, an ancient mathematical term, occurring chiefly in muſical writers. It ſignifies the ratio of two things, of which the one contains the other once and a half; as 3 : 2, or 15 : 10, otherwiſe called *ſeſquialterate.* See Ratio, and Sesquialterate.

Macrobius, on the Somnium Scipionis, lib. ii. cap. 1. obſerves, that the concord, called in the ancient muſic *diapente*, and in the modern a *fifth*, ariſes from this proportion.

HEMIONITIS, in *Botany*, from ἡμίονος, *a mule*, becauſe it was ſuppoſed to be barren. Mule Fern.—The ἡμιονῖτις of Dioſcorides appears, by his deſcription, to be *Aſplenium Hemionitis* of Linnæus, as has always been ſuppoſed. The name in queſtion is therefore adopted to deſignate another genus of dorſiferous Ferns, ſomewhat reſembling the ancient plant in habit, and next akin to it, though diſtinct, in fructification.—Linn. Gen. 560. Schreb. 757. Swartz. Syn. Fil. 20. Sprengel. Crypt. 94. t. 3. f. 19. Juſſ. 15. Lamarck. Illuſtr. t. 868.—Claſs and order, *Cryptogamia Filices*. Nat. Ord. *Filices*, Linn. Juſſ.

Gen. Ch. *Capſules* annulated, in diſperſed ſingle lines, which are either reticulated, forked, or croſſing each other alternately. *Involucrum* none.

Eſſ. Ch. Fructification in ſcattered ſingle lines, croſſing each other, forked, or reticulated. Involucrum none.

Obſ. We have already, under the article Diplazium, explained the reaſon of that genus being ſeparated from the preſent, with which it had been confounded by Smith and Cavanilles, as it formerly had with *Aſplenium* by Linnæus and Swartz. The latter writer now defines eight ſpecies of *Hemionitis*, which include what Linnæus originally founded the genus upon, and therefore this name properly belongs to them.—They divide themſelves into two ſections, and we add two new ſpecies to each ſection.

* *Frond Simple.*

1. H. *lanceolata.* Linn. Sp. Pl. 1535. Lamarck. f. 1. (Lingua cervina anguſtifolia et reticulata; Plum. Fil. 111. t. 127. f. C. Phyllitis anguſtifolia, lineis catenatis; Pet. Fil. n. 122. t. 6. f. 4.)—Frond undivided, linear-lanceolate, ſtraight, tapering at the baſe, with ſcarcely any ſtalk.—Native of the Weſt Indies.—*Root* of numerous fibres,

clothed with peculiarly long and denſe down, of a golden brown colour. Plumier repreſents it as if creeping, without any ſuch downy fibres. *Fronds* ſeveral, about a foot high, linear-lanceolate, pointed, half an inch wide, entire, ſlightly wavy, ſmooth and naked on both ſides, their baſe gradually contracted, but ſcarcely ſtalked. *Midrib* prominent beneath. Lines of *fructification* about two on each ſide of the rib, longitudinal, very narrow, naked, zigzag, meeting frequently and interbranching, as if croſſing each other, but by no means in that regular ſerpentine or chain-like manner, drawn by Plumier, and, at leaſt, not made *leſs* wonderful by his copiers.

2. H. *reticulata.* Forſt. Prodr. 79. Swartz. Syn. Fil. 208. Sprengel. t. 3. f. 19, as above. (H. plantaginea; Cavan. Leccion. 261. Schkuhr. Crypt. t. 6; according to Swartz.)—Frond undivided, elliptic-lanceolate, ſomewhat falcate, ribleſs, tapering at the baſe, ſcarcely ſtalked.—Native of the Society iſlands, and of the Philippine iſles. Mr. Menzies gave us a ſpecimen from Otaheité. This is diſtinguiſhed from the firſt by its much broader and falcate frond, which is pointed and ſlightly waved; but eſpecially by its very numerous lines of *fructification*, which are repeatedly forked, though often interrupted, more ſtraight and parallel, ſcarcely zigzag or interbranching. They are very narrow, and ſlightly ſunk into the back of the leaf. There is no appearance of a mid-rib, except at the very bottom.

3. H. *ſtipitata.* Frond undivided, elliptical, ribleſs, the length of its ſtalk. Fructification in deep channels.—Sent from Amboyna by the late Mr. Chriſtopher Smith.—*Frond* the length and breadth of the laſt, being about two inches wide and ſix long, but ſcarcely falcate; the baſe is broad, and not much decurrent, with a ſlight ſhort rib, ſcarcely diſcernible, in that part only. The *ſtalk* is equal in length to the frond or leaf, linear, ſquare, ſmooth, and naked. Lines of *fructification* diſpoſed as in the laſt, but thoſe towards the margin are rather more zigzag; all are deeply ſunk into the leaf, cauſing the upper ſide to project remarkably, in a beautiful ſort of net-work.

4. H. *ſeſſilifolia.* Cavan. Leccion. 261. Swartz. n. 3.—Frond lanceolate, ſeſſile, with a long ſlender point.—Native of wet rocks in the iſland of Mauban. "*Frond* ſix or eight inches long, and one broad, entire and ſmooth, with a long ſharp point. The lines form a kind of oblong hexagonal net-work." *Cavanilles.* Of this we have ſeen neither ſpecimen nor figure.

5. H. *palmata.* Linn. Sp. Pl. 1535. Lamarck. f. 2. (H. aurea hirſuta; *Plum. Fil.* 129. t. 151. Filix ranunculi folio, prolifera; Pet. Fil. n. 177. t. 8. f. 11.—Pluk. Phyt. t. 291. f 4.)—Frond palmate, hairy, pentagonal; the lobes undivided, wavy and crenate.—Native of the Weſt Indies. *Root* of many long, branching, ſcarcely hairy fibres. *Stalks* ſeveral, from three to five inches high, ſimple, ſhining brown, hairy. *Fronds* the ſhape of a pentagon, 1½ inch or more in diameter, deeply palmate, of five lobes, the middle one longeſt, two lowermoſt ſhorteſt, all wavy or crenate, with a ſhining brown rib to each, and clothed with ruſty, or rather golden, hairs. Theſe partly conceal the lines of *capſules*, which are prominent, crowded, and moſtly parallel.

6. H. *pedatifida.*—Frond pedatifid, hairy, pentagonal; the lobes bluntly pinnatifid, rounded at the extremity.—Native of the iſle of Bourbon.—This has much the ſhape of *Pteris pedata*, but is manifeſtly too near akin to the laſt to leave any doubt of its genus, though we have not ſeen the fructification. The two ſpecies agree in ſize, outline, and colour, but the diviſion of their fronds is eſſentially different. The three upper lobes of this are deeply pinnatifid, partly bipinnatifid, their ſegments and extremities rounded, and in ſome meaſure dilated; the two loweſt and ſmalleſt, which complete the pentagon, are pendulous, or parallel to the ſtalk, pinnatifid alſo, though ſlightly. Each lobe has a dark-purpliſh ſhining rib, vaniſhing about its middle.

** *Frond Compound.*

7. H. *pedata.* Swartz. Syn Fil. 20 and 209. t. 1. f. 3.—Frond pedate; leaflets deeply pinnatifid, acute.—Sent to Dr. Swartz by the late worthy Abbè Cavanilles, but without mention of its native country. *Stalk* half a foot high, poliſhed and ſmooth. *Frond* hairy, of three leaflets; the central one ſmall, bluntly pinnatifid, and obſcurely three-lobed; the lateral ones each two or three inches long, very deeply and rather unequally two-lobed, the lobes pointed, deeply pinnatifid, with ſharpiſh ſomewhat falcate ſegments. Lines of *capſules* numerous, ſtriaght, parallel, ſome of them dichotomous.

8. H. *ruſa.* Swartz. Syn. Fil. 20 and 210. (Acroſtichum rufum; Linn. Sp. Pl. 1525. Filix minor, ruſſâ lanugine tota obducta, &c.; Sloane Jam. v. 1. 87. t. 45. f. 1.)—Frond pinnate; leaflets oblong, heart-ſhaped at the baſe, undivided, downy, on ſhort ſtalks.—Native of ſhady places on the mountains of Jamaica. *Stalks* ſeveral, ſimple, about as thick as a ſtraw, a foot long, round, blackiſh, hairy. *Frond* with a ſimilar main rib, two feet long, pinnate, narrow or linear taken collectively, acute. *Leaflets* numerous but rather diſtant, oppoſite or alternate, ſpreading, an inch or more in length, on ſhort hairy ſtalks, oblong, rather tapering, heart-ſhaped at the baſe, undivided, but ſomewhat wavy or crenate, very hairy on both ſides, all nearly equal and ſimilar in every reſpect, except the terminal one being rather the largeſt. Lines of *capſules* covering the under ſide, of a pale reddiſh ruſty hue, parallel, ſomewhat forked, very much crowded, ſo as at length to aſſume the character of an *Acroſtichum*, at leaſt in appearance; and they are likewiſe intermixed with numerous hairs.

9 H. *triloba.*—Frond pinnate; leaflets three-lobed, ſinuated, taper-pointed, downy, ſtalked; the lowermoſt terminate.—Communicated from the Braſils by the late ſir Geo. Leonard Staunton bart. in 1793. It is evidently akin to the laſt, of which it might perhaps be deemed a variety, but the whole *frond* is ſhorter, though the leaflets are larger; they are alſo leſs hairy and more finely downy, more waved and often ſinuated, taper-pointed, three-lobed, ſometimes very deeply, at their baſe; their partial ſtalks much longer, and the lowermoſt pair compound or ternate, at leaſt occaſionally ſo. The terminal leaflet is large, very deeply three-lobed. All are of a fine light green. Lines of *capſules* numerous, but much leſs crowded, and much more repeatedly forked. This is a moſt elegant fern, of which we can find no account. It can ſcarcely be the *Aſplenium tomentoſum*, Lamarck. Dict. v. 2. 308, found in Braſil by Commerſon and Dombey, which Swartz quotes for the foregoing, and the deſcription of which beſt agrees with that ſpecies.

10. H. *acroſtichoides.* Swartz. n. 7.—"Fronds pinnate, diſtinct; leaflets broad-lanceolate, taper-pointed, waved or crenate. Fructification confluent."—Gathered at Sierra Leone by Dr. Afzelius.

11. H. *polypodioides.*—Frond pinnate, diſtinct; leaflets ſeſſile, oblong, pointed, pinnatifid; their lobes obtuſe, entire.—Gathered in Hiſpaniola by the celebrated M. Thiery de Menonville. We find nothing like it in Plumier. The *frond* is about the ſize of *Aſpidium Oreopteris*, and the innumerable, ſhort, decuſſating lines of capſules, give it the

aſpect of a true *Polypodium*. The *leaflets* are leſs deeply pinnatifid than in A. *Oreopteris*, but otherwiſe not very unlike that fern. They are ſmooth, though their ſtalk and ribs are finely ſilky.

12. *H. japonica*. Thunb. Jap. 333. Ic. faſc. 6.—" Frond doubly pinnate; leaflets lanceolate, undivided."—Gathered in Japan by Thunberg. The whole *frond* is deſcribed by him as ſmooth, with a furrowed ſtalk; the lower part doubly, the upper ſimply, pinnate; leaflets lanceolate, acute, undivided, green above, pale beneath. The *fructification* is in three-forked lines, over all the under ſide. S.

HEMIOPE, or HEMIOPUS, compounded of ἡμισυς, *half*, and οπη, *hole*, a muſical inſtrument in uſe among the ancients. The hemiopus was a flute with only three ſmall holes.

HEMIOPIA ſignifies, in *Surgery*, a certain diſorder of the eye in which the patient cannot ſee the whole of any object which he is looking at, but only a part of it. Sometimes he ſees the middle, but not the circumference; ſometimes the circumference, but not the centre; while, on other occaſions, it is only the upper or lower half which is diſcerned. Sometimes objects are ſeen thus imperfectly, whether diſtant or near; ſometimes only when they are near, and not when they are at a diſtance.

The cauſes of this defect of ſight may be divided into four principal claſſes. To the firſt belong opacities of the cornea and cryſtalline lens, eſpecially ſuch as only deſtroy the tranſparency of a certain portion of theſe parts. Patients who have theſe opacities only ſee in the above imperfect way when the objects are cloſe, and not when they are remote. For inſtance, if the lower half of the cryſtalline lens, or cornea, is opaque, the patient cannot ſee the lower half of the object which is near him, becauſe it is impoſſible for the rays of light from this part to reach the bottom of the eye; hence he only ſees the upper part of the object. However, this ſtatement only applies to things of large ſize, and not to ſuch as are ſmall; as, for inſtance, letters, ſmall pieces of money, &c.; but when the object is diſtant, the rays of light, both from its upper and lower part, ſtrike the retina, and the patient ſees the whole of it. Indeed, when he turns his eye very much downward, he is even able to ſee the whole of a near object. It is on this account that patients of this deſcription readily get into a habit of ſquinting. The diagnoſis of this caſe is plain and obvious, and the requiſite treatment is elſewhere explained. See CATARACT; *Opacities of the Cornea*.

Under certain circumſtances, perſons with an incomplete anchyloblepharon, or thoſe, whoſe upper eye-lid hangs down, ſo as to cover a part of the eye-ball, are affected with hemiopia. For example, they can naturally only diſcern the lower half of an object which is near and of large ſize, unleſs they go farther from it, draw their heads backward, or turn their eyes downward. On certain occaſions, the pupil becomes drawn away from the middle of the iris downwards, or ſideways to the margin of the cornea. This unnatural poſition of the pupil is alſo, under particular circumſtances, accompanied with hemiopia. For inſtance, when the pupil is drawn downwards it is impoſſible for the patient to ſee the upper part of a large cloſe object, unleſs he either turns his eye very much upward, or removes to a greater diſtance from what he is looking at. The nature of this caſe is obvious; but a cure is impracticable.

It is the ſame when, from ſome cauſe or another, commonly from external violence applied to the eye, any part of the iris is ſeparated from the edge of the cornea. In this caſe the natural pupil uſually cloſes, and a ſemi-lunar opening ariſes in the ſituation where the detachment has happened. Through this aperture, which is always next to the edge of the cornea, the patient naturally cannot diſcern the lower part of a near object, ſuppoſing the opening to be at the upper margin of the cornea. However, if he removes further from the object, or turns his eye very much downward, he is then able to ſee the whole of it. The diagnoſis of this caſe is alſo eaſy, though no cure can be effected.

The ſpecies of hemiopia, hitherto treated of, are merely effects of other diſeaſes. The fourth kind is the moſt important, being generally regarded as an independent diſorder. It is of two ſorts, being ſometimes denominated amauroſis dimidiata, which is a caſe that laſts a conſiderable time. Sometimes it appears rather to be the effect of a ſudden and tranſient irritation, which is productive of a morbid ſenſibility in the optic nerve. This latter caſe bears a cloſe reſemblance to one kind of diplopia, proceeding from the ſame cauſes, and requiring the ſame mode of treatment. The cauſes, according to Richter, are for the moſt part ſeated in the abdominal viſcera. With regard to the firſt kind of caſe, every thing ſaid concerning *gutta ſerena* is here applicable, the diſorder indeed frequently terminating in amauroſis. Richter informs us of a man, who, in performing a journey on horſeback, in rainy weather, was wet through and through, and had no opportunity of changing his clothes for ſome hours; the conſequence was, that the next morning he found he was only able to ſee the half of objects, which ſeemed to have a ſwinging ſort of motion. After a gentle evacuation from the bowels, the complaint was cured in three days by the tinctura thebaica mixed with antimonial wine, bliſters, and the aqua ammoniæ puræ held before the eyes. In leſs than three weeks the complaint returned twice, in conſequence of ſlight colds; but the patient at length got permanently rid of it after diligently bathing his eyes, for a time, with cold water. See Richter's Anfangſgrunde der Wandarzneykunſt, Band 3. Kapitel 17.

HEMIPLEGIA, or HEMIPLEXIA, compounded of ἡμισυς, *half*; and πλησσω, *I ſtrike*, or *ſeize*, in *Medicine*, a palſy of one whole ſide of the body. See PALSY, and *Medical* ELECTRICITY.

HEMIPTERA, in *Entomology*, the ſecond order in the Linnæan ſyſtem.

The character of the genus is taken from the ſituation of the mouth, and the ſhape, texture, and poſition of the wing-caſes; the mouth is bent in towards the breaſt; and the wing-caſes are ſoft, ſemi-coriaceous, and diſpoſed obliquely, the baſe of the left covering the inner margin of the baſe of the right in ſuch a manner that the poſterior half of one is overlaid by the correſponding extremity of the other. Linnæus under this order includes the following genera, Blatta, Mantis, Gryllus, Fulgora, Cicada, Notonecta, Nepa, Cimex, Aphis, Chermes, Coccus, and Thrips.

In the works of Geoffroy, the inſects placed by Linnæus in the order Hemiptera, form only a diviſion of the Coleoptera, from which they are diſtinctly removed by the ſofter and more membranaceous texture of the wing-caſes, and yet more clearly by the oblique poſition of the ſuture, the two inner edges of the wing-caſes in the coleoptera touching each other at the margin, and forming a longitudinal dorſal line.

The inſtitution of the new order Hemiptera was therefore an improvement in the claſſification of inſects upon the arrangement propoſed by Geoffroy, becauſe it finally ſeparated thoſe two diſtinct orders from each other. But Linnæus ſtill left much to be accompliſhed by his ſucceſſors. In the firſt place, for example, the term *hemiptera*, which he derives from ἥμισυ, *half*, and πτερὸν, *a wing*, is applicable only to ſome of the genera. It well accords with the hemelytrous upper wings, or wing-caſes of the Cimices, and as evidently diſ-agrees with thoſe of the Grylli and Fulgoræ, which are of an uniformly coriaceous texture throughout. Let us further attend to the poſition of theſe wing-caſes when the inſect is at reſt, and the conſequent form and direction of the dorſal ſuture, and in this we again perceive a manifeſt diſtinction; in the Cimices, the Nepæ, and Notonectæ, the extreme half of one folds acroſs the extreme half of the other, and the ſuture (conſidered throughout) is curved obliquely: in the genera Gryllus, Fulgora, and Cicada it is ſtraight, and as diſtinctly forms a longitudinal dorſal line as in the inſects of the Coleoptera order. The form of the wings, their length and ſituation, when folded up beneath the elytra, afford another very obvious diſtinction, and many others might be ſhewn; but there is no character perhaps throughout, in which a difference is more fully manifeſted than the ſtructure of the mouth affords. Linnæus, in deſcribing this eſſential organ, merely tells us the mouth is bent down towards the breaſt, an expreſſion ſo fugitive and unmeaning, that it cannot fail to create ſome ſentiment of ſurpriſe in the minds of thoſe who have the means of comparing the mouth of the Gryllus with the Cimex, the Blatta with the Nepa, or the Mantis with the Fulgora, Cicada, Notonecta, Coccus, and Chermes. Let him beſtow only a ſlight reflection on the diſſimilarity of theſe tribes in this individual reſpect, and he will need no further teſtimony to convince him that a new arrangement is indiſpenſible. The mouth of the Gryllus, Blatta, and Mantis, are furniſhed with genuine jaws, or mandibles, adapted to the purpoſe of cutting their food (like other inſects laterally), and theſe jaws are covered by an obtuſe ſhield. On the contrary, the mouth in the Cimex, Nepa, Notonecta, Fulgora, Cicada, Coccus, and Chermes, conſiſts literally of an articulated tube or ſucker, which is either inflected or arched, and bent underneath the head, and is in general of pretty conſiderable length. The very form of this ſucker determines the office it is appointed by nature to fulfil, and ſhews that its owner is not deſtined to prepare its food by cutting. It muſt penetrate the ſubſtances and ſuck its juices; and this is truly the caſe, for the latter prey in this manner on the blood of animals as well as vegetable fluids. The puncture and mode of feeding in that noiſome inſect, the bed bug (Cimex lectuarius), is ſufficiently explanatory of this peculiarity.

It is not a little ſingular that the difference in the ſtructure of the mouth of theſe two natural tribes eſcaped the obſervation of every naturaliſt till they were diſcovered and pointed out by Fabricius. That writer was ſo fully ſatisfied with the permanent diſtinctions theſe afford, that upon this diſſimilarity alone he entirely divided the Linnæan hemiptera into two principal ſections, the firſt his *ulonata* and the other *ryngota*. The genera of the order *ulonata* in the Linnæan language (for Fabricius has divided them into a far greater number of genera than Linnæus) are gryllus, blatta, mantis, and forſicula; the laſt being removed from the coleopterous order, in which Linnæus places it. The Fabrician order ryngota contains fulgora, cicada, cimex, nepa, notonecta, aphis, thrips, coccus, and chermes.

Olivier was the firſt who endeavoured to combine the advantages of the Fabrician improvements with an arrangement more nearly correſponding with that of Linnæus. With this view he divided the Linnæan hemiptera into two orders, allowing one to retain the Linnæan name, and aſſigning to the other that of orthoptera. This ſub-diviſion was adopted by Lamarck, and being ſtill continued by Latreille and other late writers, may be conſidered as in a great degree eſtabliſhed. The true hemiptera are thoſe which have the wing-caſes half-way down coriaceous, and in which the extremity of one wing-caſe folds over the other, and the mouth furniſhed with a ſheath or trunk by the introduction of which into the fleſh of animals and plants it derives its aliments. The wing-caſes of the orthoptera are cloſed longitudinally, or horizontally when the inſect is at reſt, meeting at the ſuture, but not folding at the tips one over the other; and the armament of the mouth conſiſts of two ſtrong mandibles, two jaws, an upper lip, and four feelers. There are other or ſecondary characters attached to each, which confirm the propriety of eſteeming the two orders diſtinct.

HEMISPHERE, Hemispherium, compounded of ἡμισυς, *half*, and σφαιρα, *ſphere*, in *Geometry*, is one half of a globe, or ſphere, when divided into two by a plane paſſing through its centre.

If the diameter of a ſphere be equal to the diſtance of the two eyes; and a right line drawn from the centre of the ſphere to the middle of that diſtance be perpendicular to the line which joins the eyes; the eyes making a rotation on the axis, or middle point between them, will ſee the whole hemiſphere. If the diſtance of the eyes be either greater or leſſer than the diameter of the ſphere, in making ſuch rotation they will view reſpectively more or leſs than a hemiſphere. See Vision.

The centre of gravity of a hemiſphere is five-eighths of the radius diſtant from the vertex. See Center *of Gravity*.

Hemisphere, in *Aſtronomy*, is particularly uſed for one half of the mundane ſphere.

The equator divides the ſphere into two equal parts, called the *northern* and *ſouthern* hemiſpheres.

The northern hemiſphere is that half in whoſe vertex is the north pole. Such is that repreſented by D P A (*Plate* XVI. *Aſtronomy*, *fig.* 140.) terminated by the equator D A, and having the pole P in its zenith.

The ſouthern hemiſphere is that other half D Q A, terminated by the equator D A; and having the ſouth pole Q in its zenith.

The horizon alſo divides the ſphere into two hemiſpheres; the *upper* and the *lower*.

The upper hemiſphere is that alſo of the mundane ſphere H Z R, terminated by the horizon H R, and having the zenith Z in its vertex.

The lower hemiſphere is that other half H N R, terminated by the horizon H R, and having the nadir N in its vertex.

Hemisphere is alſo uſed for a map, or projection, of half the terreſtrial globe, or half the celeſtial ſphere, on a plane.

Hemiſpheres are frequently called *planiſpheres*.

HEMISPHEROIDAL, in *Geometry*, ſomething that approaches to the figure of a hemiſphere, but is not juſtly ſo.

HEMISSEN, John de, in *Biography*, a painter, who is not mentioned here becauſe of his extraordinary merit, but of extraordinary good fortune, in having moſt of his productions, particularly of children, attributed to a much more elevated genius, *viz.* Lionardo da Vinci; whence the miſtake ariſes, perhaps the dealers in pictures can beſt explain.

HEMISTICH, compounded of ἡμισυς, *half*, and ϛιχος, *verſe*, in *Poetry*, a half verſe. See Verse.

Such, *e. g.* are "Cernit Deus omnia vindex;"
or, "Medio tutiſſimus ibis, &c."

It is diſputed whether or no the hemiſtichs in the Æneid were left with deſign; or whether they are owing to the work's being unfiniſhed.

In Engliſh, &c. the common and Alexandrine verſes require a reſt at the end of each hemiſtich; common verſes require it at the end of four ſyllables; and Alexandrine at the end of ſix.

Leonine verſes rhythm both at the end, and at the hemiſtich. See LEONINE.

HEMITONE, in *Muſic*, the ſame with ſemi-tone or half-tone, on ſome occaſions, but not always, as will appear from the following; *viz.*

HEMITONE of Ariſtoxenus or chromatic toniæum of this author, Euclid, Holder, &c. is half the major tone, and has a ratio of $2\sqrt{2} \div 3 = 52.00393\,\Sigma + f + 4\,m$ in the notation of J. Farey: its common logarithm being .9744237.3877, its value in the logarithms of Euler or decimals of an octave = .084962, and it is equal to 4.74070 major commas: not belonging to the diatonic ſcale, which admits of no aliquot diviſions of intervals; it cannot therefore be tuned by any combination of perfect concords.

HEMITONE of Euclid's diatonum ſyntonum or intenſe, of his diatonum molle, and of his chroma toniæum, is an interval the $\frac{6}{30}$th or $\frac{1}{5}$th part of diateſſaron or minor fourth, $= 50.803145\,\Sigma + f + 4\,m$, or $50\frac{4}{5}\,\Sigma + f + 4\frac{2}{5}m$, whoſe common logarithm is .9750122.5268, the logarithm of Euler or decimal of an octave is .083008, and it contains 4.63162 major commas; ſee Holder's "Treatiſe on Harmony," p. 103, and Overend's MS. in the library of the Royal Inſtitution, vol. iii. p. 49.

HEMITONE of Euclid; the greater in his diatonum molle, is $\frac{9}{30}$ths or $\frac{3}{10}$ths of the diateſſaron or fourth, anſwering to the interval from C to D (according to Overend), is, in Farey's notation, $= 76.27168\,\Sigma + f + 7\,m$, or $76\frac{1}{5} + 1\frac{1}{2}f + 6\frac{3}{5}m$, whoſe common logarithm is .96251813.7912; its binary or Euler's logarithm is .1245114, and it contains 6.947433 major commas.

HEMITONE, *Greater*, or maximus of Holder, is an interval whoſe ratio is $\frac{25}{27} = 68\,\Sigma + f + 6\,m$, which is the SEMITONE *maximum* of Overend; ſee that article.

HEMITONE, *Major*, or *Hemitone* of Dr. Smith, is an interval whoſe ratio is $\frac{15}{16} = 57\,\Sigma + f + 5\,m$, which is the SEMITONE *major* of the nomenclature which we have adopted from Overend; ſee that article.

HEMITONE, *Major*, of Boethius, has a ratio of $\frac{2048}{2187}$, $= 58\,\Sigma + f + 5\,m$, and is the *apotome* of the Greek ſcales of muſic, of Pythagoras, Overend, &c.; it is the abſciſs of Dr. Boyce, the *flat* and *ſharp* of Dr. Calcott (Grammar, p. 112.), and of Overend's great ſcale, the ſharp of Dr. Boyce; the chromatic ſemitone of Dr. Callcott, &c.

In our article APOTOME, we omitted to ſtate the value of this interval in the different notations, which therefore we ſhall ſupply in this place, after noticing, that by miſtake its ratio was there ſtated to be $\frac{2127}{2043}$, inſtead of $\frac{2048}{2147}$, as above: which in its component primes is $\frac{2^{11}}{3^{7}}$; its common logarithm is .9714811.6927, and its binary or Euler's log. or decimal part of the octave = .094734; it contains 5.28613 major commas and 58.188976 ſchiſmas; it is equal 2 T — t — s. The apotome is formed by the addition of the following pairs of intervals, *viz.* a ſemitone major and a ſchiſma; a limma and a diaſchiſma; a ſemitone medius and a major comma; a ſemitone minimum and a chromatic dieſis; a ſemitone minor and two major commas; a major reſidual and two chromatic dieſes; a ſemitone ſubminimis and three major commas; a priſma and four diaſchiſmas; a dieze minime and four major commas; a medius reſidual and five major commas, &c.

It is alſo equal to the difference between the following intervals in pairs, *viz.* a major tone and a limma; a ſemitone maximum and a minor comma; a tone maximum and a ſemitone major; two minor ſemitones and a dieze minime; two ſemitones minimum and a major reſidual; two ſemitones medius, and a minor ſemitone; three minor ſemitones and two ſemitones ſubminimis; four ſemitones ſubminimis and three dieze minime, five dieze minime and four medius reſiduals, &c. Our general table ſhews in like manner, fifteen ways in which the apotome can be compounded of the ſum of three intervals; 24 in which it reſults from taking one interval from the ſum of two others, and 22 where it reſults from taking the ſum of two intervals from a ſingle one, but the above muſt ſuffice, except mentioning, that this interval is equal to 7 V — 4 VIII, 3 V — 4 4ths, or 3 3 + 3 III — 4 4ths by either of which it can be correctly tuned by perfect concords, on an inſtrument having a ſufficient number of ſtrings or pipes.

HEMITONE *Medium* of Holder, is an interval whoſe ratio is $\frac{128}{135} = 47\,\Sigma + f + 4\,m$, or the SEMITONE *medius*; which ſee.

HEMITONE *Minor*, of Holder, or leſs half note, has a ratio of $\frac{24}{25} = 36\,\Sigma + f + 3\,m$, or the SEMITONE *minor*; which ſee.

HEMITONE *Minor* of Boethius and Sauveur; the ancient hemitone mentioned by Pythagoras, Ariſtoxenus, &c. It is what a fourth exceeds two major tones, and has a ratio of $\frac{243}{256} = 46\,\Sigma + f + 4\,m$, or the *Limma*; which ſee.

HEMITONE *Minimum* of Holder, has a ratio of $\frac{625}{648} = 32\,\Sigma + 3\,m$, or the SEMITONE *minimum*; ſee that article.

HEMITONE, *Artificial*, of Holder, is an interval whoſe ratio is $\frac{19}{20} = 45.270982\,\Sigma + f + 4\,m$; its common logarithm being .9777236.0529, its Euler's log. = .074006, and it contains 4.129058 major commas. Mr. Holder obſerves, that this hemitone differs from the limma of Pythagoras only by the ratio $\frac{1215}{1216}$, which is .270982 Σ, as above.

HEMITONE, *Greater*, of Quintilian, is an interval whoſe ratio is $\frac{16}{17} = 53.53181\,\Sigma + f + 5\,m$, its common logarithm is .9736710.6128, its Euler's logarithm, or decimal of the octave, is .087463, and it contains 4.88023 major commas. This is the falſe ſemitone of the trumpet and French-horn, being four octaves below the ſound yielded by $\frac{1}{17}$th part of the whole length of the tube, or fundamental.

HEMITONE, *Leſſer*, of Quintilian, has a ratio of $\frac{17}{18} = 50.46033\,\Sigma + f + 5\,m$; its common logarithm is .9751764.1627, its Euler's logarithm = .082462, and it contains 4.601184 major commas. Dr. T. Young, in his account of his HARMONIC *Sliders*, (ſee that article,) calls this an imperfect *uniſon*.

HEMITONE, *Subminimis*, of Merſennus, Holder, &c. is an interval whoſe ratio is $\frac{243}{250} = 25\,\Sigma + f + 2\,m$, or the SEMITONE *ſubminimis*; which ſee.

HEMITONE *Wolf*, is the ſmall diſcordant interval which reſults, between eleven major hemitones or ſemitones and the octave, which in Mr Farey's notation is $14.70068\,\Sigma + f + m$, or $15\,\Sigma - f + m$, equal to the ſum of the major reſidual and nine ſchiſmas, the greater fraction and 14 ſchiſmas, &c.; its common logarithm is .9927140.3606, its Euler's logarithm = .02420, and it contains 1.35056 major commas.

HEMITRITÆUS, in *Medicine*. See FEVER, *Semitertian.*

HEMITROPE, in *Cryſtallography*, a ſpecies of reverſed cryſtals, ſo termed by Haüy. Rome de l'Iſle calls them *Maches*, which ſee.

HEMIXESTON, a meaſure amongſt the ancients, containing half a xeſtes. The xeſtes contained two cotyles, and therefore the hemixeſton was a cotyle.

HEMLOCK, in *Botany*. See CICUTA and CONIUM.

HEMLOCK, in the *Materia Medica*. See CICUTA.

HEMLOCK, *Great Broad-leaved Baſtard*. See LIGUSTICUM.

HEMLOCK, *Leſſer*. See ÆTHUSA.

HEMLOCK, *Water*. See CICUTA.

HEMLOCK, *Drop-wort*. See OENANTHE.

HEMLOCK *Lake*, in *Geography*, a ſmall lake of America, in the ſtate of New York, in Geneſſee county, 12 miles long and one broad; 30 miles S. of lake Ontario.

HEMMAU, a town of Bavaria, in the principality of Neuburg; 12 miles W. of Ratiſbon.

HEMMENDORF, a town of Germany, in the principality of Calenberg, ſituated on the Saale; 12 miles E. of Hameln.

HEMMINGFORD, WALTER DE, in *Biography*, an Engliſh chronicler of the 14th century, whoſe work extends from 1066 to 1303. He was an eccleſiaſtic in Giſborough abbey, Yorkſhire, and died in 1347.

HEMORRHAGE, or HEMORRHAGY, in *Surgery*, is a ſubject of the higheſt importance; the many accidents which give riſe to alarming effuſions of blood, the bleeding neceſſarily attendant on all operations, and the awful ſuddenneſs with which life is loſt, when any ſerious hemorrhage is not immediately checked, are circumſtances fully ſufficient to impreſs upon the mind the neceſſity of being prepared to render aſſiſtance without the leaſt heſitation or delay. There are ſeveral parts of practice which leave the ſurgeon ſome little leiſure to refer to his books, refreſh his memory, and ſeek the advice of others. In the caſe of hemorrhage it is moſt frequently otherwiſe.

There is one thing proper to be done, and if the practitioner does not do it expeditiouſly, his patient will die before his eyes. Thus, the life of a fellow creature will be ſacrificed to his ignorance, or indeciſion; his own reputation and honour will be moſt juſtly forfeited; and the angry world will ever afterwards only mention him with reproaches. In many inſtances, an unſkilful ſurgeon is a ſort of authorized murderer, let looſe upon ſociety. It is difficult to ſay, whether he kills moſt, by doing what he ought not to do, or by leaving undone the things which ought to be done. The law cannot bring him to the gallows; for, what he does is an error of judgment; and when his conduct deſerves the moſt ignominious puniſhment, ſo unknowing are people in general in ſurgical matters, that they frequently thank and reward him, when he ſhould be kicked, put in the pillory, or hanged. Sometimes, however, his errors and ignorance ſtrike every bye-ſtander; he occaſions, with his own knife, a profuſe bleeding, and does not know how to ſtop it; the patient actually periſhes under his hands. Or, in other inſtances, he is called to a perſon who is wounded and bleeding largely; he knows not what to do; and, before his confuſion and heſitation are over, the poor patient breathes his laſt. On other occaſions, he adopts ſome improper method for putting a ſtop to the hemorrhage, ſo that the blood eſcapes from time to time, till the patient has fallen a more gradual victim.

"Hemorrhage (ſays a late excellent writer), the inevitable attendant on operative ſurgery, impreſſes mankind with a ſentiment of horror, and may on this, and many other accounts, be conſidered as one of the moſt formidable opponents to its improvement. It obſcures, retards, and embarraſſes the progreſs of every operation, and the juſt dread of its fatal conſequences is the chief cauſe of diffidence in the operator. But, not only as a conſequence of ſurgery is hemorrhage to be feared; it is alſo one of the moſt alarming and dangerous accidents which ſurgery is called upon to relieve. "Un ſentiment naturel (obſerves Morand) attache à l'idée de perdre ſon ſang, un terreur machinale, dont l'enfant, qui commence à parler, et l'homme le plus decidé, ſont également ſuſceptibles. On ne peut point dire que cette peur ſoit chimérique. Si l'on comptoit ceux, qui perdent la vie dans une bataille, on verroit que les trois quarts ont peri par quelque hemorrhagie; et dans les grands operations de chirurgie, cet accident eſt toujours le plus formidable." Jones on Hemorrhage, p. 6.

In caſes of bleeding, the ſurgeon feels himſelf ſo reſponſible, that to him it is truly an anxious ſcene. If the bleeding be ſlow and gradual, from ſome extenſive ſurface, as from a polypus of the noſtrils, from the womb, from the ſurface of a ſtump, or from ſome large ſore, (as Mr. John Bell remarks,) the ſurgeon is ſent for from hour to hour, he is called during the night; he is made unhappy for weeks; and, after repeated uncontrollable hemorrhages, he ſees his patient expire. But, if there be a ſudden bleeding from the veſſels cut in any operation, or from an aneuriſm, or from ſome great wound, the arteries of which cannot be diſcovered, there is immediate danger of the patient expiring even in the ſurgeon's hands. Let thoſe who have witneſſed the agitation of ſuch ſcenes, judge of the importance of the preſent ſubject. The fear of hemorrhage is always uppermoſt in the mind of the young ſurgeon. Were this one danger removed, he would go forward in his profeſſion almoſt without fear.

It is the guſhing of the blood from the great arteries, and the fainting of the patient, which hurry our moſt important operations, and makes all the difference betwixt operating on the living body and diſſecting the dead. Theſe are the things which at times make the hands of the boldeſt ſurgeon unſteady, and his heart ſink within him. No ſurgeon nor ſpectator can keep the natural colour of his cheek, when a patient is expiring, or in danger of expiring, from loſs of blood; and the actual death of the patient muſt leave a laſting melancholy on the ſurgeon's mind.

It is really this accident of hemorrhage, that has for ages retarded the improvement of ſurgery. The ancients, ignorant of the ways of ſtopping bleeding, did not venture to cut out the moſt trivial tumour, or they did ſo with fear and uncertainty. Such operations as we now perform rapidly and ſafely with the knife, they executed ſlowly, or imperfectly, with burning irons or ligatures. If they ventured to amputate a member, it was only by cutting through the mortified parts, and ſo great was their dread of blood, that they were afraid to divide the living fleſh. John Bell's Principles of Surgery, vol. i. p. 142.

The ſurgeon, who hopes to exerciſe his profeſſion with honour, ought to poſſeſs an adequate knowledge of the ſtructure and courſe of the blood-veſſels, have juſt ideas of the circulation, be well acquainted with what modern inveſtigation has made out, concerning the proceſs of nature in ſuppreſſing hemorrhage, and underſtand the comparative merits of all the plans, which the ingenuity of man has deviſed for the ſame deſirable purpoſe. The anatomical and phyſiological departments of this work will afford the neceſſary information, in regard to the track of the arteries and veins, and the circulation of the blood. Our province is chiefly to detail the various proceedings which have been adopted for the ſuppreſſion of hemorrhage, and to notice ſome improvements and intereſting facts, which ſome ingenious men have lately brought to light. A few preliminary obſervations, however, are firſt proper.

When an artery is wounded, the blood is of a bright ſcarlet colour, and guſhes from the veſſel *per ſaltum*, and with great rapidity. The blood iſſues from a vein in an even, unbroken ſtream, and is of a dark purple red colour.

In conſequence of the greater celerity, with which the blood flows in the arteries, their wounds are, generally ſpeaking, much more dangerous than thoſe of the veins, being far more difficult to heal, and attended with much greater hemorrhage. Beſides, experience ſhews, that the conſtitution cannot bear the loſs of ſo much arterial as it can of venous blood; and though it will often bear the loſs of a large quantity, either of arterial or venous blood, provided ſuch quantity is loſt ſlowly and gradually, yet it is found, that when a great deal of blood is loſt in the ſudden way, as it often is in wounds of the large arteries, the conſequences are generally ſoon fatal. Even when the patient ſurvives the immediate effects of a conſiderable and ſudden hemorrhage from an artery, it too frequently happens, that the weakneſs induced does not quickly go off, but laſts an immoderate time, and becomes the foundation of obſtinate and fatal diſeaſes.

The contraction of the ventricles of the heart drives the blood into all the arteries of the body. The office of the veins is to bring back to the heart ſuch blood as is not ſeparated by the ſecerning arteries, for the purpoſes of ſecretion and nutrition. Hence, it muſt be plain, that the current of the blood in the arteries is in a direction leading from the heart, while that of the blood in the veins runs towards this important organ. It muſt be equally manifeſt, that preſſure, made on that portion of a wounded artery, which adjoins the wound towards the heart, will tend to ſtop the bleeding; and that, in order to check any hemorrhage from a vein, the preſſure or impediment to the bleeding muſt be applied to that ſide of the wound which is moſt remote from the heart.

The wounds of certain blood-veſſels, particularly of ſome very near the ſource of the circulation, whether of arteries or veins, may be regarded as mortal. Thus wounds, either of the aorta or vena cava, of the pulmonary artery, or veins of the ſubclavian, internal jugular vein, &c. are fatal. The blood goes out of the heart into the large trunks of the arterial ſyſtem with great velocity; and it is clear, that this fluid muſt be returned to the heart through the trunks of the veins with ſufficient quickneſs to furniſh a ſupply to that organ equal to the quantity which is expelled by every ſtroke of the ventricles. Therefore, the blood is found to flow in the veins near the heart with an immenſe impetus, and their wounds are as perilous as if the injured veſſels were actually arteries.

As the ſyſtem will not bear the loſs of above a certain quantity of blood at a time, the bleeding may be ſaid to demand moſt urgently the firſt attention of the ſurgeon in every wound, whether produced by an accident or an operation. Were he to loſe time in preparing the dreſſings before he had ſecured the bleeding-veſſels, the patient would frequently bleed to death before his eyes. Were an operation to proceed in completing the exciſion of a large tumour, without tying the large veſſels regularly as they are divided, the patient would often be dead before the ſeparation of the whole ſwelling was accompliſhed.

The ſubſtance of which arteries is compoſed, is diviſible into three diſtinct parts, named by anatomiſts tunics or coats. The internal coat is very thin and ſmooth, is elaſtic and firm in the longitudinal direction, but "ſo weak in the circular, as to be very eaſily torn by the ſlighteſt force applied in that direction."

The middle coat is the thickeſt, conſiſting of circular layers of fibres, reſembling thoſe of muſcles, but differing from them in poſſeſſing a remarkable degree of elaſticity. It is this coat which keeps an empty and dead artery open and of a round form. As this coat has no longitudinal fibres, "the circular fibres are held together by a ſlender connection, which yields readily to any force applied in the circumference of the artery."

The external coat is remarkable for its whiteneſs, denſity, and great elaſticity. The ſtrength of the artery chiefly depends on it; ſo much ſo, that if the veſſel be ſurrounded with a tight ligature, its middle and internal coats will be as completely divided by it, as they can be with a knife, whilſt the external coat will remain entire.

Beſides theſe proper coats, the arteries are connected by cellular ſubſtance with ſheaths. "If an artery be divided, the divided parts, owing to their elaſticity, recede from each other, and the length of the cellular fibres connecting the artery with the ſheath admits of its retracting a certain way within the ſheath."

Arteries are ſupplied with ſmall arteries and veins, the vaſa vaſorum, and with abſorbents and nerves. "This ſtructure makes them ſuſceptible of every change to which living parts are ſubjected in common; enables them to inflame when injured, and to pour out coagulating lymph, by which the injury is repaired, or the tube is permanently cloſed." See Jones on Hemorrhage, p. 1—5.

The vaſt importance of the blood in ſupporting the functions of the animal economy has, at all times, excited the attention of practitioners to the cauſes of bleeding, and the means of ſtopping it. Hemorrhages have been divided into two kinds, *idiopathic* and *ſymptomatic*. The firſt are uſually produced by the ſpontaneous rupture of the veſſels, and are attended with a ſtate of extraordinary fulneſs of the ſanguineous ſyſtem. They are frequently accompanied with ſome degree of fever, and always ſeem to depend upon a more or leſs increaſed action of the bleeding veſſels, brought on by ſome internal cauſe. They are alſo denominated *active* hemorrhages.

The *ſymptomatic*, or *paſſive* hemorrhages are ſuch as are not neceſſarily connected with a ſtate of plethora; but, generally, originate from ſome external local cauſe.

The conſideration of idiopathic hemorrhages belongs to the phyſician. All thoſe of the paſſive kind come within the province of the ſurgeon, and, in this part of practice, modern improvements of the moſt important kind have been introduced. If there be any one thing which tends more than any other to give a practitioner of the preſent day an advantage over a ſurgeon of former times, it is the better knowledge, which now prevails, in relation to the methods of ſtopping hemorrhage. However, we may ſay, that it has not been till very lately, that ſeveral conſiderable ſteps to perfection have been made. Before the valuable publication of Dr. Jones, many incorrect notions were entertained; nor were the principles on which we ought to proceed in checking the bleeding from large arteries well underſtood. In our opinion, the ſurgical profeſſion, and mankind in general, are greatly indebted to this gentleman for his very able elucidations. It will be ſeen in the ſequel of this article, that the ancients were not entirely ignorant of ſome of the chief means of ſtopping hemorrhage; but, their not being acquainted with the circulation of the blood, their imperfect knowledge of anatomy, and, perhaps, other cauſes, hindered them from adopting plans which certainly ſeem to have come within the ſcope of their information.

Celſus recommends, for the purpoſe of ſtopping hemorrhage, the wound to be filled with dry lint, and a ſponge dipped in cold water to be applied over the lint, and made to preſs upon the part with the hand. When, notwithſtanding this method, the bleeding continues, he adviſes freſh lint wet with vinegar to be repeatedly put on the wound; but he forbids the employment of eroding eſcharotic applications, though adviſed by others for this object, becauſe they are apt to give riſe to conſiderable inflammation. He prefers, at all events, the mildeſt of this claſs of dreſſings. When the hemorrhage reſiſts the foregoing means, he recommends the wounded part of the veſſel to be tied with two ligatures, and the intervening portion to be cut through, ſo that the veſſel may heal up in the wound, and the two orifices become firmly cloſed. When the ligature cannot be applied, he propoſes the actual cautery, in caſe the wound has bled enough, and there are no muſcles nor nerves in it; as on the forehead and top of the head, parts which Celſus erroneouſly ſuppoſed were not furniſhed with ſuch organs.

Galen alſo makes mention of the ligature for ſtopping the bleeding in caſes of wounds. Some alluſions to it are likewiſe ſaid to exiſt in ſtill more ancient writers, as Archigenes and Rufus. But it is more than probable, that in the times of theſe men, the ligature was ſcarcely ever employed. This opinion ſeems to be confirmed by the conſideration of the great number of topical aſtringents, cauſtics, and other things, which the ancients have recommended for the ſuppreſſion of hemorrhages, and upon which little reliance would have been placed, had the practice of the ligature been at all common. Beſides, there cannot be a doubt, that, if the old ſurgeons had been familiar with the method of tying the arteries, they would ſoon have extended the ligature to caſes of amputation. However, ſo far were they from doing this, that, at a much later period, we find Albucaſis afraid to cut off an arm at the wriſt, leſt the patient ſhould periſh from loſs of blood.

Paré is accounted the firſt ſurgeon who uſed the ligature in amputations. An attack was made by ſome of his contemporaries upon his practice, a modeſt defence of which he inſerted in the part of his works, entitled *Apologie*. He takes great pains to impute the invention of the ligature to the ancients, and quotes a great many of them who have ſpoken of it; but its application, in caſes of amputation, he regards as ſo highly important, that he thinks himſelf inſpired by God in being the firſt to uſe it in this manner.

The cauterization of the cut veſſel, and of ſome of the ſurrounding fleſh, was what the ancients chiefly depended upon for ſtopping hemorrhage. The parts, which were thus acted upon by the fire, formed an eſchar more or leſs thick, which blocked up the opening in the veſſel, and prevented the eſcape of the blood. But, frequently, the eſchar was thrown off too ſoon, and the bleeding recurred. The danger was now greater than at firſt, inaſmuch as there was more difficulty in ſtopping the hemorrhage, than before the application of the cautery. Sometimes it happened alſo that the inſtrument, in conſequence of being made too hot, brought away with it the eſchar which it had juſt produced. At preſent, the actual cautery is never uſed in this country for the ſuppreſſion of hemorrhage. In France, indeed, the employment of it is yet deemed juſtifiable in a few particular inſtances, in which the ligature and compreſſions are both impracticable; but we entertain no doubt that the practice will in the courſe of time be univerſally abandoned. A plan, equally barbarous, was purſued for a great length of time; it was to cauterize the orifices of the bleeding-veſſels, by touching them with pledgets dipped in boiling oil of turpentine. We are happy to add, that this method has alſo been given up. See Encyclopédie Methodique, art. *Hémorrhage*.

Before we enter into a detail of the various means of ſtopping hemorrhage, we think it right to deliver an account of the different theories which have prevailed, reſpecting the natural proceſs by which bleedings are ſuppreſſed. When this is underſtood, a more correct judgment may be formed of the merits of each particular mode of treatment, ſince it will be known, that whatever diſturbs or impedes that proceſs, cannot be conſidered as good ſurgery. Much has been made out by Dr. Jones on this ſubject, and we feel highly indebted to this gentleman for the advantages and aſſiſtance which we have derived from his able criticiſms, and perſpicuous explanations.

Although the ancients were undoubtedly acquainted with the plan of tying bleeding veſſels, they do not appear to have made it their common practice. On the contrary, inſtead of undertaking rational enquiries and experiments, which might have led them to employ the ligature more extenſively, they contented themſelves with empirical attempts to check every hemorrhage with drugs, or the inſecure, yet terrible means of cauſtic and fire.

The celebrated French ſurgeon, Petit, in the year 1731, firſt endeavoured to give an explanation of the means, which nature employs, for the ſuppreſſion of hemorrhage. Upon this ſubject, he publiſhed three memoirs in the courſe of a few years, productions which, (to uſe the words of Dr. Jones,) will ever be conſidered by candid readers, as invaluable contributions to ſurgery, and indubitable proofs of the author's penetration, accuracy, and fidelity.

It was the doctrine of Petit, that hemorrhage from a divided artery is ſtopped by the formation of a clot of blood, (caillot de ſang,) which is ſituated partly *within*, and partly *without* the veſſel. He thought that the external portion is formed by the laſt drops of blood which iſſue from it; the internal portion by the blood contained juſt within its divided extremity; the former he called the *couvercle*, the latter the *bouchon*. The clot, according to Petit, afterwards becomes adherent to the internal coat of the veſſel, to its orifice, and to the ſurrounding parts. He further ſtates, that when bleeding is ſtopped by the application of a ligature, a clot is formed above the ligature, and the coagula, under theſe circumſtances, only differ in figure. This view of the ſubject led him to recommend compreſſion to ſupport the clot, that it may not be puſhed away by the impulſe of the blood.

In 1736 Morand publiſhed a memoir, in which he added many intereſting remarks to thoſe which had been made by his countryman Petit. He admitted that the formation of a coagulum, had ſome effect in ſtopping hemorrhage; but contended that the changes which the artery undergoes, alſo contribute to that effect. Theſe changes are deſcribed as being a ſort of corrugation or plaiting of the circular fibres of the artery, by which its canal is diminiſhed, and a ſhortening, and conſequent thickening, of its longitudinal fibres, ſo as nearly to fill it up. Morand conceived that this latter effect was produced when an artery is completely divided, and that it conſtitutes the principal means by which, in ſuch caſes, the hemorrhage is ſtopped. He thought alſo, that the corrugation, or puckering of an artery, might take place ſo as to obliterate its cavity, provided preſſure be made round it, as happens when a ligature is applied.

As Dr. Jones remarks, it is clear that Morand alluded to the contraction and retraction of arteries, and that he erred chiefly in his explanation of the way, in which ſuch effects are produced. The retraction is imputed to longitudinal fibres, which, according to the beſt anatomiſts, do not exiſt in the arteries of the human body. However, though Morand entertained very erroneous notions of the ſtructure and action of the arteries, yet Dr. Jones does him the juſtice to acknowledge that this does not affect the truth of his general concluſion, that the change produced on a divided artery, contributes, with the coagulum, to ſtop the flow of blood.

The opinion of Morand was alſo that which Mr. Samuel Sharp maintained. "The blood-veſſels, immediately upon their diviſion, bleed freely, and continue bleeding, till they are either ſtopped by art, or, at length contracting and withdrawing themſelves into the wound, their extremities are ſhut up by the coagulated blood." Operations of Surgery, edit. 2. 1739.

Dr. Jones obſerves that this explanation is true as far as it goes; but not ſufficiently comprehenſive.

Pouteau denied that a coagulum is always to be found after the diviſion of an artery; and when it is, he thought that it ſhould only be conſidered as a feeble and ſubſidiary means towards the ſuppreſſion of hemorrhage. He contended that the retraction of the artery had not been demonſtrated, and that, at any rate, it was not more effectual than the coagulum. His theory was, that a ſwelling of the cellular membrane, at the circumference of the cut extremity of the artery, forms the principal impediment to the flow of blood; and that the application of a ligature to an artery is uſeful by promoting a more immediate and extenſive induration of the cellular ſubſtance.

Mr. Gooch oppoſed the doctrine of Petit, concerning the effect which the coagulum had in the ſuppreſſion of hemorrhage; in delivering his own theory, he intermingles ſome of Pouteau's notions with his own. In the firſt volume of his ſurgery, he ſays: "when a ſmall artery in a limb, or any external part of the body, is totally divided, its retraction may bring it under the ſurrounding parts, and with the natural contraction of the diameter of its mouth, aſſiſted by the compreſſive power of thoſe parts, increaſed by their growing tumid, the efflux of blood may be ſtopped."

Gooch, White, and Aikin conſidered the experiments of Kirkland quite concluſive in confuting the doctrine of hemorrhage being ſtopped by a coagulum, and in eſtabliſhing the contraction of the arteries, as the means which nature employs in the ſtoppage of bleeding from divided arteries. White gives an unqualified aſſent to the opinions of Kirkland: "In regard to the means which nature employs in the ſtoppage of hemorrhages from divided arteries, (ſays Mr. White,) I never thought Petit's theory of a coagulum at all probable; a coagulum of blood, formed at the end of an artery, is as far from being of any ſervice, except in ſome few caſes, where the air cannot get admiſſion, that it is abſolutely prejudicial, as I have often obſerved, and ſhould always be removed before the application of ſponge, or any fungous ſubſtance.

"Pouteau's hypotheſis, that the ſwelling of the ſurrounding cellular ſubſtance cloſed the artery, ſeemed more probable; but I am now convinced from ſeveral obſervations, that according to the ſuppoſition of Mr. Gooch, ſince confirmed by my ingenious friend Mr. Kirkland, the arteries, by their natural contraction, coaleſce, as far as their firſt ramification." White's Caſes in Surgery.

We ſhall not lengthen this article with detailing the experiments undertaken by Kirkland. They were not of the right kind, and have juſtly incurred the following criticiſm from Dr. Jones. "Mr. Kirkland wiſhed to determine the effects of temporary preſſure on arteries, and therefore in his experiments, 'he applied a tourniquet on the limb, a ligature on the artery, or his finger to the mouth of the artery.' All theſe are artificial means; taking off the force of the circulation from the extremity of the artery, and allowing it to undergo thoſe changes proper to the new condition into which it is brought. One circumſtance only being omitted, the means can no longer be natural; eſpecially when it is that one moſt important circumſtance of all, the ſource of our anxiety and alarm, namely, the impetuous flowing of the blood through the wound of the artery. It is the hemorrhage itſelf which reſiſts the contraction of the artery to a degree that would, in almoſt every inſtance, be attended with fatal conſequences, (the artery being ſuppoſed large enough to admit of ſuch conſequences,) but for a coagulum," whoſe formation, ſituation, and uſe, Dr. Jones has moſt ably deſcribed. Mr. White's concluſions being drawn *from the condition of a tied artery*, are alſo very properly objected to by this gentleman as being unfit to explain *the condition of a divided artery left to nature.*

Mr. John Bell has advanced a theory, that the bleeding from divided arteries is ſuppreſſed by the cellular ſubſtance around them becoming injected with blood. However the account which this author gives of the ſubject is extremely vague and inconſiſtent, and has met with the animadverſions of that accurate obſerver Dr. Jones.

All the foregoing theories, relative to the natural means by which bleeding is ſtopped, are deficient and not ſufficiently comprehenſive. There is, as Dr. Jones remarks, an unjuſtifiable propenſity in each of the preceding writers, to aſſign the whole effect to one circumſtance alone, regardleſs alike of the obſervations of others, and of the general analogy of the operations of the animal economy.

A regular ſeries of experiments which Dr. Jones undertook, exhibit the proceſs as a leſs ſimple, but more ſatiſfactory one. They ſhew that the blood, the action, and even the ſtructure of arteries, their ſheath, and the cellular ſubſtance connecting them with it; in ſhort, that all the parts concerned in, or affected by hemorrhage, contribute to arreſt its fatal progreſs, by operating, in the caſe of a divided artery, as follows. "An impetuous flow of blood, a ſudden and forcible retraction of the artery within its ſheath, and a ſlight contraction of its extremity, are the immediate and almoſt ſimultaneous effects of its diviſion. The natural impulſe, however, with which the blood is driven on, in ſome meaſure, counteracts the retraction, and reſiſts the contraction of the artery. The blood is effuſed into the cellular ſubſtance, between the artery and its ſheath, and, paſſing through that canal of the ſheath which had been formed by the retraction of the artery, flows freely externally, or is extravaſated into the ſurrounding cellular membrane in proportion to the open or confined ſtate of the wound. The retracting artery leaves the internal ſurface of the ſheath uneven by lacerating or ſtretching the cellular fibres that connected them. Theſe fibres entangle the blood as it flows, and thus the foundation is laid for the formation of a coagulum at the mouth of the artery, and which appears to be completed by the blood as it paſſes through the canal of the ſheath, gradually adhering and coagulating around its internal ſurface, till it completely fills it up from the circumference to the centre.

"A certain degree of obſtruction to the hemorrhage, which reſults from the effuſion of blood into the ſurrounding cellular membrane, and between the artery and its ſheath, but particularly the diminiſhed force and velocity of the circulation, occaſioned by the hemorrhage, and the ſpeedy coagulation of the blood, which is a well known conſequence of ſuch diminiſhed action of the vaſcular ſyſtem, moſt eſſentially contribute to the accompliſhment of this important and deſirable effect.

"A coagulum then (continues Dr. Jones), formed at the mouth of the artery, and within its ſheath, and which I have diſtinguiſhed in the experiments by the name of the *external* coagulum, preſents the firſt complete barrier to the effuſion of blood. This coagulum, viewed externally, appears like a continuation of the artery, but on cutting open the artery, its termination can be diſtinctly ſeen with the coagulum, completely ſhutting up its mouth, and incloſed in its ſheath.

" The mouth of the artery being no longer pervious, nor a collateral branch very near it, the blood juſt within it is at reſt, coagulates, and forms in general a ſlender, conical coagulum, which neither fills up the canal of the artery, nor adheres to its ſides, except by a ſmall portion of the circumference of its baſe which lies near the extremity of the veſſel. This coagulum is diſtinct from the former, and I have called it the internal coagulum.

" In the mean time, the cut extremity of the artery inflames, and the vaſæ vaſorum pour out lymph, which is prevented from eſcaping by the external coagulum. This lymph fills up the extremity of the artery, is ſituated between the internal and external coagula of blood, is ſomewhat intermingled with them, or adheres to them, and is firmly united all round to the internal coat of the artery.

" The permanent ſuppreſſion of the hemorrhage chiefly depends on this coagulum of lymph; but while it is forming within, the extremity of the artery is farther ſecured by a gradual contraction which it undergoes, and by an effuſion of lymph between its tunics, and into the cellular membrane ſurrounding it: in conſequence of which, theſe parts become thickened, and ſo completely incorporated with each other, that it is impoſſible to diſtinguiſh one from the other: thus, not only is the canal of the artery obliterated, but its extremity alſo is completely effaced, and blended with the ſurrounding parts.

" When the wound in the integuments is not healed by the firſt intention, coagulating lymph, which is ſoon effuſed, not only attaches the artery firmly to the ſubjacent and lateral parts, but alſo gives it a new covering, and completely excludes it from the external wound, which then goes on to fill up and heal in the uſual manner.

" The circumſtances now deſcribed (ſays Dr. Jones), are obſerved alſo in the inferior portion of the artery, or that which is ſupplied with blood by anaſtomoſis, with this difference only, that its orifice is generally more contracted, and the external coagulum is much ſmaller than the one which adheres to the mouth of the ſuperior portion of the artery, or that from which the blood flows in its direct courſe from the heart." Jones on the proceſs employed by nature in ſuppreſſing the hemorrhage from divided and punctured arteries, &c. p. 53, et ſeq.

With the exception of a few inſtances, in which the ſtrong retraction and contraction of a divided or lacerated artery prevent hemorrhage altogether, Dr. Jones alſo concludes, that a languid ſtate of the circulation is neceſſary for the accompliſhment of the natural means by which the bleeding is ſtopped.

The above occurrences are only diſcernible a certain time; for the impervious extremity of the veſſel gradually contracts, till its canal, as far as the firſt lateral branch, is obliterated, and its condenſed tunics aſſume a ligamentous appearance. The external coagulum which had ſtopped the hemorrhage at firſt, is abſorbed in the courſe of a few days, and the ſurrounding coagulating lymph which had thickened the parts, is gradually taken away.

At a ſtill later period, the ligamentous portion of the artery is converted into a mere filament. Thus, in the end, a complete annihilation of the veſſel takes place up to the place where the firſt lateral branch is given off: But, long before this final change is effected, the anaſtomiſing branches of both the upper and lower portion of the artery have become much larger, ſo as to tranſmit the blood into the inferior part of the limb, as well as if the circulation through the arterial trunk had never been obſtructed. According to Dr. Jones, the extent and formation of the internal coagulum depend very much on the diſtance at which the diviſion of the artery has happened from a lateral branch. Thus, if the veſſel is divided about a quarter of an inch beyond ſuch branch, ſcarcely any internal coagulum will be formed, as there is hardly any ſpace left for it between the effuſed lymph and the lateral ramification. But when the diviſion of an artery has taken place at ſome diſtance from a lateral branch, a long conical internal coagulum is then formed, the baſe of which is ſituated towards the extremity of the artery, generally adhering partially at its circumference to the inſide of the veſſel, cloſe to the coagulum of lymph.

The internal coagulum of blood does not fill up the canal of the veſſel, except where its baſe is ſituated, nor is it any where elſe adherent. On the other hand, " the coagulum of lymph is principally characterized by adhering almoſt throughout its whole extent to the internal ſurface of the artery."

Though the internal coagulum of blood at firſt does not fill up the artery, except juſt at its baſe, yet, when the veſſel afterwards contracts, the coagulum is cloſely embraced by it.

The external coagulum is always formed. The internal one contributes nothing to the ſuppreſſion of hemorrhage in ordinary accidents, becauſe its formation is uncertain, and, when formed, it rarely fills the canal of the artery, or does not adhere ſufficiently to the inſide of the veſſel. However, Dr. Jones informs us, that when the artery is lacerated, the internal coagulum may extend beyond many collateral branches, and adhere to the veſſel wherever it is lacerated, ſo as to be uſeful in preventing a return of the bleeding.

The foregoing are the principal facts which Dr. Jones has brought to light, in relation to the means employed by nature in ſtopping the hemorrhage from divided arteries. The experiments, illuſtrative of theſe facts, are all detailed by this gentleman, as appears to us, with equal candour and ability. He claims the merit of having corrected and perfected the theories of many men of great eminence, whoſe views of the ſubject were either more or leſs erroneous, or too circumſcribed.

With regard to the natural means by which the hemorrhage from punctured, or partially divided arteries is ſuppreſſed, Petit was the firſt who furniſhed accurate obſervations. Dr. Jones, however, has added to the elucidation of this part of the ſubject, as he has to that of the preceding. His experiments have confirmed, that the blood is effuſed into the cellular ſubſtance, between the artery and its ſheath for ſome diſtance, both above and below the wounded part; and that when the parts are examined a ſhort time after the hemorrhage has completely ſtopped, a ſtratum of coagulated blood is found lying between the artery and its ſheath, extending from a few inches below the wounded part to two or three inches above it, and being ſomewhat thicker or more prominent juſt over the wounded part than elſewhere.

The hemorrhage, which immediately follows the puncture of an artery, by filling the ſpace between the artery and its ſheath with blood, and conſequently diſtending the ſheath, alters the relative ſituation of the puncture in the ſheath to that in the artery, ſo that they are not exactly oppoſite each other. By this means, a layer of blood is confined by the ſheath over the puncture in the artery, and by coagulating there prevents any further effuſion of blood. But, continues Dr. Jones, this coagulated blood, like the external coagulum of a divided artery, affords only a temporary barrier to the hemorrhage; its permanent ſuppreſſion is effected by a proceſs of reparation, or of obliteration, which takes place in the wounded artery. It is neceſſary, however, to recollect, that, on account of the elaſtic and contractile properties of the coats of the arteries, a great difference occurs in the degree in which the wound of the veſſel gapes, according as the puncture happens to be either longitudinal, oblique, or tranſverſe. The longitudinal, ſays Dr. Jones, appears to produce the ſlighteſt poſſible, or, perhaps, ſcarcely any ſeparation of the lips of the wound; the oblique occaſions a ſeparation proportioned to its extent; and the tranſverſe, however ſmall, ſeems to produce a circular aperture in the parietes of the artery.

The experiments of Dr. Jones alſo ſhew, that an artery, if wounded only to a moderate extent, is capable of reuniting and healing ſo completely, that, after a certain time, the cicatrization cannot be diſcovered, either on its internal or external ſurface; and that even oblique and tranſverſe wounds, when they do not open the artery to a greater extent than one-fourth of its circumference, are likewiſe filled up and healed, by an effuſion of coagulating lymph from their inflamed lips, ſo as to occaſion but little or no obſtruction in the canal of the artery.

However, Dr. Jones obſerves, it is difficult to determine the preciſe extent to which an artery may be wounded, and yet admit of being reunited. For, when the wound is very large, though not entirely beyond the poſſibility of being reunited, ſuch a quantity of coagulating lymph is poured out, that the canal of the veſſel at the wounded part is more or leſs filled up by it. When the wound is ſtill larger, the ſtrong tendency in the divided parts to retract keeps the undivided portion conſtantly on the ſtretch, ſo that it either is torn, or gives way in conſequence of ulceration.

Punctures in arteries, when they heal, are cloſed by lymph, which is effuſed from the lips of the wound of the veſſel, and alſo from the ſurrounding parts. Jones, page 116.

The foregoing obſervations will ſerve to make the reader acquainted with the nature of the proceſs, by which the bleeding from wounded arteries of a certain ſize is ſuppreſſed, without the interference of ſurgery. They will alſo qualify him for judging of the propriety, or impropriety, of ſeveral plans, which have been propoſed, or practiſed, for the object of ſtopping hemorrhage. We will now treat of ſome of theſe methods, and endeavour to ſhew what is objectionable; what praiſeworthy.

Actual Cautery.—This is one of the moſt ancient means employed for the purpoſe of ſuppreſſing hemorrhage, and conſiſted in applying a heated iron to the bleeding veſſels. The inſtrument was often put through a cannula, ſo that the ſurrounding fleſh might not be too much burnt. Former writers recommend every ſurgeon to provide himſelf with ſeveral cauteries of different ſizes, ſome with flat, others with button, or pointed extremities, ſo that he may always have one, which will be adapted to the mouths of the veſſels, without being likly to hurt any adjoining nervous, or tendinous part. Such authors are very particular in their cautions and directions. They ſay, that the iron ſhould not be uſed quite red-hot, becauſe, if haſtily applied, and inſtantly removed, the eſchar will be apt to be pulled away with the inſtrument, and the patient undergo pain to no purpoſe, the bleeding continuing as forcibly as before. When the cautery was of a moderately glowing heat, the old ſurgeons uſed to take it out of the fire, ſtrike it againſt the grate, and rubs it end againſt the floor, after which its extremity was immediately clapped upon the mouth of the artery, and turned two or three times round upon it.

The actual cautery, operated by producing an eſchar, which blocked up the mouth of the bleeding veſſel. Frequently, however, the eſchar came off at too early a period, the hemorrhage recurred, and the patient bled to death. Beſides the uncertainty, inefficacy, and inſecurity of the actual cautery, its application was attended with horrid pain, while the miſchief, neceſſarily produced by it upon the ſurfaces of wounds, muſt have made many of them incapable of healing in a moderate time, or without a great deal of inflammation, large abſceſſes, and a train of ſevere ſufferings. In fact, no perſon, acquainted with the general excellence of modern ſurgery, can retain a doubt, that, beſides the deaths from bleeding, many wounds were rendered fatal by the additional injury, which unavoidably aroſe from ſearing the fleſh with burning irons. As Mr. John Bell remarks, "the horrors of the patient, and his ungovernable cries, the hurry of the operator and aſſiſtants, the ſparkling of the irons, and the hiſſing of the blood againſt them, muſt have made terrible ſcenes, and ſurgery muſt in thoſe days have been a horrid trade."

"For one wound, and eſpecially for the amputation of a limb, many cauteries were required." Parée, in his ſpirited reply to Gourmaline, ſays to him, "if, ſir, in a ſiege, or in the aſſault of a city, where hundreds of ſoldiers have their limbs ſhattered, you ſhould chooſe to cauterize with burning irons, you would need a page to run backwards and forwards with your irons and furnaces to heat them in; and I ſhould little wonder, if, in the end, you were to be dragged out and ſtoned, as happened to Agatheus, one of the earlieſt ſurgeons in Rome." Principles of Surgery, vol. i. p. 151.

After this account, it is ſcarcely neceſſary for us to ſay, that the actual cautery is now never uſed for the ſuppreſſion of hemorrhage. It is reprobated by all approved writers on ſurgery as a barbarous and horrid method. At the ſame time, it is worthy of notice, that we find Default, and ſome diſtinguiſhed modern ſurgeons on the continent, occaſionally reſorting to this means in particular caſes, where the bleeding does not admit of the employment of preſſure, or of a ligature. In England, we are happy to ſtate, the cautery is never uſed; and yet, it gratifies our pride to think, that the practice of ſurgery is carried on here, in every one of its branches, with greater perfection, than in any other country in the world.

Potential Cautery.—Sometimes, inſtead of employing heated irons, the ſurgeons of former times applied to the bleeding veſſels cauſtics, ſtimulating things, and hot oil. Theſe were termed potential cauteries. In this way, even melted ſulphur and lead, and boiling oil of turpentine, were uſed. The latter was a very favourite application. Kettles of boiling turpentine were kept in readineſs in the cockpit during a battle at ſea, and in hoſpitals, where great operations were to be performed. The chief potential cautery, however, was blue vitriol, which was applied in the following manner. The vitriol was pounded, but not very finely, and it was wrapped up in a piece of rag. This was what was called a *button of vitriol*, which, when the bleeding had been checked by a tourniquet, was carefully placed on the mouth of the wounded artery. The cauſtic made an eſchar, juſt as the actual cautery did, and may be regarded as having a ſimilar mode of operation.

"We are to judge of theſe cauteries, boiling oils, vitriols, corroſive ſublimate, and other cauſtics, not by the horrors of the operation, nor the tranſitory pain of the moment, but by future conſequences; for the patient was continually expoſed to hermorrhagy. The eſchars might looſen too early, and of this accident, and of the ſudden hemorrhagy which followed, thouſands died; while few eſcaped a dangerous loſs of blood, and repeated cauterizing for many ſucceſſive dreſſings. In wounds the bones and tendons were expoſed, the muſcles waſted, and the arteries themſelves ſloughed, to a great extent, bleeding as long as the patient's blood retained any colour. And in amputations, the fleſh was waſted, the bone projected, and the ſtump was pyramidal and could not be cloſed." Principles of Surgery, vol. i. p. 152.

After theſe obſervations it becomes ſuperfluous to enjoin ſurgeons not to revive the uſe of the potential cautery for the ſtoppage of hermorrhages. It is not to be truſted to for this purpoſe, and its application is inevitably attended with the production of a great deal of miſchief. Cauſtics, if poſſible, are even worſe than the actual cautery; for their action is more tedious, leſs effectual, and leſs under the controul of the ſurgeon. The vitriol is diſſolved in the wound, and the irritating mixture then flows about and does incalculable injury to all the neighbouring parts without diſtinction.

Styptics and Aſtringents.—Styptics are ſubſtances, which have the property of producing a contraction of the veſſels; and, as ſome ſuppoſe, coagulation of the blood. Such are cold air, cold water, wine, brandy, ſpirits in general, diluted mineral acids, ſolutions of alum, blue vitriol, &c. Theſe ſubſtances do, indeed, poſſeſs the power of ſtopping ſome hemorrhages from ſmall veſſels, in which caſes, however, they are generally unneceſſary. In bleedings from large arteries, no prudent ſurgeon puts the leaſt reliance upon them.

The method of applying ſtyptic lotions is to dip ſome lint in them, and lay it upon the bleeding ſurface. Compreſſion is generally employed at the ſame time.

That cold air has a ſtyptic property, we have the moſt unequivocal proofs. We frequently tie on the ſurface of a wound every artery that betrays the leaſt diſpoſition to bleed, as long as the wound continues expoſed to the air. We bring the oppoſite ſides of this wound into contact, and put the patient to bed. Not an hour elapſes, before the renewal of hemorrhage neceſſitates us to remove the dreſſing. The wound is again expoſed to the air, and again the bleeding ceaſes. We have often ſeen this happen in the ſcrotum after the removal of the teſtis. The proper conduct, in ſuch caſes, is not to open the wound unneceſſarily, but to apply wet linen to the part, ſo as to produce ſuch evaporation from its ſurface, as ſhall create a ſufficient degree of cold to ſtop the bleeding. Firſt Lines of Surgery, chap. 13.

The chief ſtyptics, ſays Mr. John Bell, have been acids, ſolutions of vitriol, turpentine, and various ſolutions of aſtringent gums in ſpirit of wine. Theſe were invented by the regular phyſicians, and had their ſucceſſes in ſlighter hemorrhages; and the hope was always indulged of finding out ſome aſtringent ſufficiently powerful to ſuppreſs even the bleeding from an amputated limb. This eaſy and credulous temper of mind in men of our profeſſion has left the public very much expoſed to the practices of quacks. We know, by long experience, and many diſappointments, the inſignificancy of thoſe drugs which have been produced from the vegetable, or mineral kingdom, to ſerve as ſtyptics; we know them to be of little uſe farther than to check any ſlight bleeding of the noſe or gums. We no more expect any acid, ſpirituous, or ſaline body, to act as a ſtyptic, without cauſing pain, than we expect Digby's ſympathetic powder to act at the diſtance of many leagues. The chief ſecrets of empirics have been the neglected inventions of old phyſicians. We have never heard of any ſtyptic which has not proved in the end to be a ſolution of vitriol, or a ſpirituous ſolution of ſome aſtringent gum! What can be expected from the random inventions of ignorant people, whoſe ſole trade is that of cheating the public, and whoſe only ſkill is that of contriving and managing the deceit? From the time of Rewbell, to the celebrated Ruſpini, we have found diſappointment following quick after each fit of expectation; and though many, attracted by the proſpect of public rewards, have impoſed for a little while; though their ſtyptics have for a day borne an ineſtimable value; yet the charm has always vaniſhed with the ſecret! Such ſtyptics have no ſooner been bought by the king and parliament, and publicly prepared; they have no ſooner been dignified with the high ſounding titles of royal ſtyptics, "Aqua Styptica Regalis," &c. &c. than they have been rejected and deſpiſed!

Rewbell's ſtyptic was publicly tried after an amputation in the Hoſpital of Invalids at Paris: the inventor himſelf made the application; but the poor patient bled to death under his hands!

Mr. John Bell informs us, that he has ſeen the lateſt of theſe inventions, Ruſpini's ſtyptic, tried in this place, (Edinburgh) where, he believes, it is eſteemed of much the ſame value as the ſympathetic powder of that famous knight and moſt complete gentleman, ſir Kenelm Digby, which ſympathetic powder ſtopped the blood as effectually, when it was applied to the weapon, as when it was applied to the wound itſelf! Principles of Surgery, vol. i. p. 152—154.

The ſuppoſition that there are any ſtyptics which have the quality of promoting the coagulation of the blood, is utterly void of foundation.

The application of ſtyptics to recent wounds cannot be too ſeverely reprobated. If the cut arteries are ſmall, they will leave off bleeding as ſoon as the wound is cloſed, and the dreſſings applied. If they are of a larger ſize, like thoſe of the fingers, the hemorrhage will generally ceaſe when the dreſſings have been put on, and a little preſſure is adopted. If the wounded veſſels are of a ſize ſtill more conſiderable, they muſt be tied; and we ourſelves have ſeen ſeveral lives nearly loſt by the ſurgeon raſhly perſiſting in the uſe of ſtyptic applications, in wounds of the radial artery, inſtead of having recourſe to a ligature at once, the application of which, after all, could not be avoided.

All ſtyptic and aſtringent applications are productive of great irritation upon the ſurfaces of wounds, ſo as to excite inflammation and ſuppuration, and entirely prevent union by the firſt intention. This deſirable mode of healing a wound, indeed, is quite out of the queſtion, when ſtyptics are uſed; becauſe its lips cannot be brought into contact in conſequence of the intervention of the ſtimulating applications between them.

Upon the whole, we may ſtate, as a general remark, that, in bleedings from ſmall veſſels, ſtyptics are totally unneceſſary; and that, in hemorrhages from large ones, they are ineffectual. In caſes of recent wounds, we think their employment injudicious, and repugnant to the true principles of ſurgery.

However, we will not altogether condemn their uſe in a few inſtances. In ſome bleedings from the noſe and gums, they are certainly convenient, and cannot do any harm. Hemorrhages, from particular ulcers, alſo admit of being checked by them, without any ill conſequences. We know that the ſurgeon occaſionally meets with bleedings from diſeaſed ſurfaces, where ſtyptics prove highly ſerviceable, on account of the veſſels having loſt their natural diſpoſition to contract. In theſe examples, we think, no ſurgeons can object to a trial of ſtyptics. At the ſame time, it is proper to caution the inexperienced, that, what has been termed an hemorrhagic diſpoſition in wounds and ulcers is frequently entirely kept up by the irritating nature of the dreſſings.

Agaric and Sponge.—About the middle of the foregoing century, agaric, a fungus which grows upon old oak trees, acquired conſiderable fame for its extraordinary virtues in ſuppreſſing bleeding, not only from ſmall arteries, but from the large veſſels, which are divided in amputations. It was a French ſurgeon, named Broſſard, who brought it into general notice. He ſtopped bleedings from animals with it, and in La Charité publicly ſucceeded in effectually putting a ſtop to the hemorrhage after two amputations by M. Faget. The agaric for ſurgical uſe was gathered in the autumn, after a long continuance of very hot weather; and it was prepared by long keeping in a dry place, by cutting away the outſide rind, and beating it till it ſoftens, ſo as to admit of being torn with the fingers. It was cut into ſmall pieces, which, after the tourniquet had been tightened, were fixed upon the mouths of the bleeding arteries, ſupported by compreſſes, and bound firmly down in the wound with a fillet, which was carried up along the limb.

It is noticed by Mr. John Bell, that though the uſe of agaric in hemorrhages had actually been mentioned by Felix Wurtzius a hundred and fifty years before, yet M. Broſſard was liberally rewarded by his moſt Chriſtian majeſty. Pieces of prepared agaric were ſent from the French academy to our Royal Society, by whom they were committed to Mr. Warner for the purpoſe of trial. Warner made various experiments with agaric, which were generally ſucceſsful. He concludes, however, with obſerving, that agaric is ſtill more uſeful in old and ulcerating wounds, and in ſtumps, where the rottenneſs of the fleſh prevents the needle being uſed, than in amputations, or recent wounds. This diſcovery was thought to be perfect. M. Faget, in his enthuſiaſm, believed, that the needle was to be ſuperſeded by agaric. The diſcovery was alſo in this country a ſubject of great exultation. The virtues of agaric were equally extolled in the French Memoirs, and in our Philoſophical Tranſactions. It was reckoned to be not merely a ſponge, but an aſtringent, having very ſingular properties in making the veſſels contract; and one ſocietarian, ſuſpecting that it might be equally uſeful in internal hemorrhages, *boiled it*, like the German peaſant, who, in place of carrying the doctor's preſcriptions to a laboratory, rolled it up and ſwallowed it. Principles of Surgery, vol. i. p. 156.

After all the boaſting about the wonderful effects of agaric, ſober ſenſe has at laſt returned, and, at preſent, we hear nothing of it. In fact, like every other medicine which is brought into renown by a falſe character, it has ſunk into contempt, ſo much ſo, that there is not a ſurgeon who would not laugh at any one, who ſhould profeſs any confidence in it. Agaric does not poſſeſs the ſpecific property of ſtopping hemorrhage; and whatever good effects it may ſeem to have had, are more properly aſcribable to the compreſſion always made uſe of at the ſame time. If it has any real virtue, this is a mechanical one, ariſing from its ſoft ſpongy texture, which qualifies it for filling up all inequalities in the wound, and thus cloſing the veſſels. When we conſider, that agaric is intended to be applied to the mouth of the bleeding veſſel; and that, in this plan, the oppoſite ſurfaces of the wound cannot be brought into contact, we ſhall feel inclined to ſelect ſome other means, not quite ſo repugnant to the union of the wound. Compreſſion is often tried, becauſe the veſſel cannot be tied without difficulty, or, at leaſt, without having recourſe to an operation for the purpoſe of getting at it. But the employment of agaric is warranted by no ſuch reaſon; for its ſuppoſed ſpecific virtues require its application to be made directly to the divided artery. Agaric has alſo the inconvenience of acting as an extraneous ſubſtance in the wound, and, like compreſſes, it is liable to ſlip off the preciſe ſituation which it ought to occupy.

When the wounded veſſel is large, always prefer the ligature to agaric; when ſmaller veſſels bleed, compreſſion is much better than this vainly extolled ſubſtance. Firſt Lines of Surgery, chap. 13.

We need not ſay much concerning the uſe of common ſponge in the ſuppreſſion of hemorrhage. When uſed, in the way of agaric, it is liable to the ſame objections as this latter application. Sponge, however, is in a certain degree uſeful in checking particular hemorrhage; and this quality ariſes from its expanding nature when expoſed to any moiſture. Thus, when it is introduced into any deep narrow wound, which bleeds, it ſoon undergoes a conſiderable enlargement after it has imbibed the blood, ſo that it cloſely fills up the ſtab, and entirely prevents a further loſs of this ſalutary fluid. It does this in ſome inſtances; for, we would not have the reader to imagine, that the introduction of a piece of ſponge into a punctured wound, attended with hemorrhage, is always the proper practice. When the artery is of large ſize, the method will almoſt conſtantly fail, and, if the ligature is not uſed, the bleeding will return, or an aneuriſm be the conſequence. The introduction of ſponge is eminently uſeful in caſes of hemorrhage from within the rectum after the removal of piles. A piece of ſufficient ſize to diſtend the bleeding part of the inteſtine ought to be introduced to the proper place, and, on expanding, an effectual preſſure will be made upon the mouth of the bleeding veſſel. See Hemorrhoids.

Compreſſion.—This is executed by applying a bandage and compreſſes, in ſuch a manner that they mechanically ſtop the effuſion of blood. Formerly ſurgeons uſed to fill the cavities of wounds with charpie, and then make preſſure on the bleeding veſſels, by applying a tight roller over the part. The moderns underſtand too well the utility of not allowing any extraneous ſubſtance to intervene between the oppoſite ſurfaces of a recent wound, to perſiſt in the above plan, except in a few inſtances. They know that the ſides of the wound may be brought into contact, and that compreſſion may yet be adopted, ſo as both to reſtrain particular hemorrhages, and rather promote than retard the union of the wound. When the blood does not iſſue from any particular veſſels, but from numerous ſmall ones, compreſſion is preferable to the ligature. The employment of the latter would render it neceſſary to tie the whole ſurface of the wound. In order to make effectual compreſſion in this caſe, the wound is to have its oppoſite ſurfaces brought into contact; compreſſes are then to be placed over the wound, and a roller is to be applied as tightly as can be done without hazard of ſtopping the circulation in the part.

If compreſſion can ever be ſafely practiſed in bleedings from large arteries, it is when theſe veſſels run in the vicinity of a bone, againſt which they can be advantageouſly compreſſed. Bleedings from the radial and temporal arteries are of this kind. Compreſſion is ſometimes tried when the brachial artery has been wounded in phlebotomy. Here it is occaſionally tried in preference to the ligature, becauſe the latter cannot be employed without an operation to expoſe the artery. It is abſurd to adopt compreſſion, in this inſtance, with an idea that it effects a cloſure of the wound in the veſſel without obliterating its pervious ſtate; and conſequently that there is leſs chance of mortification from a deficiency of blood in the limb. Frequent diſſections have evinced, that whenever a large artery has been wounded and healed by preſſure, the wound is never cloſed ſo as to leave the canal of the artery pervious.

When an artery of magnitude has received a ſmall wound, the following plan may be tried.

A tourniquet is to be applied ſo as to command the flow of blood into the veſſel. The edges of the external wound are next to be brought into contact. Then a compreſs, ſhaped like a blunt cone, and which is beſt formed by a ſeries of compreſſes, gradually increaſing in ſize, is to be placed with its apex exactly on the ſituation of the wound in the artery. This graduated compreſs, as it is termed, is then to be bound on the part with a roller.

Some ſurgeons alſo apply a longitudinal compreſs over the track of the veſſel above the wound; they do ſo with a view of weakening the current of blood into the veſſel. Whatever good effect it may have in this way, is more than counterbalanced by the difficulty which it muſt create to the circulation in the arm. If the graduated compreſs be properly arranged, an effuſion of blood cannot poſſibly happen; and the application of preſſure along the courſe of the artery muſt, at beſt, be deemed ſuperfluous.

After relaxing the tourniquet, if no blood eſcape from the artery, the ſurgeon ſhould feel the pulſe at the wriſt, in order to aſcertain that the compreſſion employed is not ſo powerful as to prevent the circulation entirely. The arm is to be kept perfectly quiet in a ſling; and in 48 hours, if no bleeding take place, there will be great reaſon to expect that the caſe will do well.

Compreſſion of large arteries is never commendable, except in ſuch a caſe as has been juſt mentioned, or when the wounded veſſel is capable of being firmly compreſſed againſt an adjoining bone. The compreſſes ſometimes ſlip off, or the bandages become ſlack, ſo as to give room for fatal hemorrhage. When this plan is employed, the tourniquet ſhould therefore always remain ſlackly on the limb, and ready to be inſtantaneouſly tightened. In this kind of treatment the external wound may heal, while the aperture in the artery remains uncloſed, and an aneuriſm is the conſequence. This particularly occurs when the preſſure is not ſufficiently powerful. When it is too great, mortification of the limb is liable to happen. Such are the objections to putting entire reliance upon compreſſion. Firſt Lines of the Practice of Surgery, chap. 13.

Tourniquet.—This famous inſtrument for ſtopping bleeding conſiſts of nothing more than a band, which is faſtened round the limb with a buckle, and tightened by means of a ſcrew. To the band is attached a ſmall pad, which is to be laid exactly over the courſe of the artery. Although Ambroſe Paré is ſaid not to have been ignorant of the advantage of making preſſure on the large arteries of a limb in the performance of amputations, yet this knowledge does not appear to have led him to the invention of any inſtrument calculated to execute that object. Morel is reputed to have been the firſt inventor of a tourniquet, about the year 1674. His inſtrument, however, was not the perfect kind of one now in uſe; it remained for Petit to deviſe a tourniquet upon the ſimple yet perfect plan which we at preſent meet with in practice. We ſhall not here dwell on the conſtruction of the inſtrument, as this ſubject will more properly belong to another place. (See TOURNIQUET.) Our preſent deſign is merely to ſay a few words concerning its uſes.

The invention of the tourniquet will ever be regarded by ſurgeons as one of the moſt important improvements in their profeſſion, and when we recollect how many lives it has undoubtedly been the means of ſaving, the event muſt appear highly intereſting to mankind in general. Before ſurgical practitioners were acquainted with the uſe of the tourniquet, thouſands of their patients muſt have bled to death under their hands, in conſequence of their not having any means by which they could at once put a temporary ſtop to the bleeding, until they had had time to take ſuch meaſures as would have a permanent effect in its ſuppreſſion. In this ſtate the art of ſurgery muſt have been truly defective. No great operation could be undertaken upon the limbs without ſeriouſly endangering the patient's life from loſs of blood; while the want of that kind of ſuccour, which the tourniquet affords, muſt have made a great many wounds fatal, which otherwiſe would not have been attended with the leaſt danger. With a tourniquet of the modern conſtruction, ſurgeons are eaſily able to reſtrain in a moment the effuſion of blood, when any large artery of the limbs is wounded. As the inſtrument encircles the whole member, it compreſſes the branches of the artery as well as the trunk. It has alſo this immenſe advantage over every other contrivance, that, when it is well put on, a ſingle turn, or even a half turn of the ſcrew, will anſwer either for letting the blood guſh out in a full ſtream, or for preventing it altogether from iſſuing out at all.

The tourniquet is uſually put upon a limb in the following manner. A ſmall linen compreſs is firſt placed exactly over the courſe of the artery, on which it is intended to make the preſſure of the pad of the inſtrument operate. The ſurgeon then takes the tourniquet, and, laying its pad preciſely over the little compreſs, which, as we have juſt ſtated, ſhould be placed accurately over the artery, he faſtens the band round the limb with the buckle. The requiſite degree of preſſure is then to be made by turning the ſcrew, ſo as to tighten the band. In this manner it muſt be obvious, circular preſſure is made upon the member; but yet that preſſure will be the greateſt where the compreſs and pad are ſituated, that is, upon the ſpot beneath which the trunk of the artery lies.

Although the tourniquet is always ranked among the principal means of ſtopping hemorrhage, and its claim to praiſe is very high, its operation is only of temporary duration, it being common to apply it merely until ſome permanent plan of checking the hemorrhage is put into practice. Thus, in amputations, it is put round the limb, in order that the patient may not loſe too much blood in the operation; and no ſooner is this completed than the modern ſurgeon always immediately proceeds to ſecure the bleeding veſſels with the ligature. The tourniquet is then quite looſened, and often taken away entirely, it having executed its office. We do not wiſh this opportunity to paſs without expreſſing our diſapprobation of the common plan of taking the tourniquet off the limb, after amputations of the thigh, and the operation of popliteal aneuriſms. We have heard of ſome inſtances in which patients have been deſtroyed or pitifully reduced by ſudden hemorrhage, which could not be ſtopped with proper expedition by reaſon of the tourniquet having been taken away. This inſtrument, after ſuch operations, ſhould always be left in a ſlack ſtate upon the limb, ready to be tightened in a moment, by any nurſe or attendant in caſe of neceſſity.

The tourniquet, beſides being only of temporary utility, is limited in its application, by being only adapted to the limbs.

The ordinary tourniquet, as we have deſcribed, makes preſſure upon every part of the circumference of the limb, compreſſing the branches as well as the trunks of the veſſels. As it does this, and alſo preſſes upon both arteries and veins, it is plain that ſuch an interruption muſt in this manner be created to the circulation of the blood in the limb, that, were the application of the inſtrument to be continued beyond a certain time, a mortification muſt be the inevitable conſequence. It is for this reaſon that ſurgeons only uſe it as a temporary means. We have to mention, however, that tourniquets have been deviſed which are intended for making preſſure upon only one point of the limb, that is to ſay, upon the ſituation of the artery. With theſe inſtruments the practitioner could prevent the blood from flowing into an aneuriſmal ſac as long as he pleaſed, or rather as long as the patient's feelings would allow him. A tourniquet of this ſort has been invented by Plenk, intended for healing by preſſure the wound of the brachial artery accidentally made in bleeding.

Highly as we, with moſt other ſurgical writers, have ſpoken of the tourniquet, it would not become us to conceal the fact, that objections have been made to its common employment in amputations, and that ſuch objections come from ſuch ſurgeons as Monro, Louis, and Deſault. It is obſerved, in the Encyclopedié Methodique, partie chirurgicale, art. Hemorrhagie, that, how uſeful ſoever the tourniquet may be, ſurgeons have learned to do without it, and, for ſome years paſt, practitioners of the firſt eminence have almoſt laid it aſide. Inſtead of it, they make an aſſiſtant preſs a pad againſt the artery with his hands, by which means, it is ſtated, the hemorrhage may be ſufficiently commanded in almoſt every inſtance. In amputations at the ſhoulder-joint, the influx of blood into the arm may eaſily be prevented, by making preſſure upon the ſubclavian artery as it paſſes over the firſt rib, with a compreſs or ſimply with the fingers. This, ſays the French writer, can be more conveniently done thus, than with a tourniquet. He adds, that wherever a tourniquet will command the flow of blood, an intelligent aſſiſtant, accuſtomed to the buſineſs, will ſtop the bleeding equally well with his hands; except perhaps in a few examples, where the artery is very deeply ſituated, as is the caſe with the femoral and popliteal arteries in fat ſubjects. The ſame author alſo quotes a caſe, recorded in the thirteenth volume of the Edinburgh Medical Commentaries, where, in an amputation of the thigh, the bone was ſawn through immediately below the little trochanter, and the artery was merely preſſed upon with the fingers.

This method, which was recommended many years ſince by the celebrated Monro, has been followed by various practitioners, and, in particular, by that diſtinguiſhed ſurgeon Deſault, who ſeldom uſed the tourniquet in his practice. The plan is repreſented as being more convenient to the operator, and leſs fatiguing to the patient. Diminiſhing the number of inſtruments in the operation, is alſo held forth as a reaſon for the method. M. Louis was rather an advocate for it, ſince he found, that in his mode of amputating, it was advantageous not to hinder the looſe muſcles from retracting as much as poſſible, as ſoon as they were cut through, by having any tight band applied round them at the time.

Notwithſtanding theſe objections and reaſons, we find all the beſt ſurgeons commonly uſing the tourniquet in amputations, and, as we think, with perfect propriety and prudence in the generality of caſes. In amputations at the ſhoulder, indeed, the tourniquet is awkward, and hardly admits of being applied; ſo that, in this caſe, it is common to make preſſure upon the ſubclavian artery, with a compreſs held down with ſome ſuch inſtrument as the handle of a key. We think, that in other amputations, with the exception of a few, ſo high up the thigh that the tourniquet cannot very well be uſed, without being in the operator's way, the employment of this inſtrument is highly prudent. It is true, the aſſiſtant can effectually ſtop the current of blood through the main artery; but, does he prevent the hemorrhage from the branches, which, by reaſon of the anaſtomoſes, bleed as profuſely as the trunk itſelf? How many patients, brought to the ſad dilemma of parting with a limb, for the ſake of having a chance of living, are incapable of bearing much loſs of blood? When the femoral artery is compreſſed by an aſſiſtant, what is to hinder that alarming and profuſe hemorrhage, which muſt ariſe from the branches of the arteria profunda, as well as from thoſe veſſels, which inoſculate freely with the large arteries, which emerge from the pelvis? Our ſentiments are entirely in favour of the common mode of proceeding.

Of the Ligature.—The plan of tying the mouth of a bleeding artery with a ligature ſeems, at firſt view, ſo exceedingly ſimple and obvious, and at the ſame time ſo likely to be effectual, that we ſhould be ſurpriſed at the delay attending its introduction into practice, were we not convinced, that it is the inſeparable fate of the medical profeſſion always to be retarded by the influence of baſe, intereſted, mercenary characters, by an obſtinate adherence to old errors, and the worſe effect of blind and obdurate prejudice. The ancients, undoubtedly, cannot be ſaid to have been totally unacquainted with the method of tying arteries, as ſome paſſages in the article ANEURISM, of this work will clearly prove. But they certainly did not derive much advantage from whatever knowledge they had upon the ſubject, ſince it did not prevent them from placing confidence in a multitude of inſignificant and pernicious drugs, which they were in the habit of commonly employing for the ſtoppage of bleedings. Neither did it urge them to relinquiſh the cuſtom of ſearing the fleſh with hot irons for the ſame object. Even in the time of Ambroſe Paré, who, in conſequence of the general oblivion, into which the ligature had fallen, is reputed to be its inventor, the greateſt oppoſition was made to its being uſed, and ſuch reſiſtance, (be it alſo remarked to their ſhame,) was made by men at the head of their profeſſion, and by the whole college of phyſicians in Paris, one of the moſt enlightened cities in the world. This unwillingneſs to uſe the ligature proceeded from the jealouſy and literary pride of the phyſicians of thoſe times. Delighted with the abſurd learning, which they cultivated and attached to their Greek, Roman, and Arabian maſters, they were worſhippers of the ancients, and of their doctrine of fire. They were intolerant and revengeful; they claimed to be the legitimate repreſentatives of the old ſchools; they would rather cauterize arteries with the ignorant and brutal Albucaſis, that Arabian farrier, than tie them with Paré, the firſt ſurgeon of Europe, their contemporary. See John Bell's Principles of Surgery, vol. i. p. 158.

Paré's vile opponents complained of its being "very forward, raſh, and preſumptuous, in a certain perſon, to venture upon condemning the cauterizing of bleeding veſſels, after cutting off a mortified limb, a method ſo highly and continually commended, and approved of by all the ancients; teaching in oppoſition to that, without any authority, without knowledge, without experience, without good ſenſe, ſome new method of his own, of tying arteries and veins."

As the ligature is now univerſally conſidered the beſt and moſt ſecure means of ſtopping every conſiderable hemorrhage, it is neceſſary to be rather particular in the account of it. We ſhall, therefore, now endeavour to explain ſome very intereſting facts upon the ſubject, which are related in Dr. Jones's excellent work.

This gentleman was informed by Dr. J. Thomſon, of Edinburgh, that in every inſtance in which a ligature is applied around an artery, without including the ſurrounding parts, the internal coat of the artery is torn through by it. Dr. Thomſon added, at the ſame time, with his uſual candour and liberality, that the fact had been firſt noticed by Monſieur Deſault. Dr. Thomſon alſo demonſtrated to Dr. Jones, on a portion of artery taken from the human ſubject, that the internal and middle coats are divided by the ligature.

This information led Dr. Jones to undertake a ſeries of experiments on the arteries of dogs and horſes, with a view of obtaining a further confirmation of theſe circumſtances, and additional light, reſpecting the changes, which happen to an artery, in conſequence of the application of a ligature to it. From ſuch experiments it was aſcertained, that the firſt effects of the ligature upon an artery are a complete diviſion of its internal and middle coats, an oppoſition of its wounded ſurfaces, and an obſtruction to the circulation of the blood through its canal. There is a ſmall quantity of blood at reſt juſt within the extremity of the artery, it therefore coagulates; but it does not appear in every inſtance to form at once a coagulum, capable of filling up the canal of the artery. Indeed, Dr. Jones expreſſes a ſuſpicion, that the end of the artery may yet undergo ſuch a degree of contraction, as may prevent the formation of a complete coagulum. However, the production of a coagulum in this inſtance, "is, according to Dr. Jones, of little conſequence; for ſoon after the application of the ligature, the extremity of the artery begins to inflame; and the wounded internal ſurface of its canal, being kept in cloſe contact by the ligature, adheres and converts this portion of the artery into an impervious, and at firſt ſlightly conical ſac. It ſeems to be entirely owing to the effuſion of lymph, by which this adheſion is affected, that the coagulum of blood, formed within the artery, is ſometimes found adhering by a ſmall part of its baſe to the extremity of the artery. But whilſt the adheſion of the internal parietes of the artery is accompliſhed, a conſiderable quantity of lymph is effuſed between its coats, and among the parts ſurrounding its extremity; ſo that in a very ſhort time, the extremity of the artery is enveloped in lymph, and covered with a layer of it, juſt as we have ſeen the punctured artery to be. After a ſhort time, the ligature occaſions ulceration of the part around which it is immediately applied; and acting as a tent, a ſmall aperture is formed in the layer of lymph effuſed over the artery; through this aperture a ſmall quantity of pus is diſcharged as long as the ligature remains; and finally, the ligature itſelf alſo eſcapes, and the little cavity, which it has occaſioned, granulates and fills up, and the external wound heals in the uſual manner; leaving a conſiderable thickening and induration of the cellular membrane, extending a little beyond the extremity of the artery." Jones on Hemorrhage, p. 162.

It is further to be obſerved, that when a collateral branch is very near the place where the ligature is applied, no coagulum is formed. The permanent changes alſo, which take place in an artery, and in the circulation through the limb, in conſequence of the ligature, are the ſame as thoſe which happen in conſequence of the diviſion of an artery. The portion of the arterial trunk which has been tied is gradually annihilated to the firſt collateral branches, while all the collateral branches begin to aſſume a larger ſize from the very moment the trunk is tied. Jones, p. 163.

The deſign of applying a ligature to an artery is to produce an immediate ſuſpenſion of the hemorrhage, and an adheſion of the internal and middle coats of the artery. The accompliſhment of the latter object affords the only laſting ſafety againſt a recurrence of the bleeding. Union, by the firſt intention, can in general only be obtained in clean and ſimple inciſed wounds. For this reaſon, Dr. Jones recommends us to take the utmoſt care to uſe the ligature of the form, and to apply it in the manner moſt conducive to the formation of ſuch a wound. This able writer has publiſhed ſome inſtructive conſiderations reſpecting the manner in which the ligature, by its improper form or application, may give riſe to ſecondary hemorrhage. He points out the common and blameable indifference of ſurgeons about the ſize and form of their ligatures, and the force uſed in tying the artery. "Some ſurgeons (ſays Dr. Jones) wiſhing to guard againſt the ligature's ſlipping off, tie it with very conſiderable force, while others, apprehenſive leſt they ſhould cut through the artery, or occaſion too early a ſeparation of the ligature, draw it only ſufficiently tight to prevent the eſcape of any blood. Now it appears highly improbable that a broad flat ligature ſhould make ſuch a wound in the internal and middle coats of the artery, as is moſt favourable to adheſion; becauſe it is ſcarcely poſſible to tie it ſmoothly around the artery, which is very likely to be thrown into folds or to be puckered by it, and, conſequently, to have an irregular bruiſed wound, made in its middle and internal coats. And, even if it ſhould make a proper wound, yet by covering a conſiderable ſpace of the external ſurface of the artery, it may deſtroy the very veſſels which paſs on it in their way to the cut ſurfaces of the internal and middle coats, and thereby render them incapable of inflaming; nor does it appear that anaſtomoſing branches can ſupply this defect: for if the branches which immediately ſupply the cut ſurfaces are bruiſed and compreſſed by the ligature, how is the blood from anaſtomoſing branches to enter them? But, admitting that ſuch a ligature makes a proper wound, and that the wound unites, ſtill it may cover that part of the external coat which is directly over the newly united part, and, conſequently, as ſoon as it has occaſioned ulceration through the external coat, it will produce the ſame effect on the newly united parts, and of courſe ſecondary hemorrhage." Jones, p. 167—169.

When the form of the ligature is irregular, the internal and middle coats of the artery will probably be cut through more completely at ſome parts than others. But Dr. Jones's experiment proves, that, in order that ſuch an effuſion of lymph may happen as will produce adheſion, it is neceſſary that theſe coats be completely divided all round the artery. Hence he infers, that ſecondary hemorrhage will take place as ſoon as the ligature has ulcerated through any part of the parietes of the artery, and that it will be more copious and frequent as the ulceration advances.

If ſuch a ligature, or perhaps any ligature, is too ſlackly applied, for fear of cutting through the artery, or of a too ſpeedy ſeparation, the ſame thing will happen.

Dr. Jones, with much reaſon, ſhews the impropriety of applying a ligature round an artery, in ſuch a manner, that it is higher on one ſide than the other. When this is the caſe, the cut edges can neither be ſo juſtly placed, nor ſo firmly kept in oppoſition as they ought to be; they will therefore be more eaſily torn aſunder; and the ulceration produced by the ligature will be much more likely to affect the recently united parts, and produce hemorrhage. Jones, p. 171.

This judicious writer adviſes the employment of ligatures which are round and very firm. Theſe ſhould be tied with rather more than ſufficient tightneſs to cut through the internal and middle coats of the artery. By this means, the cut ſurfaces will be more certainly kept in contact; the coming away of the ligature will be expedited, and the riſk of the ulceration extending to the newly cicatrized part therefore leſſened. As the internal coats ſoon become adherent, there is no danger of the ligature making its way by ulceration through the external coat before that event is completed. See Jones, p. 172.

Since the arteries are themſelves furniſhed with arteries from thoſe which ſurround them, and ſince they can only be in a ſound ſtate, while they continue to receive a due ſupply of blood through the vaſa vaſorum, it muſt be evident, that, tying an artery in a place where it is completely detached from all its ſurrounding natural connections, muſt be particularly unfavourable. Such portion of the artery is not in a fit ſtate for inflaming and throwing out the neceſſary quantity of coagulating lymph, by which adheſion and the permanent cloſure of the veſſel are to be completed. Should it receive a partial ſupply of blood, in conſequence of its connections not being totally deſtroyed, it will not be in a condition to bear inflammation, but will be likely to fall into a ſtate of ſloughing or ulceration, in ſuch a degree, that ſecondary hemorrhage muſt enſue.

Hence, in compliance with the advice given by Mr. Abernethy in ſpeaking of aneuriſm, the beſt Engliſh ſurgeons always make it a rule in practice to tie every large artery, as near as poſſible to the part of it which lies undiſturbed among its natural connections.

However, practitioners ought to be particularly careful not to include any of the ſurrounding fleſh in the ligature, as this method, beſides being productive of ſevere agony, great ſloughing of the ſurface of the wound, &c. tends to hinder that moſt deſirable effect of the ligature, the diviſion of the internal and middle coats of the artery.

Of courſe, when the veſſel is under a certain ſize, the ſurgeon cannot avoid tying a ſmall portion of fleſh together with it; but ſtill ſuch portion ought to be as little as poſſible, in order that the patient may not be put to unneceſſary pain, and that as much of the wound may heal by adheſion as circumſtances will allow.

When the mouth of a cut artery is wide and very viſible upon the ſurface of a wound, it is beſt to take hold of it with a pair of ſpring forceps, (ſee *Plate* II. *fig.* 11.) and tie it as nearly as poſſible to the part where it begins to be ſurrounded with fleſh. However, nothing except the artery ſhould be included in the ligature, neither nerve nor muſcle. When the artery is of ſmaller ſize and leſs diſtinct, it cannot be ſo conveniently taken up with the forceps, and ſurgeons, for the purpoſe of tying it, uſually raiſe it, together with a ſmall portion of the fleſh, by means of the tenaculum. (See *Plate* II. *fig.* 9.)

Surgeons ſhould make it a maxim never to employ more ligatures than are eſſentially neceſſary for the removal of all riſk of hemorrhage. Ligatures act as foreign bodies in wounds exciting irritation, preventing adheſion, and producing ſuppuration. In all recent wounds there are always many ſmall arteries, which bleed at firſt for a few minutes; but which then ſpontaneouſly ceaſe to pour forth any blood and give no farther trouble. Were a ſurgeon haſtily to tie every veſſel of this ſort, he would raſhly tie nearly the whole ſurface of the wound, the patient would be put to an unneceſſary degree of exceſſive pain, and the wound, inſtead of healing by the firſt intention, would ſlough and ſuppurate to a very great extent. In hemorrhages, from the ſmaller order of arteries, compreſſion ought rather to be truſted than the ligature uſed; becauſe compreſſion has a tendency, by keeping the oppoſite ſurfaces of the wound in contact, to promote adheſion, while the operation of the ligature, as an extraneous ſubſtance, is prejudicial in the manner already mentioned.

In conſequence of cicatrization being hindered by the continuance of ligatures in wounds, it is always advantageous to take them away, as ſoon as they are looſe enough for this purpoſe. The celerity with which ligatures become detached, is, generally ſpeaking, in proportion to the ſmall ſize of the tied veſſels, and the little quantity of additional ſubſtance included with them in the ligature. From ſmall arteries ligatures are often detached in three or four days; with ſuch arteries as the radial and ulnar, the proceſs frequently takes up a week; while, with veſſels equal in ſize to the femoral, inguinal, and axillary arteries, the ligature generally remains firmly attached ten days or a fortnight. When it continues longer than uſual, the ſurgeon ſhould draw it very gently, at each time of applying the dreſſings, ſo as to accelerate the ulceration of the external coat of the artery, by which means the ſeparation is effected. However, as Dr. Jones has explained, great caution is requiſite in endeavouring to expedite this event. "We ſhould always remember, (ſays he), that ſo long as the attachment of the ligature appears to have any degree of firmneſs, any force exerted on it, (as, for inſtance, by pulling it rather ſtrongly,) muſt act more or leſs on the recently cicatrized extremity of the artery, which is not only contiguous to it, but is ſtill in union with that portion of the artery which detains the ligature; for it is the external coat of the artery which hinders the ſeparation of the ligature, partly in conſequence of its undergoing ulcerations ſlowly, and partly becauſe the ulceration which takes place in the firſt portion of the artery, by rendering the ligature looſe, diminiſhes very much its power of promoting ulceration through the reſt of the artery." Jones, p. 162.

Ligatures, in conſequence of being applied in an improper and careleſs manner, have ſometimes ſlipped off the end of the artery, and dangerous and fatal hemorrhages been the conſequence. Some ſurgeons have endeavoured to avert all blame from themſelves by imputing the accident to the violent impetus of the blood. Dr. Jones more accurately refers it to the clumſineſs of the ligature, which prevents its lying compactly and ſecurely round the artery; or to its not having been applied tight enough, leſt it ſhould cut through the coats of the artery too ſoon; or, finally, to its having that very inſecure hold of the artery, which the deviation from the circular application muſt neceſſarily occaſion. The impetus of the blood is immediately diminiſhed by this fluid being determined into the collateral branches, as ſoon as the ligature is applied. Neither is there any pulſation for ſome way above the tied extremity of the veſſel. The artery alſo, after its firſt retraction, undergoes only an inconſiderable and gradual change of this kind. Jones, p. 173.

The ſubject, juſt now noticed, is one deſerving of ſome attention. Mr. Aſtley Cooper met with ſome inſtances in which the ligatures ſlipped ſuddenly off the end of the artery, in the operation for popliteal aneuriſm. This circumſtance led him to adopt a plan, which is deſcribed by Dionis, and conſiſts in paſſing the end of the ligature through the part of the artery below where the knot has been made, and then tying the two ends of the ligature together in an additional knot. Now, ſince this mechanical method of hindering the ligature from ſlipping is not needed, when the artery is tied upon the principles related by Dr. Jones, and ſince allowing a ſecond knot to lie in the wound, upon the end of the artery, muſt increaſe irritation, and augment the riſk of the ulceration deſtroying ſome of the recent adheſion of the internal and middle coats of the artery, we cannot refrain from expreſſing our averſion to the practice.

Ligatures always have a bad effect, in relation to the proceſs by which the wound is healed, ſo that they ſhould never be large nor more numerous than is abſolutely uſeful. Large, clumſy ligatures muſt be the leaſt calculated for cutting through the internal and middle coats of the artery, a thing which is ſo eſſential and deſirable.

Surgeons, after tying the bleeding arteries, in caſes of wounds, always cut off one end of each ligature, the other being ſufficient for the purpoſe of withdrawing it when looſe. In this way the quantity of extraneous ſubſtance is materially leſſened.

Every one who knows any thing at all about ſurgery, muſt have heard a great deal of the plan of ſtopping hemorrhage with the needle and ligature, which are paſſed through the fleſh on each ſide of the mouth of the bleeding artery, after which a knot is made and the needle cut off. We were ſorry to find Mr. John Bell ſo laviſh of praiſe upon the needle. When an artery is ſo expoſed that its mouth can be taken up with the forceps, or tenaculum, the ligature ſhould be put and tied round the end of the artery with the fingers. There is no occaſion whatever for piercing the patient's fleſh with the needle; nor can the practice of including the fleſh in this way in the ligature be at all juſtifiable upon any rational or really uſeful principle. We will not ſay, however, that there can never be a caſe, in which it is neceſſary to uſe a needle and ligature for the ſuppreſſion of hemorrhage. When it is deſirable to introduce a ligature cloſely under an artery, which has not been completely cut acroſs, and which has been ſufficiently brought into view, we agree that a needle may ſometimes be of advantage. But, even in ſuch inſtances, the ſharp points of the common needles are ſomewhat dangerous; ſo that the moſt prudent ſurgeons uſually employ an eye-probe, or an aneuriſm-needle for the purpoſe. The moſt approved aneuriſm-needle is repreſented in *Plate* II. *fig.* 10. All random thruſts into the fleſh with the needle and ligature, for the object of ſtopping an hemorrhage, muſt ever meet with the diſapprobation of a well-informed ſurgeon. The injury and pain, which are invariably occaſioned by ſuch practice, are quite unwarrantable; and the miſchief which may be done is of the moſt formidable and fatal deſcription. When a wounded artery is not ſufficiently expoſed to be tied, let the ſurgeon expoſe it by careful diſſection; but never venture to puſh a needle into the parts at random, with a view of getting the artery into the nooſe with the reſt of the fleſh.

With regard to the occurrence of ſecondary hemorrhage, in caſes of aneuriſm, Dr. Jones imputes the accident, when the operation has been performed by tying the artery once without dividing it, either to a diſeaſed ſtate of the artery; to contrivances for compreſſing a large portion of the veſſel; to placing a looſe ligature above that which is tied; or to tying the artery in too ſlack a manner, from a fear of producing too ſpeedy an ulceration of the veſſel. In conſequence of this laſt circumſtance, the ligature is not applied with ſufficient tightneſs to cut through the internal and middle coats ſo as to fit them for adheſion; but, on the contrary, occaſions a gradual ulceration through the coats of the artery, and, of courſe, hemorrhage, which returns with greater violence as the ulceration advances. The improper form and thickneſs of the ligature may alſo tend to the ſame bad conſequences. See Jones, p. 176.

The greater likelihood of ſecondary hemorrhage, when only one ligature is uſed in the operation for aneuriſm, inſtead of applying two and dividing the artery between them, is explained by Dr. Jones on the ſame principles as thoſe which were ſome years ago pointed out by Mr. Abernethy, in his obſervations on aneuriſm. When two ligatures are applied, and the artery cut through, "the artery is tied cloſe to the part at which its connection with the ſurrounding cellular membrane is complete." In the other mode, "a conſiderable portion of the artery is detached from the ſurrounding cellular membrane, and the ligature applied, perhaps, in the centre of this detached portion; or, even if it be applied at the upper end, ſtill there remains a conſiderable portion of detached artery below it; now, when we conſider that the arteries receive their veſſels from the ſurrounding cellular membrane, it muſt be evident, that if we deprive it of theſe veſſels, it cannot undergo thoſe changes which depend upon vaſcularity, *viz.* inflammation and adheſion; and, conſequently, the ligature cannot produce thoſe effects on which the ſucceſs of the operation depends; but the portion of artery dying, and burſting or ſloughing, hemorrhage takes place if the ligature be applied on the centre of the detached portion of the artery, when the artery gives way, the hemorrhage will proceed both from the upper and lower portions; but if it be applied on the veſſel at its connection with the ſurrounding cellular membrane, either above or below, the hemorrhage will then proceed from only one part of the artery, which will be that which has the detached portion of the artery for its extremity." Jones, p. 177.

There is another cauſe of ſecondary hemorrhage mentioned by this gentleman; it is the ſudden ſeparation, or laceration of the recently united parts of an artery by premature and extraordinary exertions of the patient. See p. 181.

Dr. Jones, in the courſe of his very intereſting experiments, aſcertained, that if a ligature be tied round an undivided artery, with ſufficient tightneſs to cut through its internal and middle coats, an obliteration of the canal of ſuch veſſel follows, though the ligature be untied and taken away, immediately after its application. This is a highly important fact in relation to the operation for aneuriſms, and ſeems likely to lead to a new practice. For if the continuance of a ligature in a wound is productive of irritation, and preventive of union by the firſt intention; if, alſo, ſecondary hemorrhage is ſometimes a conſequence of the ill form and bad application of the ligature: we have no heſitation in thinking, that the ſimple plan of juſt tying an artery with a thin round ligature, to cut through its internal and middle coat, and then taking it altogether away, promiſes to lead to conſiderable improvement. One of the chief objects to be attended to in ſuch an operation, would be to detach the artery no more from the ſurrounding parts, than is juſt ſufficient for the paſſage of the ligature under it.

In amputations, the nutrient artery of the bone ſometimes bleeds rather profuſely, and, in conſequence of its ſituation in a bony canal, cannot be tied. In this circumſtance, if the operator directs an aſſiſtant to preſs a little bit of lint on the bleeding aperture, during the time employed in ſecuring the reſt of the veſſels, the hemorrhage will in general have ceaſed, before it is time to cloſe the wound. Should it not have done ſo, the ſurgeon may immediately ſtop it by juſt introducing a ſmall plug of lint into the orifice, from which the blood proceeds.

Sympathetic inflammatory fever is the conſequence of all conſiderable wounds, whether theſe be occaſioned by accidents, or operations. By ſuch febrile diſturbance, the action of the whole arterial ſyſtem is rendered more vehement. Hence during its predominance, the patient is particularly expoſed to the danger of freſh hemorrhage. The bleeding occaſioned by the impetuous motion of the blood, ariſes either from veſſels, which previouſly effuſed little or no blood, or from ſuch as did bleed before, but were not effectually ſecured.

In this caſe, if the patient be very plethoric, the performance of veneſection may be proper, the loſs of venous blood being leſs hurtful to the conſtitution, than that of arterial. The flow of blood into the wounded limb is always to be decreaſed by placing the part (if poſſible) in an elevated poſture. Sometimes cold applications; in other inſtances, compreſſion may be tried. A tourniquet, ſo made and applied, that it would neither ſtop the circulation in too great a degree, nor hinder the return of blood through the veins, might be of much utility. When, however, notwithſtanding other means, the bleeding yet continues, the veſſels muſt be expoſed, and tied with a ligature. John Bell's Principles. Jones on the Proceſs employed by Nature in ſuppreſſing the Hemorrhage from divided and punctured Arteries, the Uſe of the Ligature, on ſecondary Hemorrhage, &c. 1805. Cooper's Practice of Surgery, chap. 13. edit. 2.

Hemorrhage, *Uterine*, is a profuſe diſcharge of blood from the uterus. See Flooding.

HEMORRHOIDALIS, in *Anatomy*, (from hæmorrhois, which is derived from αιμα, *blood*, and ῥοος, *flux*,) a name applied to ſome parts belonging to the inferior portion of the large inteſtine, ſuch as its arteries and veins. The internal hemorrhoidal artery is a branch of the inferior meſenteric; the external hemorrhoidal arteries come from the pudendal: the hemorrhoidal veins join the inferior meſenteric. See Artery and Vein.

HEMORRHOIDS, or Piles, denote varicoſe ſwellings originating about the anus, or termination of the rectum, and formed by a morbid dilatation and thickening of the veins, which belong to this inteſtine.

Hemorrhoids vary in number, ſize, ſhape, and ſituation; ſome are *external*, and others *internal*. In general they only occaſion a degree of inconvenience, which is very bearable; but, ſometimes, they give riſe to ſerious grievances, either by burſting and pouring out ſuch quantities of blood as reduce the patient to the loweſt ſtate of debility, and dangerouſly impair his health; or by exciting inflammation around them, and cauſing abſceſſes and fiſtulæ; or by becoming conſtricted by the ſphincter ani muſcle, ſo as to produce exceedingly acute pain; or, laſtly, by aſſuming a malignant character.

When theſe tumours are not in the habit of bleeding every now and then, they are denominated, by ſyſtematic writers, *blind* piles; when they occaſionally emit blood, they have the epithet of *open* applied to them.

It is a doctrine advanced by many reſpectable writers on ſurgery, that hemorrhoids, which are not very troubleſome, and diſcharge only moderate quantities of blood, are rather ſalutary, than hurtful to the conſtitution, and require no particular treatment. Sabatier obſerves, that there are ſome piles of ſmall ſize, which every now and then bleed; that ſuch periodical diſcharges afford great relief to the patient; and that the evacuations are almoſt as neceſſary to him as the menſes are with regard to the female ſex. He ſtates, that when the uſual bleeding is ſuppreſſed, the patient finds himſelf indiſpoſed, being troubled with laſſitude, heavineſs about the head, flatulence, lowneſs of ſpirits, &c. Of courſe, practitioners, who can bring their minds to believe, that the continuance of any diſcharge, not ordained by nature, is beneficial to the patient, will naturally think of taking ſome means to reproduce it when it is ſtopped. Some, in caſe the bleeding from piles is ſuppreſſed, direct leeches to be applied. M. J. L. Petit, however, acknowledges, that he never ſaw any benefit reſult from this plan, either becauſe the quantity of blood, thus taken away, is too inconſiderable, or becauſe it is not taken from the overdiſtended veſſels. On the contrary, it is urged againſt the method, that ſome inſtances of very profuſe hemorrhages have been the conſequence of it, the parts having returned within the rectum, and it not having been in the practitioner's power to make any effectual application to them.

M. J. L. Petit preferred puncturing one of the largeſt and moſt external of the tumours with a lancet, for which purpoſe, he uſed to make his patient ſit over the ſteam of ſome hot water till the hemorrhoids were ſufficiently ſwollen.

With reſpect to applying leeches to piles, its ſafety is now fully eſtabliſhed by the practice of every day; for, in this country, we may ſay, they are invariably employed for the relief of inflamed hemorrhoids, though never with the abſurd notion of taking away blood for the cure, or prevention, of complaints, fancied to proceed from the ſuppreſſion of the bleeding, from theſe tumours. Beſides, were an evacuation of blood neceſſary for the health of the conſtitution, veneſection in the arm would be a much more rational plan, as giving the practitioner an opportunity of taking away an effectual quantity from the circulation. Entertaining, as we do, a total diſbelief of the doctrine, that the bleeding from piles is ever really ſerviceable to the ſyſtem, we ſhall never attempt to re-produce a diſcharge of blood from them, when ſuch is ſuppreſſed; but, at the ſame time, ſince a perſon with piles may alſo have complaints, which require bleeding, we perceive no reaſon why, in ſuch caſes, any change ſhould be made in the common mode of taking away blood, or that veneſection in the arm ſhould be abandoned for the employment of leeches, or the lancet, in another part. We know, that it is approved as a general maxim, to take away blood as near as poſſible to the ſeat of a diſeaſe; and to this method we alſo give our decided approbation. It is for this reaſon, that we often preſcribe the application of leeches to the anus, in caſes of inflamed protruded hemorrhoids. But as we do not credit, that the ſtoppage of bleeding from piles is likely ever to prove a cauſe of any diſeaſes, but rather of an improvement of the health, we are far from being anxious to ſee the hemorrhage renewed in any form whatever. But ſuppoſing ſome illneſs were actually to be the effect of a ſuppreſſion of bleeding from the tumours, ſuch illneſs could only be imputed to a conſtitutional plethora, induced by the uſual evacuation of blood not taking place. Here the redundant and hurtful quantity of the circulating fluid might be much more conveniently and certainly drawn from the arm, in the common way, than by applying leeches to the tumours, or puncturing them with a lancet. The blood, in this circumſtance, is not taken away for the relief of the piles, but of ſome other affection, and, conſequently, the principle of bleeding, as near as poſſible to the ſeat of the diſeaſe, is not at all obſerved, as ſome may ſuppoſe it is, in drawing blood from the ſwellings themſelves.

Hemorrhoids, ſituated high up the rectum, are in general not ſo apt to be painful as when the ſwellings occupy a lower ſituation, where they are liable to be compreſſed by the ſphincter ani muſcle. Piles, which are far up the inteſtine, are ſurrounded by ſoft ſubſtances, and are not in danger of ſuffering any conſtriction, ſo that it often happens the patient has no ſuſpicion of the diſeaſe till he is alarmed by ſome great and ſudden bleeding from the anus.

However much piles may put on the appearance of being ſolid excreſcences, they are only dilatations of the hemorrhoidal veins, or mere varices. The diſtended parts of the veſſels are indeed thickened and indurated, while ſome of the adjacent cellular ſubſtance is harder than is natural. It is from theſe circumſtances that the ſwellings often ſeem more like firm fleſhy ſubſtances than hollow varices, likely to burſt and bleed in a troubleſome and dangerous manner. Piles are brought on by the ſame ſort of cauſes, which give riſe to varicoſe tumours in other parts of the body. Whatever tends to obſtruct and retard the return of the blood through the hemorrhoidal veins is apt to bring on the diſeaſe; a ſedentary inert life is often productive of the complaint; inactivity and neglect of proper exerciſe, by being attended with a languid circulation in the venous ſyſtem, are common cauſes. It is for theſe reaſons that women are particularly often afflicted with piles. The frequency of the complaint in the female ſex is alſo greatly increaſed by the preſſure which the uterus makes on the trunks of the hemorrhoidal veins in the advanced ſtage of pregnancy. Inactivity frequently leads to coſtiveneſs, in which caſe the large inteſtines are apt to remain diſtended for days and days together with hard maſſes of excrement, which muſt have conſiderable effect in obſtructing the flow of blood through the ſurrounding veins, and conſequently in producing the diſeaſe. This may be another reaſon of the frequency of piles in women, and all perſons of ſedentary lives, or of a coſtive habit of body. We believe, alſo, that exceſs in drinking tends very much to the production of the complaint, probably by firſt occaſioning a coſtive ſtate of the bowels. The preſſure of an enlarged liver, or of the water, in caſes of dropſy, is repreſented by ſurgical writers as an occaſional cauſe of hemorrhoids. When piles originate from the preſſure made by the gravid uterus upon the hemorrhoidal veins, it is in vain to look for a cure before parturition; and after this has happened the interference of a ſurgeon is in general not required, as then a ſpontaneous cure uſually enſues. Nor can hemorrhoids be cured, when they ariſe from the preſſure of the water of aſcites, until the fluid is either got rid of by proper medicines, or by tapping the abdomen.

Perſons afflicted with piles ſhould, above all things, avoid coſtiveneſs. Gently laxative medicines, and an horizontal poſition of the body, generally diminiſh the uneaſineſs attendant on the diſeaſe; at the ſame time, a ſalve, made of elder ointment and the powder of oak-galls, in equal parts, may be applied to the tumours, together with linen wet with the lotio aquæ lithargyri acetati. This latter is more particularly neceſſary when the caſe is accompanied with conſiderable pain and inflammation, in which circumſtance leeches are highly proper. Theſe may be uſed without riſk of bringing on any dangerous degree of bleeding, as manifold experience has convinced us; and we cannot help conſidering the profuſe hemorrhage, which Petit mentions having ſeen follow their employment, as altogether uncommon, and undeſerving of ſerious apprehenſion. Some ſurgeons puncture hemorrhoidal ſwellings with a lancet, and the bleeding which is thus excited is generally followed by a ſubſidence of the pain attending certain ſtates of the diſeaſe. When piles are in a painful inflamed ſtate, it is a good plan, in ſome inſtances, to apply warm water to them by means of a bidet, or ſemicupium, conſiderable eaſe being frequently obtained in this manner. When the pain and inflammatory ſtate of piles is owing to their being conſtricted by the ſphincter ani muſcle, it is evident that the mode of relief conſiſts in puſhing the tumours with the finger a little within the rectum, where they are not liable to ſuffer from preſſure.

When the number and ſize of hemorrhoids are ſo conſiderable as materially to obſtruct the paſſage of the feces; when they are very painful, and ſubject to profuſe bleedings; when the patient is incapacitated by them from following his uſual occupations; and when palliative means are ineffectual, it is the duty of the ſurgeon to recommend the removal of the tumours.

We ſhall not detain the reader with deſcribing how former ſurgeons uſed to deſtroy piles with the actual and potential cautery, plans which now only excite horror, and ſerve to make us conſcious of the ſuperiority of modern over ancient ſurgery. Theſe barbarous methods have been very properly adandoned, the only means of extirpation now employed being the knife or ſciſſors, and the ligature, with which the ſwellings are either at once cut off, or tied ſo as to fall into a ſtate of mortification.

The common method of removing piles with a knife or pair of ſciſſors, has nothing peculiar in it, the tumours being ſimply cut through at their baſes. With reſpect to ſciſſors, we have to obſerve, that though they are not apt to do any material harm in the preſent caſe, yet it is better not to employ them, but always accuſtom ourſelves to that more truly ſurgical inſtrument the knife. If we uſe ſciſſors in one inſtance, where a little contuſion is not of much conſequence, we ſhall perhaps contract a habit of uſing them on other occaſions, where incalculable miſchief may be the effect of the inciſion not being cleanly performed. Some ſurgical writers, among whom is Sabatier, adviſe us to ſave the ſkin covering the hemorrhoids. We are recommended to raiſe it with a pair of diſſecting forceps, and then ſeparate it from the tumours with a knife, without cutting it away. The piles are next to be removed. The preſervation of the ſkin is repreſented as being of great conſequence; for any bleeding which may occur may now be more eaſily ſtopped; and when there are ſeveral hemorrhoids to be extirpated, the loſs of ſubſtance about the anus will be leſs, and of courſe the patient will not be ſo liable to a contraction of this part, which has ſometimes proved a laſting grievance through life.

Some hemorrhoids are only viſible juſt after the patient has been at ſtool. We need ſcarcely remark, that in ſuch caſes the practitioner is obliged to take this opportunity of performing the operation.

Reſpecting the extirpation of piles with a knife, and their deſtruction with a ligature, Mr. Ware obſerves, that theſe operations, though leſs dreadful than thoſe which have been relinquiſhed, are ſtill formidable in no ſmall degree. The former, if the tumours are large, makes a round of conſiderable extent, and riſks a hemorrhage, which has ſometimes been very difficult to ſuppreſs. The latter brings on a ſevere pain, which has continued many days, before the portions that are included within the ligatures have ſeparated and come away.

Before a recourſe is had to either of theſe operations, Mr. Ware thinks that it may be of uſe to recollect, that though the number of hemorrhoidal tumours protruded through the anus is often conſiderable, yet the pain which the patient ſuffers is not produced equally by all of theſe. If an accurate enquiry be made, he believes it will be found that the patient will point to one, or at moſt to two of the tumours, from which all the pain proceeds. When theſe are examined it will be diſcovered that they are much harder, and more inflamed than the reſt; and that, generally, they are alſo ſmaller and leſs prominent, protruding but juſt low enough to be compreſſed by the ſphincter ani muſcle.

Suppoſing this account to be accurate, it follows that the operation of cutting off the whole number of hemorrhoids with a knife or ſciſſors, and that of tying a ligature around them, in order to cauſe them to die and fall off, are both equally unneceſſary. Inſtead of having recourſe to theſe proceedings, we ſhould, according to Mr. Ware, only direct our attention to the hard inflamed tumour which is the cauſe of the pain, and which is not unfrequently ſituated in the centre of the reſt. This is often no larger than the end of the little finger, and the removal of it almoſt inſtantly abates the pain, and in a ſhort time cauſes the reſt of the tumours to collapſe and diſappear. The mode in which this gentleman has performed the operation, in a great variety of caſes, is ſimply this: Having ſecured the little hard tumour, which is often ſituated near the centre of the reſt, and much darker coloured than they are, with a common diſſecting hook, or forceps, he ſnips it off, as cloſe to its baſis as poſſible, with a ſharp pair of curved ſciſſors. The pain which the operation occaſions is repreſented as really trifling; and the hemorrhage which follows is ſo ſlight, that he has rarely found any neceſſity to do any thing to ſtop it. In caſes in which the pain has not been violent, but a conſtant diſtreſſing uneaſineſs has been felt, with frequent returns of a profuſe hemorrhage, which ſometimes weakens the patient in an extreme degree, an operation ſimilar to what has juſt been deſcribed, will, ſays Mr. Ware, not unfrequently be ſufficient, in an eaſy manner, to effect a radical cure of the diſorder. In caſes of this deſcription, as well as in thoſe before mentioned, a careful inquiry will often diſcover that one, or at moſt two, of the hemorrhoids are alone productive of theſe effects, and alone require removal, the excitement and protruſion of the reſt being merely the effect of the irritability which theſe occaſion. See Ware on the Treatment of Hemorrhoids.

Without pretending to pronounce any deciſion reſpecting the efficacy of Mr. Ware's plan, we are inclined to entertain a favourable opinion of it, becauſe it is undoubtedly leſs ſevere than the common method of removing all the tumours, and even in caſe of failure no harm is done, as the reſt of the troubleſome ſwellings may now be extirpated. The patient, in this circumſtance, firſt has the chance of being cured by a mild operation; ſuppoſing he does not obtain the deſired degree of relief, the removal of the reſt of the ſwellings will in all probability procure it for him; and the pain of the two operations will not be greater than what would have been ſuffered, had all the tumours been cut away at once. However, with our averſion to the employment of ſciſſors for dividing parts of the human body, we cannot refrain from again repeating our advice to uſe a ſcalpel.

With regard to tying hemorrhoids, it is eligible when theſe ſwellings are ſituated high up the rectum, where the danger of bleeding is ſomewhat alarming; but, as the common means of deſtroying piles, we give it our decided reprobation. It is always a tedious plan, ſeveral days often paſſing before the tumours drop off; it is alſo leſs cleanly, and attended with much more pain, than what is occaſioned by the knife. Petit was led to give up the mode of curing hemorrhoids with a ligature on account of a very ſerious circumſtance; after its application, in one or two inſtances, ſuch ſymptoms, as are brought on by a ſtrangulated hernia, took place, with dangerous and fatal conſequences.

Hemorrhoids are frequently the cauſe of a prolapſus ani, which is excited by the irritation of thoſe ſwellings, and uſually diſappears on the original diſeaſe being removed.

Whenever the bleeding, after the removal of any hemorrhoidal tumour, is troubleſome, profuſe, or dangerous, the ſurgeon muſt diſtend the rectum with a piece of ſponge of ſuch ſize as will make the requiſite degree of preſſure upon the opening of the bleeding veſſel. Some ſurgeons would alſo dip the ſponge in ſome ſtyptic lotion, though, perhaps, the beſt way would be to introduce that ſubſtance quite dry into the inteſtine, and let it expand there with the blood which would be imbibed by it. With this plan, it is right, at the ſame time, to apply linen wet with cold water to the nates. Every practitioner ſhould know how to proceed in this ſort of caſe, as the hemorrhage has been known to prove fatal, the rectum and whole of the colon being found filled and diſtended with blood on inſpecting the body after death.

HEMP, in *Botany*. See Cannabis.

Hemp, in *Agriculture,* a well known fibrous-rooted plant of the herbaceous ſort, which riſes to a conſiderable height with a thick ſtrong ſtem, eſpecially where the ground is favourable to its growth. It affords a rind or coat, the texture of which is firm and ſtrong, being held in high eſtimation in the manufacture of the more coarſe ſorts of cloth, ropes, and different deſcriptions of cordage, as well as a number of other articles.

There is a great variety of other plants, both of our own growth and that of other countries, which yield a ſtrong fibrous covering, but none, that have yet been diſcovered, which are in any degree equal to this in the forming of the ſeveral articles that have been juſt noticed. It is, of courſe, a matter of much regret, that the growth of a plant of ſuch utility and importance ſhould not be more attended to in this country, where there is ſo much land well ſuited to its cultivation.

Soil.—The nature of the ſoil moſt adapted to the raiſing of hemp crops, is chiefly that of the more deep black putrid vegetable texture, which has a ſomewhat low ſituation, with ſome degree of inclination to moiſture. But they ſucceed tolerably on the deep mellow, loamy, and ſandy deſcriptions. The great difference is, that on the former ſort there is generally a more abundant produce; but which ſome ſuppoſe of a leſs valuable quality. They are alſo capable of being grown on ſoils of an inferior quality, where proper care and attention are beſtowed in their culture.

In entering upon the cultivation of this ſort of crop, it is neceſſary for the farmer to have regard to ſeveral different matters; ſuch, for inſtance, as the convenience of markets for the diſpoſal of the produce; the capability of providing ſufficient ſupplies of ſuitable manure; the diminution it will cauſe in the extent of neceſſary green crops for the uſe of live ſtock; and its being of a nature to contribute little to the increaſe of the dung-heap; as well as to the great trouble and attention which it requires in being prepared for the market, &c.

Preparation.—It is neceſſary, in preparing land for this kind of crop, that it ſhould be brought into a fine mellow condition, and be perfectly freed from all ſorts of weeds, by the frequent operation of the plough and harrow. Theſe are uſually accompliſhed where it is put in after grain crops, by having recourſe to three ploughings and an equal number of harrowings; the firſt being performed as ſoon as poſſible after the preceding crop is removed, the ſecond as early as it can be done in the ſpring; and the laſt, immediately before the ſeed is ſown. Some, however, give four ploughings, and as many operations of the harrow; or two ploughings, with a ſufficient number of ſcufflings, having the ſurface ultimately harrowed down quite fine, and left in broad flat ridges.

It is uſual in the ploughing, immediately before the ſeed is put in, to apply well rotted farm-yard dung in the quantity of twenty-one-horſe cart loads, or good rich compoſt in the proportion of thirty-three, as without ſuch dreſſings good crops can ſeldom be procured.

In the growth of this kind of crop in Scotland, they manure the land well with the beſt dung; and after the ſeed is put in, top-dreſs with aſhes, and the dung of ſheep, pigeons, &c.

Seed.—It is of much importance, in the culture of this ſort of crop, to have ſuch ſeed as is perfectly freſh and good, which is beſt aſcertained by its weight and the brightneſs of its colour.

The quantity of ſeed muſt neceſſarily vary under different circumſtances; but from two to three buſhels are the quantities moſt uſually employed. Too much ſeed ſhould, however, never be given, as much injury is conſtantly done where the plants are too cloſe and thick upon the ground. Where the ſowing is executed in the drill manner, a much ſmaller quantity of ſeed may be ſufficient.

Sowing.—This is, in the greateſt number of caſes, performed in the broadcaſt manner, being diſperſed over the ſurface of the prepared ground as evenly as poſſible, and then covered in by means of light harrowing.

Where drilling is had recourſe to, which is ſuppoſed to have the advantange of more completely promoting the early growth of the plants, eſpecially where ſeed is the object, the rows ſhould be formed as near together as the ſhares of the machine will admit.

The proper time of ſowing this kind of crop, is when the danger of the ſpring froſts is over, as when put into the ſoil too early, it may be greatly injured by them, and when kept out to a late period, it may be much damaged in that way. The beſt ſeaſon on the drier ſorts of land is, without doubt, as ſoon as poſſible after the froſts in the month of April, while in thoſe of a more moiſt quality, it is the moſt ſafe way to delay it to a later period, always chooſing a medium ſtate of dryneſs in the mould of the ſoil for the execution of the buſineſs. The ſeed ſhould, however, never be kept out of the ſoil a moment when the ſeaſon is ſuitable, as various advantages attend the early ſowing of this crop, ſuch as the ſuperior vigour of its early growth, and its withſtanding the different after operations practiſed upon it in a better and more effectual manner. It is, however, to be remembered, that the plant is of a rather tender nature.

This is a kind of crop that is capable of being grown after moſt other ſorts, and even on land broken up from the ſtate of ſward, in a perfect manner by the uſe of the ſkim-coulter plough. And it has been grown on the ſame ſpot of ground for a great number of years, without the intervention of any other ſort. In Suffolk this has been the caſe for ſeventy years in ſucceſſion, but with the almoſt conſtant uſe of manure to prevent the exhauſtion it would otherwiſe produce. And in other diſtricts the ſame is the caſe.

It is conſtantly neceſſary, when the ſeed of the hemp plant has been ſown, to uſe much caution in keeping the birds from the ground, as they otherwiſe devour a large proportion of it in a very ſhort time.

After-Culture—But little attention is neceſſary in the management of this crop after the ſeed has been depoſited in the ground, the tall growth and thick ſhade of the plants, from the nature of their foliage, ſoon covering the ſurface, ſo as to prevent the riſing of every ſort of field weed.

In caſes where the drill machine is employed in putting in crops of this nature, it is ſometimes the practice to give them a hoeing or two in their more early growth.

It is neceſſary to obſerve farther, that in the culture of this ſort of field-crop, there ſhould be a mixture of the male and female, or *femble* hemp plants, in order to the obtaining the moſt complete ſucceſs. The latter is the ſort that yields the ſeed, the former affording merely flowers.

Pulling.—When the crop is become perfectly ripe, which is known by its putting on a whitiſh yellow colour, and the ſtems beginning to ſhed their leaves, it is time to pull it; but the male ſort of hemp frequently becomes ripe ſome weeks before that of the female.

They are in general both leſs injured by being pulled at too early a period than too late, or when they are not too fully ripened. And at the time one part is pulled, it is neceſſary to be cautious that as little damage as poſſible be done to the other. When the land is in narrow ridges or in drills, there will be little danger of its being injured as the ſide-furrows or intervals will give ſufficient room to thoſe who are engaged in the work of pulling.

In ſome diſtricts both kinds of the hemp plants are pulled together, while in others they are ſeparated, and the laſt is ſuppoſed the beſt practice where it can be adopted, as by pulling a large portion of the crop before it is properly ripened, the amount of the produce muſt not only be conſiderably diminiſhed, but its quality be much impaired in reſpect to its durability.

The work of pulling is performed by forcing it up by the roots from the ground in ſmall portions at a time, by means of the hand, ſhaking off the mould well from them before the parcels are depoſited upon the ſurface. The buſineſs is commonly executed in a little more than three months from the time of putting in the crop. The expence of the work varies greatly in different ſituations and circumſtances. In ſome it formerly amounted to the large ſum of 18*s.* or 20*s.* the acre; while in others it is performed in an equally good manner for not more than 11 or 12*s.* But at preſent the expence of the labour ſtands conſiderably higher.

As ſoon as the labour of pulling is finiſhed, the hemp is tied up into ſmall bundles, or what are commonly denominated *baits*.

Seeding.—Where crops of this nature are deſigned for the purpoſe of affording ſeed, they muſt of neceſſity ſtand until the ſeed becomes perfectly ripened, which is readily ſhewn by the appearance of the plants. The ſtems are then pulled up and bound into rather large bundles; which are ſet up in nearly the ſame way as thoſe of green, until the ſeed becomes ſo firm and dry as to ſhed in a free manner: it is then either immediately threſhed out on large cloths for the purpoſe, ſpread out upon the field, or preſerved in ſmall ſtacks, to be afterwards performed at the farmer's convenience. In the buſineſs of pulling, much care is required to prevent the ſeed from being loſt. The ſeed of the hemp may be rendered much more fine, hard, and ſlippery by ſuffering it to ſtand out in the ſtooks in the field for ſome days when the weather is fine, and, in order to prevent any inconvenience in the watering of the ſtem parts, the ſeed-pods may be chopped off with a knife for the purpoſe, and be afterwards dried upon ſome ſort of cloth, being fully expoſed to the influence of the air in ſome ſort of ſhed or other ſimilar place. By this means the danger of injuring the hemp by threſhing out the ſeed, as well as by ſun-burning, rain, and the loſs of the colour, may in a great meaſure be avoided.

Preparation of the Hemp.—In rendering the rind or bark of the hemp-plant proper for the uſes of the manufacturer, it is neceſſary for it to undergo a variety of other proceſſes.

Retting.—This is performed in two different methods, either by means of the dew or the uſe of water. The former is denominatted *dew-retting*, the latter *water-retting*, which affords much the fineſt hemp. Both theſe proceſſes are ſaid to anſwer the moſt perfectly when the weather is inclined to be ſhowery while they are going on. In the dew-retting method, the hemp-ſtalks are, immediately after being pulled, ſpread out in a thin, even, and regular way, ſo as to keep exact rows on a fine piece of cloſe, old, ſward land, which is pretty even on the ſurface, for the ſpace of three, ſix, or even eight weeks, according to circumſtances, being turned as often as may be neceſſary in the time. In ſhowery ſeaſons, this is moſtly done three times in the week, while in other circumſtances, twice is in general as much as is requiſite.

As ſoon as the rind or barky portion of the hemp-plant becomes eaſily ſeparable from the firm part of the ſtem or bun, it is taken up from the ground, and tied up into rather large bundles, in order to be carried home and ſtacked up, or placed in ſome covered building till it is wanted for being formed into hemp.

This proceſs is denominated *graſſing*, and in its execution requires great nicety and attention, in order to prevent the texture of the hemp from being deteriorated by too long a continuance on the ſward, or by removing it at too early a period before the hempy ſubſtance has been rendered ſufficiently ſeparable.

In the water-retting method, which is much more common and ſpeedy, the hemp, after being wholly taken up, and bound into rather ſmall bundles, by means of bands at each end, is carried in general to a pond of ſtanding water; ſuch pits as have clayey bottoms being moſtly preferred, being there depoſited bundle upon bundle, in a direct and croſſing manner, ſo as to form what is generally called a *bed* of hemp. When it has been piled to ſuch a thickneſs as the depth of the water will admit, which ſome ſuppoſe can hardly be of too great a depth, though five or ſix feet are the moſt uſual depths, the whole maſs is loaded with large pieces of heavy wood, until it is completely immerſed. When it has remained in this ſtate for five or ſix days or more, according to the nature of the pond and the weather, it is taken out and conveyed to a piece of mown graſs, or other ſward-land, that is perfectly clean and free from all ſorts of animals. There the bundles are untied, and the hemp-ſtalks are ſpread out thin, ſtem by ſtem. While in this ſtate, eſpecially in moiſt weather, it muſt be carefully turned every ſecond day, to prevent being injured by the worm caſts. It is continued in this way for five or ſix weeks or more, when it is gathered up, tied in large bundles, and kept perfectly dry in a houſe or ſmall ſtack, till wanted for uſe.

In ſome of the northern parts of Scotland, where, after the hemp is pulled, and the leaves, ſeeds, and branches removed by means of a ripple, it is formed into bundles of twelve handfuls each, and ſteeped ſix days or more in the manner of flax. It is known when it has had ſufficient watering by the reed being readily capable of parting from the bark. But it is favourable that it ſhould rather have too much than too little time. The moſt ſlender hemp ſtands in need of the greateſt length of time in the water. Where the quantity of hemp is only ſmall, the hempy part may be ſeparated from the reed by hand labour; but where it is large, drying and breaking it in the manner of flax is the beſt method. See FLAX.

The hemp, after being taken out of the water, is not here ſpread out upon graſs-ground in the way of flax, but dried as quickly as poſſible, by ſetting it in an inclining poſition, againſt cords faſtened up for the purpoſe, or in any other way that will afford it the full benefit of the air, until it is completely dry, and riſes in bliſters from the boon. As ſoon as it has been reeded, it ſhould be cleared from the mucilaginous material which it contains, by pouring water upon it and repeatedly ſqueezing it, being careful not to let the fibres be entangled together, as by that means waſte is incurred.

Monſ. Brealle on the continent, has however ſuggeſted a very different method to any of theſe, for the purpoſe of ſteeping hemp, the advantages of which, it is aſſerted, have been fully proved by numerous trials. The proceſs conſiſts in heating water in a veſſel or vat to the temperature of from 72 to 75 degrees of Reaumur, diſſolving in it a quantity of green ſoap, in the proportion of 1 to 48 of the hemp. The body of water made uſe of in this intention, ſhould be about forty times the weight of the hemp. When this is prepared, the hemp ſhould be thrown into it, in a manner ſo as to float upon the ſurface, the veſſel being immediately covered, and the fire put out. The hemp ſhould continue in this ſtate for about two hours, when it will be found to be fully ſteeped.

The principal ſuperiority of this method is ſuppoſed to conſiſt, beſides a great ſaving of time and expence, in the ſame quantity of hemp affording more tow. The value of the fuel as well as the time employed in the proceſs, ſhould however be well conſidered in ſuch caſes. It is likewiſe believed to promote the cultivation of hemp crops, by the facility which it affords to its preparation, even in ſuch ſituations as are not contiguous to rivers, ſtreams, or ponds, as well as to obviate any ill conſequences that might poſſibly originate from the putrid effluvia of the atmoſphere, and the corruption of the waters induced by it, which laſt are well known to deſtroy the fiſh contained in them, as well as to prove hurtful to cattle that drink of them.

Where hemp is left for ſeed, and not water-retted, in conſequence of the great trouble and expence of the proceſs, though it is unqueſtionably the beſt way to always have it performed, it is commonly ſtacked up and well covered for the winter ſeaſon, in order that it may be thinly ſpread out about January or in the following month. Where this can be executed during the period of a ſnow, the hemp comes much more readily to a good colour, and forms ſtrong coarſe cloths, but is far inferior to that pulled in due ſeaſon, and which undergoes the water-retting operation as noticed above.

Various contrivances have been made, in the form of ponds and pits, for the ſteeping of hemp, but one which ſeems to poſſeſs much merit, is deſcribed in the Norfolk Report as the invention of Mr. Rainbeard, by which the hemp "is depoſited in the pit without the neceſſity of a ſingle perſon being wet. The pond is an old marle-pit with a regular ſlope from one ſide, (where the hemp is prepared,) to the depth of eight feet on the other ſide; on the ſlope above the water, the hemp is built into a ſquare ſtack, upon a frame of timber of ſuch a height, as will float and bear a man without wetting his feet; this is ſlid down upon the frame into the water, and when floating drawn away; a perſon on the oppoſite bank drawing the floating ſtack to the ſpot where it is to be ſunk, and on which it is built to the requiſite weight." The inventor "finds it does ſooneſt at bottom, and would not object to ſixteen feet of water. By means of this very uſeful contrivance he can put in a waggon load in an hour." The ſheaves are taken out one by one in the uſual manner; but it is ſuggeſted that ſome more expeditious and ſimple contrivance is here requiſite for effecting the purpoſe, either on the principle of the lever or ſome other.

In preparing hemp for the tool denominated the *heckle*, the work is chiefly executed by the *beetle*, and by firſt having recourſe to a coarſe, and then a finer brake. But the labour is capable of being more expeditiouſly performed by the rollers of a lint-mill. In either mode ſhaking the handfuls frequently with ſmartneſs is particularly neceſſary. In caſes where it happens that the hemp has not been ſufficiently watered, hand-peeling becomes neceſſary.

There is another method in uſe, which is that of the hemp-mill, much uſed by the Americans. It conſiſts ſimply of a large heavy ſtone in the form of a ſugar loaf, having the ſmall end cut off. Thus ſhaped, it readily moves round in a circle, when paſſing upon a plane. It is impelled by the power of a water-mill, when the hemp being depoſited upon the receiving floor, it becomes perfectly cruſhed and broken by the weight of the ſtone in its different revolutions.

The fluted rollers of the lint-mill are however without doubt the beſt means of performing the work, provided ſufficient care be taken to guard againſt accidents while it is going on.

As ſoon as the hemp has been completely broken, another operation becomes neceſſary, which is uſually denominated *ſwingling*, or ſcutching, the intention of which is to ſeparate the reed from the hemp.

This is executed chiefly in two different methods. The firſt is by the labourer taking a handful of hemp in his left hand, and while holding it over the ſharp edge of a board, ſtriking it with the fine edge of a long flat ſtraight piece of wood, uſually termed a ſwingle hand, or ſcutcher. This method is, however, both laborious and tedious in its performance; of courſe others have been had recourſe to, ſuch as mills moved by water, having a number of ſcutches fixed upon the ſame axle-tree, and which move with great velocity. The work is in this caſe executed with great expedition and far leſs fatigue to the workmen, but there is a great waſte of hemp, in conſequence of the prodigious velocity by which the mill is moved.

Before the hemp, prepared in this manner, is ſubjected to the heckle, it moſtly undergoes another proceſs which is termed *beetling*; by which the fibres of the hemp become more looſened and divided. The beetles employed in this intention are moved either by the power of the hand or that of water, which is by much the beſt.

Produce.—The quantity of produce in crops of this nature is extremely various according to the goodneſs of the land, and that of the cultivation which is beſtowed upon it. In ſome diſtricts, as that of Suffolk and ſome others, it is ſaid frequently to riſe to forty-five or fifty ſtones, and ſometimes more upon the acre; while in others, it often does not exceed twenty-five. It has been ſtated that the average crops of this kind, when prepared for the heckle, are from thirty-eight to forty ſtones of fourteen pounds each. And that the expence is commonly from about 7*s.* 6*d.* to 8*s.* or 9*s.* the ſtone, excluſive of the bounty allowed by government, which not unfrequently comes to 15 or 20*s.* more the acre. In the county of Norfolk the average crop is about 40 ſtones, and the price about 12*s.* the ſtone water-retted; and 9*s.* dew-retted. The uſual prices for ſeven years were 6*s.* dew-retted, and 8*s.* water-retted. In Scotland the produce and prices are nearly the ſame as in the above county.

In ſtanding for ſeed, the quantity is generally eleven or twelve buſhels the acre, and the prices commonly from 4*s.* to 6*s.* the buſhel.

However, though the expences of the cultivation of hemp crops are very conſiderable, on account of the ſoil, labour, and trouble which they require, the value which they afford in the produce, moſtly repays thoſe who engage in raiſing them in a pretty ample manner.

It has indeed been ſuggeſted by the writer of one of the Northern Reports, that this will prove a profitable crop to the farmer, who has greatly the advantage over the importer of foreign hemp, which, over and above freight and riſk, is liable to a heavy duty, as that of 2*l.* 4*s.* per cwt. when dreſſed, and 3*l.* for ſuch as is undreſſed. But the chief advantage of this ſort of crop is conceived to be that of its capability of being brought to many times the value of the original raw material.

It has been ſtated that the moſt beneficial time for the cultivator to diſpoſe of crops of this deſcription, is while they remain upon the land, juſt before the ſeaſon of pulling them, as in this way he wholly avoids the great trouble and uncertain expence of the ſeveral operations which are neceſſary in preparing them for the market, as well as the interruption which they are apt to throw in the way of other ſorts of work.

It cannot be doubted, from what has been ſtated above, but that hemp may be grown in many diſtricts of this country with great profit and advantage; and that the extenſion of its cultivation would be of vaſt national benefit. This cannot however be accompliſhed while the price of wheat keeps up to its preſent height, unleſs proper encouragement were given by means of bounties. But if this were the caſe, it would, in all probability, be much had recourſe to, as it is found to afford an excellent preparation for wheat crops. This would unqueſtionably take place, if ſuch encouragements were held out for any ſuitable length of time. In places where its cultivation is carried on to the greateſt extent, it has been confeſſedly found of much utility to the poor, in furniſhing them with full and conſtant employment. And in all ſituations where there is much neceſſity for ſail-cloth, cordage, netting, &c. its culture would be of vaſt benefit, if duly encouraged in preventing the money which is paid for theſe articles from going out of the country.

The neceſſity of attending more fully to the culture of hemp crops in this kingdom, is indeed rendered more imperious by the increaſing difficulty of obtaining foreign ſupplies, as well as by the inſufficiency of the various ſubſtitutes which have been adopted.

It does not appear that the ancients were acquainted with the uſe of hemp, in reſpect of the thread it affords. Pliny, who ſpeaks of the plant in his Natural Hiſtory, lib. xx. cap. 23, ſays not a word of this; contenting himſelf with extolling the virtues of its ſtem, leaves, and root. In effect, what ſome writers of the Roman antiquities remark, *viz.* that the hemp neceſſary for the uſe of war was all ſtored up in two cities of the weſtern empire; *viz.* at Ravenna and Vienne, under the direction of two procurators, called *procuratores linificii*, muſt be underſtood of linum, or flax.

HEMP, *Baſtard.* See AGERATUM, DATISCA, and GALEOPSIS.

HEMP *Agrimony.* See EUPATORIUM.

HEMP *Agrimony, Baſtard.* See AGERATUM.

HEMP *Agrimony, Naked-headed.* See VERBESINA.

HEMP *Agrimony, Water.* See BIDENS.

HEMP, *Virginia.* See ACNIDA.

HEMPFIELD, in *Geography*, the name of two townſhips of America, in Pennſylvania, one in Lancaſter county, and the other in that of Weſtmoreland.

HEMSKIRK, EGBERT, in *Biography*, a painter, who exhibited much frolic of fancy in the ſubjects he choſe for his pencil, and vigour of execution in the completion of his pictures. He was born at Haerlem in 1645, and was a diſciple of Peter Grebber, whoſe manner he left for that of Brouwer.

In his own time his compoſitions caught the attention of the public, and were much eſteemed becauſe of their humour, and the whimſical imagination that reigned in them; but they are not now ſo much prized. His delight was in painting fanciful, wild, and uncommon ſcenes of his own compoſing; ſuch as the nocturnal intercourſe of witches, devils, and ſpectres; enchantments, temptations of St. Anthony, interiors of ale-houſes with drunken men, monkies in the actions of men and women, &c. &c. all which he wrought with great freedom of touch and intelligence of drawing. His colour likewiſe, though not always pure, was, in general, rich and agreeable.

He quitted his own country to ſettle in London, where he died in 1704. It was cuſtomary with him to paint his own portrait in his drolls, and which was not of the moſt engaging kind; and he wrought by means of a looking glaſs his characters from his own face.

There were two other Hemſkirks painters, one Martin Hemſkirk, who painted ſerious hiſtorical pictures of no great merit, and Egbert Hemſkirk, called, by diſtinction, the Old, who painted ſubjects of the like kind with more ſucceſs.

HEMSON, in *Geography*, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 62° 43′. E. long. 17° 49′.

HEMSTERIUS, Tiberius, in *Biography*, was born at Groningen in the year 1685, where he received the early parts of his education, and from which place he removed to Leyden, for the purpoſe of ſtudying under the celebrated Perizonius. In 1705, he became profeſſor of mathematics at Amſterdam, an office which he reſigned in 1717, on being choſen Greek profeſſor at Franeker, to which, in 1738, was added the chair of hiſtory. In 1740 he quitted this place for ſimilar duties at Leyden, where he died in the year 1766. His firſt publication was an edition of the three laſt books of the Onomaſticon of Julius Pollux, which was publiſhed in 1706, when he was a very young man. On this occaſion he received a complimentary letter from Bentley, which, though at firſt it overwhelmed the youthful critic, and made him ſo ſenſible of his inferiority as to induce a reſolution never to appear again before the public, yet in a ſhort time he felt differently on the ſubject, and was anxious to emulate the powers of the man which he ſo greatly admired. His other publications were "Select Dialogues, and the Timon of Lucian." The "Plutus of Ariſtophanes with the Scholia and Notes." "Notes and Emendations on Xenophon Epheſius," inſerted in the Miſcellanea Critica of Amſterdam; "Obſervations on Chryſoſtom's Homily on the Epiſtle of Philemon," and many other pieces; particularly an edition of ſome parts of Lucian, in three volumes 4to. He was accounted an excellent critic, as well from the extent of his learning, as for his ſagacity in applying it. He was author of "Inaugural Speeches," and "Letters to Geſner and others."

HEMYNPOUR, in *Geography*, a town of Hindooſtan, in the circar of Gohud; 14 miles S.E. of Calpy.

HEN, in *Ornithology*, the female of the Phasianus *gallus*, which ſee. For the difference between the cock and hen, ſee Cock; and for the varieties of both, ſee Phasianus. In the choice of hens for domeſtic uſe, they ſhould be carefully ſelected, if we would have a genuine race; but if we want to vary and improve the ſpecies, the breed muſt be croſſed. To this purpoſe Columella expreſsly ſays, that the beſt poultry is produced by the union of a cock of a foreign family with the ordinary hens; and we find in Athenæus, that this idea was improved, a cock pheaſant being given to the common hens. In every caſe we ought to chuſe thoſe hens which have a lively eye, a flowing red comb, and no ſpurs. The proportions of their body are, in general, more ſlender than the males; yet their feathers are broader, and their legs ſhorter. Sagacious farmers, it is ſaid, prefer black hens, becauſe they are more prolific than the white, and more eaſily eſcape the piercing ſight of the birds of rapine, which hover near the farm-yard. Young hens lay moſt eggs; but old ones are the beſt ſetters. (See Fowl.) Hens need not the embrace of the cock to procure eggs; theſe are continually detached from the bunch in the ovarium, which grows independently of the union with the male. But theſe eggs, even when they acquire maturity, are mere organized bodies, ſuſceptible of a kind of life, but not a living animal ſimilar to the mother, and in its turn capable of continuing the race. This requires the union of the male, and intimate mixture of the ſeminal liquor of both ſexes; but when this has taken place, its effects are durable. Some hens lay eggs that have no ſhell; theſe never produce chickens; this happens, it is ſaid, to hens that are too fat. The oppoſite circumſtances occaſion the eggs to have too thick ſhells, or even double ſhells. (See Egg.) Hens lay through the whole year, except the time of moulting, which generally laſts ſix weeks or two months, about the end of autumn, or beginning of winter. The ordinary fecundity of hens is limited to the laying of an egg each day. There are ſome, we are told, in Samogitia, Malacca, and other places, that lay twice a-day. Ariſtotle mentions certain hens of Illyria, which laid ſo often as thrice a-day; and theſe were probably the ſame with the Adriatic hens, mentioned by him in another place, which were noted for their prolific quality. Some ſay that hens derive this prodigious fecundity from a peculiar mode of feeding; and, therefore, it is adviſed by ſome, in order to render hens productive in eggs, that they ſhould be well kept with ſome ſort of grain, or ſeeds, in which view, in addition to barley, buck-wheat and hemp-ſeed have been particularly recommended. The giving them a little animal food, and even fiſh, has alſo been ſuppoſed to make them lay at an early period. Heat is alſo very favourable; inſomuch that hens can be brought to lay in winter, by keeping them in a ſtable that has always warm dung on which they can ſit. (See Hatching and Incubation.) It is ſeldom that a hen clutches a brood of chickens more than once in a ſeaſon. The number of eggs laid in a year by the domeſtic hen are above 200; provided that ſhe be well fed and ſupplied with water. Her neſt, if left to herſelf, requires little previous preparation; and, warned by natural inſtinct, ſhe gives notice of the proper time for hatching by a low clucking note, and by ceaſing to lay. This clucking-ſeaſon is ſometimes artificially protracted, and ſometimes altogether ſet aſide by thoſe who derive greater profits from the eggs than from the chickens. Accordingly, the hen is ſtinted in her proviſions, and ſometimes, to the hazard of her life, plunged in cold water. If the hen be left to herſelf, ſhe would ſeldom lay more than 20 eggs in the ſame neſt, without attempting to hatch them; but if her eggs are removed, ſhe continues to lay, in order to increaſe their number. In the wild ſtate the hen ſeldom lays more than 15 eggs. When ſhe begins to ſit, her perſeverance and patience are very remarkable; ſhe continues for ſome days immoveable; and when hunger forces her away from the neſt, ſhe quickly returns. While ſhe ſits, ſhe carefully turns her eggs, and even removes them to different ſituations, till at length, in about three weeks, the young brood give ſigns of burſting their confinement. When they have broken with their bills a paſſage for themſelves through the ſhell, the hen continues to ſit till they are excluded. When all are produced, the ſtrongeſt taking the lead, and the weakeſt following, ſhe leads them forth to provide for themſelves, and in various ways ſeek the food that is neceſſary to ſupply their wants She recals them when they wander, ſpreads her wings over them to defend them againſt the inclemency of the weather, and broods a ſecond time. In theſe expreſſions of anxiety and attention, her own health is viſibly impaired, and ſhe may be diſtinguiſhed from every other hen by her ruffled feathers, and her trailing wings. The hoarſeneſs of her voice, and its different inflections, are all expreſſive of her ſituation, and of her maternal affection and ſolicitude. For their preſervation ſhe neglects herſelf, and expoſes her life to danger in their defence. Whatever the enemy be that aſſails them, ſhe warns them by her repeated cries, and boldly attacks the foe, whilſt her brood are driven into ſome place of ſecurity. The number of chickens which a good hen can rear and clutch at a time is about 10 or 12; but this bears a ſmall proportion to the number of eggs ſhe lays; and, therefore, recourſe has been had to artificial methods of hatching in aid of her own efforts. See HATCHING. See alſo CHICKENS, FOWL, and POULTRY.

HEN, *Guinea*. See NUMIDIA *Meleagris*.

HEN *and Chickens*, in *Geography*, a cluſter of ſmall iſlands in the South Pacific ocean, near the coaſt of New Zealand; one of them is high, and terminates in two peaks. S. lat. 35 53′. W. long 180° 1′.—Alſo, a group of ſmall iſlands in the Eaſt Indian ſea. S. lat. 5° 30′. E. long. 118° 3′.

HENAO, GARIEL DE, in *Biography*, was born in 1611. He entered, when he was about 15 years of age, into the order of the Jeſuits at Salamanca, and ſpent the greateſt part of his life in that univerſity. After he had been long in the habit of teaching philoſophy and ſcholaſtic theology, he was admitted to the degree of doctor of divinity, and appointed rector of the univerſity. He obtained a very high reputation by the ſolutions which he gave to perſons who came from all parts to conſult him in caſes of conſcience. He lived to the great age of ninety-three, and continued to perform the duties of profeſſor till within three years of that time. His works conſiſt of eleven folio volumes, all written in the Latin language. Nine of them are compoſed of treatiſes on philoſophical, theological, and controverſial ſubjects; the others are devoted to an account of the antiquities of Biſcay, and furniſh the reader with much curious and intereſting matter; they are entitled "Biſcaya Illuſtrata." He was author of many ſmaller pieces not inſerted in this collection. Moreri.

HENAULT, CHARLES JOHN-FRANCIS, the ſon of a farmer-general, was born at Paris in 1685, and acquired, at an early age, a taſte for elegant literature. In 1707 he obtained the prize of the French Academy by a poem, and in 1715 he produced a tragedy, which met with ill ſucceſs, but was printed, in 1768, by Mr. Walpole, at Strawberry-hill. He became an aſſociate of the French Academy in 1723, and about the ſame time was received into the Academy of Inſcriptions, and other learned ſocieties. He was appointed honorary preſident of the inqueſts in parliament, and ſuperintendant of the finances of the queen's houſhold; but as an author, the work by which he is beſt known is his "Abregè Chronologique de l'Hiſtoire de France," 1768, in two volumes 4to. This is an excellent abridgment of all that is moſt intereſting and important in French hiſtory; in which the leading facts are thrown into a tabular form; the portraits of the moſt celebrated perſons are drawn, and ſhort diſſertations occur on ſeveral important hiſtorical topics. It has been tranſlated into ſeveral languages, and has ſerved as a model for other national hiſtories of a ſimilar kind; and is even now the beſt guide that can be followed in French hiſtory and chronology. He publiſhed in the ſame year two volumes of his miſcellaneous works, including academical harangues, ſome comedies, and other dramatic pieces. He died at Paris in 1770.

HENAULT, JOHN, a French poet, who flouriſhed in the 17th century, was the ſon of a baker at Paris, and travelled into the Low Countries and England. Upon his return, he was introduced to the munificent Foucquet, who patronized him on account of the excellence of his poems, which he at that period preſented to the public. On the fall of the miniſter, Henault compoſed a ſevere ſatirical ſonnet againſt his enemy and ſucceſſor, Colbert. This he would afterwards have gladly ſuppreſſed, but it was gone forth to the public much approved as a party piece, and could not be called in. He publiſhed a collection of poems in 1670, of which, one was a ſonnet, "On an Abortion," occaſioned by an accident which befel a young lady of rank. This excited an extraordinary degree of public attention, and for a time occupied all Paris with the diſcuſſion of its merits. Henault was addicted to the Epicurean philoſophy, and was rather eager in propagating his ſentiments. He went to Holland for the ſake of converſing with Spinoſa, but on the ſubject of religion Henault knew but little, and on the approach of death, he was probably alarmed at the future, and ſubmitted himſelf to his confeſſor, by whoſe advice he burnt part of his tranſlation of Lucretius, which, according to the opinion of Voltaire, judging from the part that remained, would have given him much celebrity. He died in 1682, and his printed works conſiſt of ſonnets, of letters, and of an imitation of two acts of the Troas of Seneca. Bayle. Gen. Biog.

HENBANE, in *Botany*. See HYOSCYAMUS.

HENBANE, in the *Materia Medica*. This plant, which is a native of England, and grows commonly amongſt rubbiſh, about villages, road-ſides, &c. and flowers in June, has been uſed medicinally; but the adminiſtration of it requires great caution. It has a ſtrong peculiar ſmell, and the leaves, when bruiſed, emit ſomewhat of the odour of tobacco. The odour is ſtronger when the leaves are burnt; and on burning they ſparkle with a deflagration, reſembling that of nitre, but to the taſte they are mild and mucilaginous. Henbane is a powerful narcotic poiſon; and different authors have mentioned ſeveral inſtances of its deleterious effects; whence it appears that any part of the plant, when taken in ſufficient quantity, is capable of producing very dangerous and terrible ſymptoms. The *roots*, which are biennial, long, compact, white, and beſet with many fibres, have been eaten by nine perſons, ſome of whom were ſpeechleſs, and ſhewed no other ſigns of life than by convulſions, contortions of their limbs, and the riſus ſardonicus; ſome had their eyes ſtarting out of their heads, and their mouths drawn backwards on both ſides; others of them had all the ſymptoms alike; but five of them did now and then open their mouths merely to utter howlings. On their recovery, all objects appeared to them as red as ſcarlet, for two or three days. The roots of the common henbane are uſed for anodyne necklaces, to hang about children's necks, in order to prevent fits, and cauſe them to breed their teeth eaſily; but this ſeems to be merely a vulgar application of them. Sir Hans Sloane gives an account in the Philoſophical Tranſactions (N° 430, or vol. 38. p. 99.) of ſome children who, eating the ſeeds of the common henbane, were affected with intenſe thirſt, ravings, dimneſs of ſight, and a profound ſleep, which in one of them laſted two days and nights.

Theſe were all recovered by bleeding, bliſtering, purging, and vomiting. What ſir Hans obſerves particularly of the caſe is, that the delirium which was occaſioned by theſe ſeeds was not of the common kind, but was of the nature of that produced by the dutroa, a ſpecies of ſtramonium, and by the bangue of the Eaſt Indies, which is a plant with leaves like hemp.

The virtues of this ſeed may compenſate for the miſchief it may do when taken in an improper manner; in the tooth-ache, nothing is perhaps equal to it. Sir Hans Sloane mentions an account of a quack who cured this pain immediately by burning theſe ſeeds, and cauſing the vapour to be received into the tooth through a funnel. The empiric ſlily contrived to have ſome ſmall maggots conveyed at the ſame time into a pail of water placed under the perſon's head, which he pretended to have fallen out of the tooth, by the virtues of the medicine; but theſe being bred up to their change, became ſmall beetles, and were doubtleſs of the common kind.

The *leaves* of the hyoſcyamus, we are told, were boiled in broth, and eaten by ſeven perſons, who ſoon became affected with ſymptoms of intoxication. About three hours afterwards, three of theſe perſons were become quite inſenſible, did not know their comrades, talked incoherently, and were in as high a delirium as people in the rage of a fever. All of them had low irregular pulſes, ſlavered and frequently changed colour; their eyes looked fiery, and they caught at whatever lay next them, calling out that it was going to fall. Phil. Tranſ. vol. xlvii. ann. 1750.

Henbane is poiſonous to birds and dogs; but horſes, cows, goats, and ſwine are not affected by it. Nevertheleſs, this plant, under proper management, may be ſafely employed, and in many caſes may be found an active and uſeful remedy. It was known to the ancients, and its anodyne effects were experienced by Dioſcorides, and it ſeems to have been uſed internally and externally by ſubſequent writers, particularly by Celſus; and in hemorrhagic diſeaſes the ſeeds were ſucceſsfully given by Plater, Foreſtus, and Boyle. It was, however, for a long time diſuſed, till baron Stoerck publiſhed ſeveral caſes of different diſeaſes, in which an extract, prepared from the juice of this plant, has been diſcovered to be an efficacious remedy. Theſe diſeaſes, as the baron ſtates them, are internal ſpaſms and convulſions, palpitation of the heart, madneſs, melancholy, epilepſy, inveterate head-aches, hæmoptyſis, and a troubleſome cough, accompanying the laſt-mentioned complaint. The ſucceſs in theſe caſes is confirmed by Collin, who extended the doſe of the extract to 24 or 30 grains a day. But from the experiments of Greeding, who tried it in 40 caſes of melancholia, mania, and epilepſia, the reſult was very different: it appears, however, to be an uſeful anodyne; and as it uſually opens the body, it may be advantageouſly ſubſtituted for opium, where the aſtringency of the latter becomes an objection to its uſe. Dr. Cullen is of opinion, that in epilepſy and various convulſive affections, the extract of henbane has no great virtue, different from or ſuperior to that of opium. Dr. Withering found it beneficial in a caſe of difficult deglutition. Stoerck and ſome others recommend the extract in the doſe of one grain or two; but Dr. Cullen obſerves, that he ſeldom diſcovered its anodyne effects till he had proceeded to doſes of eight or ten grains, and ſometimes to 15 and even to 20. The leaves are ſaid to have been applied externally with advantage in the way of poultice, for reſolving ſchirrous tumours, and for removing ſome pains of the rheumatic and arthritic kind. Woodw. Med. Bot.

Henbane, *Yellow*. See Nicotiana and Tobacco.

Henbane-*louſe*, in *Natural Hiſtory*, a name given by ſome to a peculiar inſect found very frequently on that plant in the ſummer months. It is one of the cimices of authors, and is very well deſcribed by Liſter in the Philoſophical Tranſactions. It is a very large cimex, of a fine red, ſpotted with black. It feeds on the juices of the henbane, whoſe leaves and ſtalks it pierces with its trunk. It is very remarkable that the juices of this ſtinking plant become of a very agreeable and aromatic flavour in the body of this inſect; and on trial it may perhaps be found, that the miſchievous narcotic quality of the plant may be rendered wholeſome, and a good medicine, in the body of this inſect. Phil. Tranſ. N° 71.

In June and July it is common to ſee ſeveral ſeries of oblong orange-coloured bodies adhering to the upper ſides of the leaves of this plant; theſe are the eggs of this cimex. Theſe eggs are white in the belly of the inſect, and whitiſh when laid firſt; but they grow more deep coloured when the young ones come near the time of hatching. They are hatched into perfect cimices, not into worms. Theſe eggs yield a colour, which is ſo fine, that it may be worth introducing into uſe in ſome manner; it is a fine lively carnation. There needs no more to obtain it, but the rubbing or cruſhing the eggs, while freſh, upon white paper. The inſects themſelves are ſo common, that from May to the end of June it is ſcarce poſſible to find a plant without them: and the eggs are not leſs frequent in their ſeaſon, in hot weather. They are ſometimes laid in May, but never later than June; their colour is apt to fade of itſelf; but this might probably be much aſſiſted as to holding, by alum, or other additions.

HENBIT, in *Botany*. See Lamium.

HENDA, in *Geography*. See Handa.

HENDAYE, a town of France, in the department of the Lower Pyrenées, at the mouth of the river Bidaſſoa, oppoſite to Fontarabia.

HENDECAGON, Endecagon, or *Undecagon*, compounded of ἕνδεκα, *eleven*, and γωνια, *angle*, in *Geometry*, a figure which has eleven ſides, and as many angles. If each ſide of this figure be 1, its area will be equal to 9.3656399 $= \frac{11}{4}$ tang. $73\frac{7}{11}°$, radius being 1. (See Polygon.) For the method of conſtructing a regular hendecagon on a given line, ſee alſo Polygon.

Hendecagon, in *Fortification*, is uſed for a place defended by eleven baſtions.

HENDECASYLLABUM, Ἑνδεκασυλλαβον, compounded of ἕνδεκα, *eleven*, and συλλαβη, *ſyllable*; of συλλαμβανω, *I comprehend*, in Greek and Latin *Poetry*, a verſe of eleven ſyllables.

Sapphic and Phaleucic verſes are, *hendecaſyllaba*, or *hendecaſyllabic*. *E. gr.*

Sap. Jam ſatis terris nivis atque diræ.
Phal. Paſſer mortuus eſt meæ puellæ.

HEND-DEIRE, in *Geography*, a town of Perſia, in the province of Irak; 50 miles S.W. of Com.

HENDERSON, Alexander, in *Biography*, a Scotch preſbyterian divine, who, on account of his great learning and impreſſive eloquence, was ſent to England as plenipotentiary. When Charles I. was at Newcaſtle in 1646, he engaged in a diſpute with him about epiſcopacy, in which Henderſon was overcome. This diſgrace, it is ſaid, haſtened his end, and before his death he expreſſed much concern at the part he had taken againſt the king.

Henderson, in *Geography*, the chief town of Montgomery county, North Carolina, ſeated at the confluence of the Yadkin and Huarry rivers, which form the Great Pedee: its court-houſe is 35 miles from Saliſbury.

Henderson's *Grant*, a tract of land 12 miles ſquare on the peninſula formed by the junction of Green river with the Ohio, in the ſtate of Kentucky.

Henderson, a county of Kentucky, including the greater part of the above grant, and containing 1263 inhabitants, of whom 340 are ſlaves.—Alſo, a poſt-town of the above county; 786 miles from Waſhington.

HENDERSON-TOWN, a poſt-town of Montgomery county, in North Carolina; 455 miles from Waſhington.

HENDERSON-VILLE, a poſt-town of Nottoway county, Virginia; 204 miles from Waſhington.—Alſo, a poſt-town of Sumner county, Teneſſee; 720 miles from Waſhington.

HENDON, a pariſh and village in the hundred of Goare, and county of Middleſex, England, is ſeven miles north of London, and contained, in the year 1800, 373 houſes, inhabited by 1955 perſons. This village is widely diſperſed, and its various detached cluſters of houſes are deſignated by different names. The pariſh contains 8204 acres of land, of which about 300 are arable, 120 woodland, and the remainder meadow and paſture. In this village the abbot of Weſtminſter formerly had a palace, and poſſeſſed a manor here. The church is a large building, and contains ſeveral monuments, ſome of which commemorate perſons of eminence. One, with an effigy in white marble, is raiſed to the memory of ſir William Rawlinſon, knt., one of the commiſſioners of the great ſeal, in the time of king William and queen Mary. Near this is another for Edward Fowler, biſhop of Glouceſter, who died Auguſt 26th, 1714. Charles Johnſon, a dramatic writer of ſome eminence, was buried here March 18th, 1743. In the church is an ancient ſquare font, ornamented with the architectural details, &c. peculiar to the Norman era. In this village are an alms-houſe, and two charity ſchools. In the vicinity of Hendon are ſeveral pleaſant and handſome ſeats and villas. At Mill-hill the late Peter Collinſon formed and planted a botanical garden. Hendon-place, belonging to George Snow, eſq. is a fine ſeat. In Brent-ſtreet, near the church, is the ancient manſion of the Whithcotes, now the property and reſidence of John Cornwell, eſq. Lyſons's Environs of London, vol. iii. quarto.

HENDOOA, a circar of Bengal, bounded on the N. by Boglipour, on the E. by Rajemel and Pultanabad, on the S. by Birboom, and on the W. by Curruckpour; about 36 miles long and 22 broad; the chief town is Noony.

HENDOOABAD, a town of Hindooſtan, in Allahabad; 21 miles N.N.W. of Jionpour.

HENDU-KESH, a town of Grand Bucharia; 65 miles N.E. of Bamian.

HENEAGO Island, one of the Bahama iſlands, about 40 miles long, and from five to ten broad. N. lat. 21° 5'. W. long. 73°.

Heneago *Key*, a ſmall iſland among the Bahamas. N. lat. 21° 40'. W. long. 72° 46'.

HENED-Penny, in our *Old Writers*, a cuſtomary payment of money inſtead of hens, at Chriſtmas. It is mentioned in a charter of king Edward III. Mon. Angl. tom. ii. p. 327. Du-Cange is of opinion it may be hen-penny, *gallinagium*, or a compoſition for eggs; but Cowel thinks it is miſprinted *hened-penny*, for *heved-penny*, or *head-penny*.

HENFLING's *Temperament of the Muſical Scale.* In the Memoirs of the Academy of Sciences at Paris for 1711, 16mo. edition, pp. 406 and 416, M. Sauveur gives an account of the diviſion of the octave into 50 equal parts by M. Henfling, to form a tempered ſyſtem, of which the mean tone is eight and the major limma is five of theſe parts: the temperaments of the different intervals being ſhewn in eptemerids and logarithms in M Sauveur's table, p. 416 as above. Dr. Robert Smith alſo, at page 156 of his "Harmonics," gives the temperaments of this ſyſtem (forgetting, however, to mention M. Henfling) and ſhews, that it agrees indefinitely near with his ſyſtem of equal harmony, in three octaves. The tenth and eleventh ſcholia to Mr. Farey's muſical theorems, in the Philoſophical Magazine, vol. xxxvi. p. 50, ſhew, that the fifths in this ſyſtem are each flattened 3 04811 ſchiſmas, and by theſe theorems, or the corollaries at p. 374, all the other temperaments and the wolves can be readily calculated.

HENG, in *Geography*, a city of China, of the ſecond rank, in the province of Quang-ſi. N. lat. 22° 36. E. long. 108 35'.

HENGIST, in *Biography*, the firſt Saxon chief who obtained a ſettlement in Britain, was ſaid to be a deſcendant of Woden, whom the Saxons worſhipped as a god. Hengiſt was in high eſtimation among his countrymen, the inhabitants of the Northern coaſt of Germany, on account of his great valour. When the Britons, wearied with, and unable to reſiſt the incurſions of the Picts and Scots, ſent a ſupplicant embaſſy to implore the aid of the Saxons, Hengiſt and his brother Horſa accepted the invitation, and in 449 brought over an army of ſixteen hundred men, whom they diſembarked in the iſle of Thanet. They were afterwards joined by five thouſand more of their countrymen, and not only defeated the common enemy with great ſlaughter, but determined to eſtabliſh themſelves in the country which they came to defend. They ſhortly after found means to quarrel with the Britons about their promiſed rewards, and commenced open hoſtilities againſt them. Vortigern, a weak and vicious king, was depoſed by his Britiſh ſubjects, and his ſon Vortimer placed at their head. Under his command many battles were fought between the Britons and the Saxons, in which the latter, under Hengiſt, committed the moſt cruel devaſtations, till he became entire maſter of Kent, of which diſtrict, including Middleſex, Eſſex, and part of Surry, he took the title of king, about eight years after his firſt arrival The conquerors conſiſted chiefly of three tribes, the Saxons, Angles, and Jutes, who paſſed under one common appellation, ſometimes of Saxons, ſometimes of Angles, and ſpeaking the ſame language, and being governed by the ſame inſtitutions, they were led, as well from theſe cauſes as from their common intereſt, to unite themſelves againſt the ancient inhabitants. Hengiſt made Canterbury the ſeat of royalty, where he died in 488, tranſmitting his newly acquired dominions to his ſons. Hume.

HENG-TCHEOU, in *Geography*, a city of China, of the firſt rank, in the province of Hou-quang, ſituated on the river Heng, which runs into a lake, called Tong-ting. The principal manufacture is that of paper. Near it are mines of ſilver, not allowed to be wrought. N. lat. 26 56'. E. long. 112°.

HEN-HARRIER, in *Ornithology*. See Falco *Cyaneus*.

HEN-HOUSE, a place or building for confining or ſheltering poultry.

HENIDA, in *Geography*, a town of Perſia, in the province of Irak; 40 miles S.W. of Gnerden.

HENIOCHAS, Ἡνιοχος, *Auriga*, in *Aſtronomy*, a northern conſtellation. See Auriga.

HENIOCHI, in *Ancient Geography*, a people of Sarmatia, who inhabited the northern coaſt of the Euxine ſea. According to Ammianus Marcellinus, they trace their deſcent from two conductors of the chariots of the Dioſcuri, who had founded the town of Dioſcurias in this place. Theſe people were much addicted to piracy.

HENLEY, John, in *Biography*, known by the name of "Orator Henley," was ſon of a clergyman at Melton Mowbray, in Leiceſterſhire, where he was born in 1692. He was educated partly at the free-ſchool of his native town, and partly at Okeham, in Rutlandſhire. When he was about 17 years of age he was entered of St. John's college, in the univerſity of Cambridge. While he was under-graduate he ſent a letter to the Spectator, which was publiſhed as the 396th number of that work. After he was admitted to the degree of B. A., he undertook the care of a ſchool at Melton Mowbray, which he raiſed from a very low to a flouriſhing condition. Here he obtained a curacy, and acquired celebrity as a preacher. Flattered by his friends, he began to conceive himſelf adapted to ſome more important ſphere of action, and under this perſuaſion he reſigned his ſchool and curacy, and determined to try his fortune in the metropolis. Here he was much followed as a preacher, and was frequently engaged in pleading the cauſe of charity. He publiſhed a tranſlation of "Pliny's Epiſtles:" of ſome of the works of the abbé Vertot, of "Montfaucon's Italian Travels," and other works. He looked for preferment in the church, and had been promiſed it; but all his hopes being diſappointed, he opened a chapel of his own, and attracted crowded audiences, but his manners were light and trifling, and aiming at nothing but popularity, he acquired no reſpectability, and was in a ſhort time followed only by the very loweſt orders of the people, to whom the vulgarity and licentiouſneſs of his addreſſes were ſuited. He removed to a hired room near Lincoln's-inn Fields, where he practiſed the moſt miſerable tricks to collect money. He died in the year 1756.

Henley-*upon-Thames*, in *Geography*, a market town and pariſh in the hundred of Benfield, and county of Oxford, England, is ſituated on the banks of the river Thames, at the baſe of ſome high grounds, which follow the courſe of that river. Dr. Plot calls it "the ancienteſt town in the county," but he has neither adduced fact nor argument to ſupport his conjecture. This name he derives from *Hen*, ſignifying old, and *Ley*, a place. In an inſpeximus granted by queen Elizabeth to the corporation of Henley, it is called Hanlegauz, and Hanneburg. By charter the town is incorporated, and governed by a high-ſteward, recorder, mayor, 10 aldermen, and 26 burgeſſes. Here are a weekly market on Thurſdays, and four annual fairs. The malting buſineſs is the chief trade of the place; and is a ſource of profit and employ to many perſons. Over the Thames, at this place, is a handſome ſtone bridge, the key ſtones in the centre arch of which were ſculptured by the honourable Mrs. Damer. Near the bridge is a ſpacious church, with a ſquare tower, moſtly of flint. In the town are three free-ſchools, and other charitable endowments. The petty ſeſſions are held here. In the year 1800 the town conſiſted of 635 houſes, and 2948 inhabitants.

About one mile from the town is Park-Place, the ſeat of the earl of Malmſbury. The grounds are finely adorned with hanging woods; and in a field adjoining the park is an ancient and very curious Druidical temple, which the late general Conway cauſed to be brought from the iſle of Jerſey. The ſtones have been placed in the ſame relative poſitions as they were originally found.

Henley *in Arden*, a market town and chapelry in the pariſh of Wootton-wawen, and hundred of Barichway, in the county of Warwick, England, is built on the bank of a ſmall river at the diſtance of about 10 miles from Warwick. In the year 1800 the town conſiſted of 245 houſes, and contained 1098 inhabitants. In the reign of Henry III. Peter de Montford obtained the grant of a weekly "mercate," or market, for this place, and a yearly fair for two days. The chapel in this town was built about the 41ſt year of Edward III.d's reign, at the ſole expence of the inhabitants. In the 26th of Henry VI. a hoſpital was built here for the relief of poor people and ſtrangers. Dugdale deſcribes 19 ſhields of arms which were painted on the glaſs of the chapel windows. Dugdale's Antiquities of Warwickſhire, fol. 1656.

Henley-*houſe*, a ſtation or factory of Canada, belonging to the Hudſon Bay company, on the N. bank of Albany river; 150 miles S.W. of Albany fort. N. lat. 51 14′ 27″. W. long. 85 5′ 54′.

HENLOPEN Cape, a cape of America, which forms the S.W. ſide of the entrance of Delaware bay, and cape Mary on the N.E. ſide; 28 miles apart. It lies in N. lat. 38 50′. W. long. 75′ 26. Here is a handſome light-houſe, maintained at the annual expence of about 650*l.*, and viſible at ſea at the diſtance of 10 leagues.

HEN-MOULD Soil, in *Agriculture*, a term uſed by the huſbandmen in Northamptonſhire, and other counties, to expreſs a black, hollow, ſpungy, and mouldering earth, uſually found at the bottoms of hills.

It is an earth much fitter for grazing than for corn, becauſe it will never ſettle cloſe enough to the grain to keep it ſufficiently ſteady while it is growing up, without which, the farmers obſerve, it either does not grow well; or if it ſeem to thrive, as it will in ſome years, the growth is rank, and yields much ſtraw, but little ear.

It is too moiſt, and to that is principally to be attributed this rankneſs of the crop in ſome years; and the occaſion of its retaining ſo much moiſture is, that it uſually has a bed of a ſtiff clay, which will not let the water run off into the under ſtrata.

In ſome places they alſo give this name to a black, rich, and denſe earth, with ſtreaks of a whitiſh mould in many parts. This ſort of hen-mould is uſually found very rich and fertile. Moreton's Northamp. p. 37.

HENNA, in *Botany*, the Arabian name of the *Lawſonia inermis*. See Alhen and Alcanna.

HENNABERG, in *Geography*, a county and principality of Germany, ſituated N. of the biſhopric of Wurzburg, extending about 24 miles from N. to S. and 22 from E. to W. The land bears corn and tobacco. It abounds with foreſts and mountains, mines of copper, ſilver, iron, and ſteel, medicinal ſprings and ſalt water. The principal of its 13 towns are the Werra, Schleuſs, Schwartza, and Felde. The inhabitants are Lutherans: four miles S. of Meinungen.

HENNADYS, the moſt ancient of the Libyan tribes, known in Egypt. They poſſeſs about three or four hundred horſes; and with their allies can muſter from 900 to 1000 cavalry.

HENNEBOND, a town of France, in the department of Morbihan, and chief place of a canton, in the diſtrict of Lorient, ſeated on the Blavet, which is navigable for veſſels of a moderate ſize. The place contains 4548, and the canton 13,752 inhabitants, on a territory of 190 kiliometres, in four communes. It carries on a conſiderable trade in corn, iron, honey, &c. N. lat. 47° 49′. E. long. 3 11′.

HEN-NEISHAH, a powerful and warlike, but a genteel and comely tribe, who inhabit the moſt fruitful, as well as the moſt extenſive diſtrict of Numidia, in Africa. It lies betwixt the rivers Hameeſe and Myſkim-Anah, the latter being the moſt ſouthern, the former the moſt northern branch of the Me-jerdah, and is in every part of it watered by ſome choice fountain or rivulet.

HENNERSDORF, a town of Sileſia, in the principality of Neiſſe; eight miles N.N.E. of Neiſſe.

HENNEVEUX, a town of France, in the department of the Straits of Calais, and chief place of a canton, in the diſtrict of Boulogne; three leagues E. of Boulogne.

HENNIN Lietard, a town of France, in the department of the Straits of Calais, and chief place of a canton, in the diſtrict of Arras; three and a half leagues N.N.E. of Arras.

HENNINGES, Jerome, in *Biography*, who flouriſhed in the ſecond century, was a native of Germany, a diſciple of Melancthon, and became diſtinguiſhed by his genealogical reſearches. His principal works are (1) "Genealogiæ Familiarum Saxonicarum," publiſhed at Hamburgh in folio, 1596: (2) "Theatrum Genealogicum omnium Ætatum et Monarchiarum Familias complectens." This is a vaſt compilation, containing the Jewiſh families from Adam to the deſtruction of Jeruſalem: the origin of all other nations, and the families of the ſecond and third monarchies: the families of ancient Greece and Italy, and thoſe of all the principal modern kingdoms. Moreri.

HENNUYER, John, a French prelate, illuſtrious for the humanity and ſpirit which he diſplayed in oppoſing the maſſacre of the Proteſtants in the reign of Charles IX., was born at St. Quintin, in Picardy, in the year 1497. He was educated at Paris, in the college of Navarre, and paſſed through the various duties of his ſituation with diſtinguiſhed reputation. In 1539 he was admitted to the degree of doctor by the faculty of the Sorbonne; was appointed profeſſor of theology in the college of Navarre, and ſelected to ſuperintend the ſtudies of Anthony of Bourbon, afterwards king of Navarre. In 1553 he was appointed confeſſor to Henry II.; in 1557 he was nominated to the ſee of Lodère, from which, in the following year, he was tranſlated to that of Liſieux. In this ſituation he acquired immortal honour, by reſiſting the infamous project of the court to follow up the maſſacre at Paris on St. Bartholomew's day, by the murder of the Proteſtants in his dioceſe. Notwithſtanding the bigotry of the court, this act of virtue extorted from the king a high commendation of the biſhop's firmneſs and humanity. He died in 1577, at which time he was dean of the faculty of theology at Paris. Moreri.

HENOTHRIX, in *Natural Hiſtory*, the name of a fly of the ſeticauda, or hair-tailed kind. This is diſtinguiſhed from the others by having only one hair, and is called alſo by ſome uniſeta. The whole body of this ſpecies is black, except the middle of the back and belly, which are red; the wings are ſilvery, and the antennæ very ſmall and black. It is very common in the warm climates, and is uſually found ſitting on the ammi, or biſhop's weed; whence it is called by ſome the ammi fly.

HENOTICUM, Ἑνωτικὸν, q. d. *reconciliative*; of ἑνόω, *I unite*, in *Church Hiſtory*, a famous edict of the emperor Zeno, publiſhed A. D. 482, and intended to reconcile and re-unite the Eutychians with the Catholics.

It was procured of the emperor by means of Acacius, patriarch of Conſtantinople, with the aſſiſtance of the friends of Peter Mongus and Peter Trullo.

The ſting of this edict lies here; that it repeats and confirms all that had been enacted in the councils of Nice, Conſtantinople, Epheſus, and Chalcedon, againſt the Arians, Neſtorians, and Eutychians, without making any particular mention of the council of Chalcedon. It is in form of a letter, addreſſed by Zeno to the biſhops, prieſts, monks, and people of Egypt and Libya. It was oppoſed by the Catholics, and condemned in form by pope Felix II.

HENRICHEMONT, in *Geography*, a town of France, in the department of the Cher, and chief place of a canton, in the diſtrict of Sancerre, 3¾ leagues S. of Aubigny. The place contains 2633, and the canton 7087 inhabitants, on a territory of 185 kiliometres, in 7 communes.

HENRICIANS, in *Eccleſiaſtical Hiſtory*, a ſect ſo called from Henry its founder, who, though a monk and hermit, undertook to reform the ſuperſtition and vices of the clergy. For this purpoſe he left Lauſanne, in Switzerland, and, removing from different places, at length ſettled at Thoulouſe, in the year 1147, and there exerciſed his miniſterial function, till being overcome by the oppoſition of Bernard, abbot of Clairval, and condemned by pope Eugenius III. at a council aſſembled at Rheims, he was committed to a cloſe priſon in 1 48, where he ſoon ended his days. This reformer rejected the baptiſm of infants; ſeverely cenſured the corrupt manners of the clergy; treated the feſtivals and ceremonies of the church with the utmoſt contempt, and held clandeſtine aſſemblies for inculcating his peculiar doctrines. Moſheim's Eccl. Hiſt. vol. iii. See Petrobrussians.

HENRICKSWALD, in *Geography*, a town of Pruſſian Lithuania; 6 miles W.S.W. of Tilſit. N. lat. 47° 18′. E. long. 2° 36′.

HENRICO, a county of America, in Virginia, about 30 miles long and 7 broad, containing 4541 free inhabitants, and 4608 ſlaves. It is ſurrounded by Hanover, Charles city, Goochland counties, and James river. The coal-mines of this county have produced conſiderable profit to the proprietors. Its chief town is Richmond.

HENRIQUELLE, a remarkable ſalt pond in the Spaniſh part of the iſland of St. Domingo, about 22 leagues in circuit, inhabited by lizards and alligators, and land-tortoiſes, of a large ſize. The central part is an iſland, about two leagues long, and one wide, in which is a ſpring of freſh water, well ſtocked with cabritoes, and hence called "Cabrito Iſland." This pond is about 11 leagues E. of Port-au-Prince.

HENRY I. in *Biography*, emperor of Germany, was ſon of Otho, duke of Saxony, by a daughter of the emperor Arnulph. He was himſelf duke of Saxony, and was eſteemed a perſon of great conſequence when the emperor Conrad I. on his death-bed, ſent him the inſignia of his office, and an aſſembly of the nobles confirmed him in the imperial dignity in 919. His firſt concern as emperor was to reſtore concord among the princes of Germany, in which he ſucceeded; he next defeated the Hungarians, who invaded his dominions; and then marching northwards againſt the Vandals, drove them out of Saxony, and exterminated the whole nation on the ſhores of the Baltic. He vanquiſhed the Bohemians, the Sclavonians, and the Danes, and conquered the kingdom of Lorraine. The emperor, having finiſhed his plans with regard to foreign ſtates, employed himſelf in regulating the police of his dominions, in making good laws, in building cities, and in propagating the Chriſtian religion among neighbouring heathen tribes. On the expiration of the truce with the Hungarians, they made an irruption in 932, with a large army, the main body of which he defeated with prodigious ſlaughter. Having reſtored peace and good order into all parts of his dominions, he determined to comply with the pope's invitation to receive from him the imperial crown in Rome. He ſet out for Italy at the head of an army, but died on his journey, at the age of ſixty. This was in the year 936, but he had the ſatisfaction of ſeeing the ſucceſſion to the empire ſettled by the princes upon his ſon Otho. Henry was accounted one of the ableſt princes of his time, equally qualified for the duties of war and peace, and zealouſly attached to the intereſts of religion. Univer. Hiſt.

Henry II. emperor, duke of Bavaria, was elected to the imperial throne in 1002, to ſucceed his couſin Otho III. The troubles excited in Germany by the king of Poland, and a revolt of the Sclavonians, gave full employment to his arms for ſome time, and it was not till 1005, that he was able to march to Italy, and receive the crown at Pavia. On his return to Germany he had new troubles to contend with, and new wars to engage in. To avoid theſe calamities, he would gladly have reſigned the ſplendour of the throne, and have retired to a monaſtery. He was, however, diſſuaded from the project, reſumed his accuſtomed activity, and in 1014 repaſſed into Italy, and received the crown at Rome from pope Benedict VIII., to whom he promiſed fidelity. His wife, Cunegunda, was accuſed of want of chaſtity, and ſhe thought it neceſſary to vindicate her honour by undergoing the ordeal; whether this was a ſatisfactory proof of her innocence may be doubted, ſince it is well known that the emperor, though married to her, lived in a perpetual ſtate of continence, ſo that, ſays the hiſtorian, any conjugal diſhonour he underwent is neither to be wondered at nor pitied. The laſt tranſaction of this reign was an interview between the emperor and Robert king of France, in which they agreed upon certain regulations of church and ſtate, for the benefit of their reſpective dominions. Henry died in 1021, after a proſperous but unquiet reign of twenty years. The reverence in which he held the church, obtained for him the title of The Holy, and he and his empreſs have been enrolled among the Romiſh ſaints.

Henry III. emperor, ſurnamed the Black, ſucceeded to the empire at the deceaſe of his father Conrad II. in 1039. Scarcely had he aſcended the throne when he was obliged to take up arms againſt the duke of Bohemia, whom he ſubdued. In 1046, he marched into Italy, where three popes had been contending for the holy ſee, which at length was conferred upon a fourth competitor, Gregory VI. The emperor, offended at this election, cauſed the pontiff to be depoſed, and a German biſhop to be placed in the papal chair, by the name of Clement II. who then inveſted the heads of Henry and his empreſs with the imperial crown. On this ſubject new diſputes occurred, and it was not till Victor II. was choſen by the Romans, and his election was confirmed by the emperor, that the contending claims were for a time quieted. Another war in Hungary employed his arms, which was ſucceeded by troubles in Bavaria, occaſioned by the tyrannical government of its young duke. Henry, without heſitation, diveſted him of his dominions, which he conferred on his own ſon, then an infant. In 1055, the emperor again viſited Italy, and was preſent in a council held at Florence, and after a progreſs through the country he returned to Germany. At this period, the empire was afflicted with famine, which was aggravated by an irruption of the Sclaves into Saxony, in which they defeated the imperial general, and ravaged the whole province. Henry was overwhelmed with theſe diſaſters, and having convoked a diet at Goſlar, in which his ſon was acknowledged king of the Romans, he was taken ill and died in 1056, after a reign of ſeventeen years.

Henry IV. the Great, ſon and ſucceſſor to the preceding, was but ſix years old when his father died; the regency was committed to his mother, the empreſs Agnes, who became unpopular, becauſe ſhe had not power to prevent many inteſtine commotions and was accordingly diſpoſſeſſed of her authority in 1062. The guardianſhip of the young emperor was committed to the archbiſhops of Cologn and Bremen, the latter of whom has been accuſed of encouraging the young prince in every ſpecies of licentiouſneſs in order to maintain an influence over him. Henry early diſtinguiſhed himſelf by a native courage, and when he attained the age of manhood he took up his reſidence at Goſlar in Saxony, with the expreſs purpoſe of quelling the lawleſs proceedings which had long prevailed in that country. To this end he erected a number of caſtles, which obliged him to lay taxes upon his people, who formed a confederacy againſt his authority. An agreement ſoon followed, but his repeated miſconduct deprived him of the attachment of his beſt friends, and the princes of the empire met together to conſider on the propriety of his depoſition; but he heard of their proceedings, and, by ſolemn promiſes of amendment, appeaſed their diſpleaſure. A revolt of the Saxons followed, in which Henry in perſon gave them a terrible defeat, and, purſuing his victory, made himſelf maſter of the whole country, and reduced them to ſue for peace on any terms. In the mean time, Hildebrand had been elevated to the popedom under the name of Gregory VII. to which, though not pleaſing to the emperor, he did not think proper to object. The firſt acts of the pontiff were levelled at the emperor; theſe and other inſults he for ſome time bore with apparent patience, till at length Gregory ſummoned him to appear at Rome, to anſwer to various accuſations with which he ſtood charged. Henry, in his turn, cauſed the pope to be ſolemnly depoſed at an aſſembly of prelates at Worms in 1076. Gregory, to be revenged on his adverſary, depoſed and excommunicated the emperor; a civil war enſued, in which Henry, deſerted by his own partiſans, on whom he depended, was reduced to humble himſelf as the only reſource of ſaving his crown. He went to Italy and made his ſubmiſſion, but Gregory was not to be appeaſed. (See Gregory.) Henry now reſolved upon vengeance. The electors choſe Rodolphus duke of Suabia, and the pope confirmed the title, but Henry attacked and defeated his competitor, and put him to death. He then called a council, which depoſed the pope, and elected in his room the archbiſhop of Ravenna. In 1106, his ſon Henry aſſumed the title, and ſeized upon the imperial treaſures at Spires, but finding that his father was likely to prove the ſtrongeſt, he affected remorſe, threw himſelf at the emperor's feet, obtained forgiveneſs, and then perſuaded him to diſband the army. As ſoon as this was done, he confined his father a priſoner in his own houſe, and then calling an aſſembly at Mentz, he aſſiſted in his depoſition. This act was performed with the moſt indecent and unfeeling rigour. The prelates ſnatched off his crown, dragged the aged monarch from his throne, and tore from his back the royal robes. In the midſt of this outrage, Henry, with tears trickling down his cheeks, exclaimed, "Great God! thou art truly the God of vengeance! I have ſinned, I confeſs, and have merited this ſhame by the follies of my youth, and thou wilt not fail to puniſh traitors for their perjury and ingratitude." His mind was afterwards ſo far overcome by the accumulation of his misfortunes, that he made a voluntary reſignation of the crown in his ſon's favour, beſeeching, at the ſame time, an abſolution from the ſentence of excommunication. This was refuſed, and it redounds to the infamy of his ſon, and of the times in which he lived, that the depoſed emperor was ſuffered to want the common neceſſaries of life. He was reduced ſo far as to ſolicit from the biſhop of Spires an office in the cathedral, which he himſelf had liberally endowed. This was refuſed, and the humiliated monarch cried out with a deep ſigh "pity me, my dear friends, for I am touched with the hand of the lord." After a long confinement and enduring much diſtreſs he eſcaped to Cologne, where he was once more acknowledged as lawful emperor, and fortune ſeemed diſpoſed to ſmile on him, when he died in the fifty-ſixth year of his age. His body remained five years unburied till the ſentence of excommunication was taken off. This emperor ſaw and experienced the moſt ſerious viciſſitudes of life; he was a man of active courage, which had been tried in ſixty-two battles at which he was perſonally preſent. He poſſeſſed many eminent qualities, he was mild and clement in his diſpoſition, and ſingularly charitable, but the licentiouſneſs of his youth laid a foundation for the misfortunes and diſgraces of his reign.

Henry V. emperor, ſon of the preceding, was born in 1081, and ſeized, as we have ſeen, upon the crown in 1106. After the death of his father he became involved in a diſpute with pope Paſchal, concerning the buſineſs of inveſtitures.

An invaſion of Hungary, and an attempt to conquer Sileſia from the Poles, employed his arms in 1107, 8, and 9, but with no great ſucceſs. In 1110 he paſſed into Italy with a powerful army, in the raiſing of which he was aided by a large ſum paid as the dowry of his wife Matilda, or Maud, daughter of Henry I. of England. Paſcal entered into a treaty with him, containing ample conceſſions with reſpect to inveſtitures; but Henry ſoon found that he did not mean to abide by the pledge, and made the pope, his cardinals, and many perſons of rank, his priſoners, and after razing the very walls of Rome in ſeveral places he encamped in the fields. Paſchal now not only gladly confirmed the treaty in the moſt ſolemn manner, but crowned the emperor with his own hands. On his return to Germany, he was accompanied to the foot of the Alps by the pope and principal clergy, but ſcarcely had he left their country than they annulled the agreement, which they contended was compulſory, and therefore not to be regarded. A rebellion in Saxony ſoon followed, and Henry, in attempting to quell it, received a great defeat. The prelates and nobles, taking advantage of his misfortunes, immediately excommunicated him. He was continually involved in diſputes till 1122, when he ſent an embaſſy to pope Calixtus II. in order to compromiſe their differences. In this agreement he abandoned many of the principles for which he had been contending, and in return received abſolution, and was reſtored to the communion of the church. In 1124 the emperor, at the inſtigation of his father-in-law, the king of England, invaded France, but was compelled to retreat without having effected any thing. He died at Utrecht in 1125, at the age of forty-four. He was a man of much vigour, and endowed with great talents for government, but was characterized by his biographers as cruel, haughty, and avaricious.

HENRY VI. emperor, ſurnamed the *Severe*, eldeſt ſon of the emperor Frederic Barbaroſſa, was declared king of the Romans by his father in 1184, when he was about twenty-four years of age. He married, in 1186, Conſtance, ſiſter and heireſs of William, king of Sicily. Frederic, on his departure for the Holy Land, left the care of the empire to Henry, who ſucceſsfully defended himſelf againſt the attack of Henry the Lion, duke of Saxony. In 1190 he ſucceeded to the imperial crown, and in the following year marched with an army into Italy, and was crowned at Rome with his empreſs. He then attempted to recover the kingdom of the two Sicilies from Tancred, natural brother of the empreſs, and marched an army into the ſouth of Italy for that purpoſe. A peſtilential diſeaſe ſeized on his army, and he was obliged to retire. But in a ſhort time afterwards he made freſh preparations for the ſame purpoſe, and, while he was thus employed, Richard I. king of England, fell into the hands of the duke of Auſtria, in his return from Paleſtine, from whom he was claimed by the emperor, who hoped thereby to ſhare in the ranſom. The money thus gained ſerved to augment Henry's army. He returned to Italy in 1194, and took the city of Salerno, upon the inhabitants of which he ſo terribly revenged an affront they had offered the empreſs, as juſtly to entitle him to the epithet of *Severe*, or *Cruel*. Tancred was now dead, but the mercileſs Henry purſued the widow and unoffending children, ſtript them of their kingdom and property, and confined the females in a monaſtery, while he mutilated the ſon and put out his eyes. In 1196, after various other acts of ſavage tyranny, the emperor cauſed his ſon Frederic to be crowned while he lay in his cradle. He next engaged in a cruſade, and by his eloquence induced the princes of the empire to join in the ſame wild project. Three armies were raiſed, with one of which Henry proceeded to Italy, in order to reduce the Norman rebels of Naples and Sicily. His cruelties produced a ſeries of inſurrections, and at length the inſurgents were joined by Conſtance, his empreſs, who felt for the injuries inflicted on her countrymen. Henry was beſieged in a caſtle in Sicily, and was obliged to make a treaty on very unfavourable terms, ſoon after which, as he was preparing to depart, he was carried off by illneſs at Meſſina, in the eighth year of his reign.

HENRY VII. emperor, duke of Luxemburg, was elected to the imperial crown in 1308, on the death of the emperor Albert. One of the early acts of his government was the expulſion of the Jews from Germany, in order that he might have an opportunity of pillaging them. He then prepared to march into Italy, the chief towns of which were diſtracted by the oppoſite parties of the Guelphs and Gibellines. At firſt the pope raiſed a confederacy againſt him, but he was admitted into moſt of the Lombard towns, and received the imperial crown at Milan. He attacked and took Breſcia after an obſtinate reſiſtance, and in 1312 preſented himſelf in order of battle before the gates of Rome. After many other warlike acts, he died at the convent of Buonconvento in 1313, at the age of 51.

HENRY RASPON, landgrave of Thuringia, was elected emperor by the eccleſiaſtical princes in 1246, when pope Innocent II. had depoſed Frederick II.; but the newly made emperor died in the following year of a wound inflicted while he was contending with his competitor.

HENRY I. king of France, ſon of king Robert, was aſſociated to the crown in 1026, and ſucceeded to the entire regal authority in 1031. His mother, Conſtance of Provence, excited a revolt againſt him in favour of her younger ſon Robert, but without ſucceſs. Henry died, with the reputation of a valiant commander and a good king, in the year 1060, aged 55 years. He had, previouſly to his death, cauſed his eldeſt ſon Philip, then ſeven years of age, to be conſecrated at Rheims. Univer. Hiſt.

HENRY II. king of France, ſon of Francis I. was born in 1518, and came into poſſeſſion of the crown in 1543, at which time France was at war with England. In 1550 peace was reſtored, and Boulogne ſurrendered to the French for a very large ſum. The year following a league was entered into, between him and the Proteſtant princes of Germany, againſt Charles V. which produced a ruinous war to France. In 1559, Henry concluded a diſhonourable peace, and in the ſame year he was wounded at a tournament by a lance, of which he died. Henry II. was poſſeſſed of ſeveral of thoſe qualities which render a king of France popular; he was warlike, gallant, magnificent, eloquent, and a patron of learning; but he was diſſolute, prodigal, and inattentive to the duties of his ſtation. It cannot be overlooked, that during this reign great ſeverities were exerciſed upon the French Proteſtants, and it is certain that in one inſtance the king himſelf was preſent at a dreadful execution of theſe unhappy people, the idea of which is ſaid to have haunted his memory ſo long as he lived. At the ſame moment that he was murdering the French Proteſtants without any feelings of compunction, he was making a league with thoſe of Germany.

HENRY III. king of France, third ſon of Henry II. ſucceeded his brother Charles IX. in 1573. While he was duke of Anjou, the Poles elected him to their throne on the death of Sigiſmund Auguſtus; but he renounced it on taking poſſeſſion of that of France. He concluded a peace with the Huguenots, in which toleration was granted them. This was revoked in 1586, when the Proteſtant princes, of whom Henry king of Navarre was the chief, had recourſe to arms.

The king of Navarre defeated, in 1587, the Catholic army. The duke of Guiſe, on the other hand, obtained a ſignal advantage over the Huguenots and their allies; but on his marching to Paris the gates were ſhut againſt him. The people, however, were attached to Guiſe, and the king was obliged to retire from his capital, which was commanded by the head of the Catholic league. Thus France was divided into three parties, the Royaliſts, the Guiſes, and the Huguenots. At length the two firſt were reconciled in appearance, but Henry cauſed the duke to be aſſaſſinated with his brother the cardinal. The flames of civil war broke out with additional fury. The pope excommunicated the king, and his own parliament inſtituted a criminal proceſs againſt him. In this exigency he had recourſe to the king of Navarre, who ſet out on his march to Paris, but the face of affairs was ſuddenly changed by the death of the king of France, who was aſſaſſinated in 1589, by James Clement, a Dominican prieſt. Thus, he who had been the death of multitudes, and who, with the moſt artful hypocriſy, had cauſed the Guiſes to be maſſacred, fell himſelf by the hand of an aſſaſſin, who had been led to believe that the act would prove beneficial to the church and world. Henry III. lived long enough to be generally hated and deſpiſed by his ſubjects, few of whom probably offered one ſigh when the news of his death was promulgated: he, nevertheleſs, poſſeſſed many qualities that might have rendered him illuſtrious and popular. With him, as we have ſeen elſewhere, ended the royal branch of the houſe of Valois. See FRANCE.

HENRY IV., king of France and Navarre, called the Great, was born in 1553, at Pau, the capital of Bearne. His father was Antony de Bourbon, king of Navarre, and his mother Joan d'Albert. Henry was brought up by his grandfather in a ſimple and hardy manner, and thus was laid the foundation of a vigorous conſtitution and temperate habits. Being deſcended from Lewis IX. of France, he became the heir of that kingdom, but as he was educated a Proteſtant, his claim was reſiſted. He early diſtinguiſhed himſelf in arms: he learned the art of war under the admiral Coligny, and was proud to imitate ſo great a model. After the peace of St. Germain in 1570, he went to Paris, and two years afterwards married the ſiſter of Charles IX. This union was celebrated at the moment that Charles and his mother Catharine were plotting the deſtruction of the Huguenot party. The execrable St. Bartholomew ſoon followed, and on that fatal day Henry was brought before the king, whoſe throne was, as it were, drenched in Proteſtant blood, and who, with a countenance well adapted to the infamy of the deed, gave him his option of Maſs, Death, or the Baſtile; in the moment of ſurpriſe and horror he choſe the firſt. From this time he was kept a kind of priſoner at court, and was led to practiſe thoſe arts of diſſimulation which were the general policy of the time. To drive away more ſerious and gloomy thoughts he fell in with the licentious manners of the age, and it is believed that he entered likewiſe into a political intrigue, for aboliſhing the power of the queen mother, and baniſhing the Guiſes from court. The plot was diſcovered, and Henry was arreſted and thrown into priſon, from whence he found means to eſcape and retire to Alençon, where he renewed his profeſſion of the reformed religion; and put himſelf at the head of the Huguenot party. In the war which followed, he performed all the duties of the hardy ſoldier, as well as thoſe of the brave commander. He ſlept in his tent upon the ſtraw, eat ammunition bread, viſited in perſon the works and batteries, and expoſed himſelf freely to every danger. The cheerful frankneſs of his manners rendered him extremely popular among the ſoldiers, who emulated his example, and followed him with enthuſiaſm. He ſupported the cauſe in which he engaged with an invincible ſpirit, and when excommunicated by Sixtus V. he cauſed an appeal of defiance to be poſted up in the public places of Rome. In 1589 he ſucceeded to the crown of France, but his religion proving an obſtacle to his coronation, he conſented to abjure it in the year 1593. It would be uncandid to mention this renunciation of his principles as dictated merely by ſelf-intereſt, he had properly higher objects in view: he ſaw his country torn to pieces with contending factions, ſome towns declaring for Henry, and others for a rival who was a Catholic, and ſupported by the League. In 1590 he had valiantly fought in defence of his right, and before the battle he addreſſed his troops, "My children, if you loſe ſight of your colours, rally to my white plume, you will always find in it the path to honour and glory." His conduct was anſwerable to his profeſſion, nothing could reſiſt his impetuous valour, and the leaguers ſuſtained a total and bloody defeat. In the midſt of the rout Henry followed, crying out, "Save the French," and his great clemency on this occaſion added a number of enemies to his own army. He reſumed the blockade of Paris, where the extreme of fanaticiſm prevented all overtures to accommodation. The Sorbonne iſſued a decree of excommunication againſt Henry, making him incapable of wearing the crown; though he was not to be daunted by the thunders of the church, his heart melted over the injuries of his country. The war ſtill continued with various ſucceſs, and the king's enemies ſhewed no diſpoſition to come to terms: to accommodate matters, and to ſtop the effuſion of blood, Henry became a Catholic, to which meaſure, it is ſaid, the moſt ſenſible and faithful of his Proteſtant ſervants adviſed him. Henry was accordingly received into his capital in the following year; ſcarcely, however, was he ſettled in the city, when an attempt was made to aſſaſſinate him by Chatel, a furious bigot, who had been prepared for the murderous taſk by the Jeſuits. Henry fortunately eſcaped, and the whole order was declared by the parliament of Paris, "corruptors of the youth, diſturbers of the peace, and enemies of the king and ſtate," and was baniſhed the kingdom. In 1595 he iſſued the edict of Nantz, granting toleration to the Proteſtants. The ſame year he entered into a war with Spain, which laſted till 1598, after which his country enjoyed uninterrupted peace till his death. During the interval of quiet he had leiſure to attend to thoſe internal improvements, and that melioration of the condition of his ſubjects, which his own good ſenſe and benevolent diſpoſition ſuggeſted; in this he was aſſiſted by the honeſt and indefatigable exertions of his miniſter the duke de Sully. The wiſe adminiſtration of this miniſter brought order into the finances and foſtered agriculture, and the king himſelf introduced ſeveral new branches of manufacture, and encouraged commerce and the arts. Henry had long entertained the project of diminiſhing the overgrown power of the houſe of Auſtria, and to this he joined the grand, though probably chimerical ſcheme of forming a kind of European federative republic, conſiſting of powers ſo well balanced, that they ſhould be able to prevent future wars or encroachments. Such a ſyſtem, however plauſible at firſt ſight, cannot be deſirable, for if they were able to prevent wars, they would be ſufficiently powerful to cruſh every effort among the people for meliorating their condition; they might indeed, eſtabliſh in every country the moſt cruel deſpotiſm, none daring to reſiſt their power. Vaſt preparations were made for this enterprize; great ſums of money were laid up in the treaſury; magazines were formed; the army reinforced, and carefully diſciplined; alliances were negociated; and nothing delayed the king's departure at the head of the troops but the ceremony of the queen's coronation. Hiſtorians have aſſerted, and it has been generally credited, that he felt a great repugnance to this ceremonial, and entertained a preſentiment of ſome fatal accident connected with it: a circumſtance naturally ariſing from the ſeveral attempts which had already been made againſt his life. The ſolemnity was performed with extraordinary magnificence. On the next day, May 14, 1610, as he was riding in his coach through the ſtreets, he was ſtabbed by Ravaillac, a mad enthuſiaſt. The wound was inſtantly fatal, he neither roſe nor ſpoke again. Henry IV. was the moſt popular of all the French kings. "He united," ſays Henault, "to extreme frankneſs the moſt dextrous policy; to the moſt elevated ſentiments a charming ſimplicity of manners; to a ſoldier's courage an inexhauſtible fund of humanity." As a king he was diſtinguiſhed by a fellow-feeling for his ſubjects, which is rarely met with in that condition. He had lived ſo much among them that he knew all the detail of common life, and their comfort and proſperity were as much his wiſh as his own glory. Hence he obtained univerſally the epithet of "Good," even from thoſe who would not allow him the title of "Great."

Henry I king of England, ſurnamed Beauclerc, fourth ſon of William the Conqueror, was born in 1068, and ſucceeded to the crown of England upon the death of his brother Rufus, in the year 1100, at which time his elder brother Robert was in Normandy. Robert, unwilling to be diſpoſſeſſed of his right, invaded the kingdom, but at length agreed with Henry to ſurrender his claim on condition of a yearly tribute being paid to him; each brother, by this treaty, was to inherit the dominions of the other in caſe of death without iſſue, and the adherents of both were to receive full pardon. Henry, however, when the danger was over, made no ſcruple of infringing the latter part of the covenant, and the ruin of ſome great families was the conſequence. He now began to meditate offenſive meaſures, invaded Normandy, defeated his brother Robert, made him priſoner, and reduced the whole duchy. It is to his diſgrace that he kept his brother confined in the caſtle of Cardiff till his death, a long ſpace of twenty-eight years. The uſurpation of Normandy involved Henry in continual wars on the continent, and was a ſource of much pecuniary diſtreſs among the Engliſh. Henry was generally ſucceſsful againſt his enemies, but he met with a moſt ſevere domeſtic misfortune, in the loſs of his only ſon William, at ſea, juſt as he was approaching manhood. He was drowned in 1120, on returning from Normandy, together with his ſiſter, whoſe ſhrieks recalled him to the ſinking ſhip after he had got clear off in the long-boat. The unhappy father was never ſeen to ſmile again. Henry governed his dominions with prudence, and though he firmly maintained his authority, he was not deaf to the complaint of grievances. He reformed the court, and withſtood the claims of the papal ſee. He forgave all the debts owing to the crown prior to his acceſſion, and he granted a charter to London, which was probably the firſt ſtep towards rendering that city a corporation. He died in Normandy in 1135, and his remains were brought to England, and interred in the abbey of Reading. This prince was one of the moſt accompliſhed that has ever filled the Engliſh throne: he poſſeſſed all the great qualities both of body and mind, natural and acquired, which could fit him for ſo high a ſtation. By his great progreſs in literature, he acquired the name of "Beauclerc," or the ſcholar. He aboliſhed the curfew-bell, and eſtabliſhed a ſtandard for weights and meaſures. It is obſerved by Mr. Hume, (to whoſe hiſtory we ſhall have recourſe for facts in the following articles, as we have had in this,) "that this prince, from indulgence to his tenants, changed the rents of his demeſnes, which were formerly paid in kind, into money, which was more eaſily remitted to the exchequer. But the great ſcarcity of coin would render that commutation difficult to be executed, while at the ſame time proviſions could not be ſent to a diſtant quarter of the kingdom. This affords a probable reaſon why the ancient kings of England ſo frequently changed their place of abode. They carried their court from one place to another, that they might conſume on the ſpot the revenue of their ſeveral demeſnes." Hume's Hiſt.

Henry II. the firſt of the Plantagenets, born in Normandy in 1132, was the ſon of Geoffrey, count of Anjou, by the empreſs Matilda, daughter of king Henry I. He ſucceeded Stephen to the crown of England in 1154, and one of the early acts of his reign was the diſmiſſing all the foreign mercenaries who had been retained by his predeceſſor. He next ſought for glory on the continent, and added to his dominions the provinces of Anjou, Touraine, Maine, Poictou, Saintonge, Guienne, and Gaſcony. His reign at home was greatly affected by the diſputes between him and Becket, archbiſhop of Canterbury, on account of whoſe murder, the pope obliged the king to undergo penance at Becket's tomb at Canterbury. In 1170 he cauſed his eldeſt ſon to be crowned king of England. After this he conquered Ireland, and the following year his ſons rebelled againſt him, being inſtigated to this unnatural conduct by their mother, on account of Henry's attachment to fair Roſamond Clifford, the theme of popular ballads and romances, not forgotten even at this diſtant period. The ſons of the king, in their uſurpations, were aſſiſted by the kings of France and Scotland, till a peace was concluded between all the parties. In 1182 his ſon Henry died, being in his 20th year, and ſhortly after his third ſon Richard again took up arms againſt his father, and was ſupported in his project by the king of France. Henry, being defeated in Normandy, was obliged to ſubmit to diſgraceful terms. He died in 1189, in the 56th year of his age. Such is the outline of the events of the reign of Henry II. This prince paſſed much more of his time on the continent than in this iſland. He was ſurrounded with the Engliſh gentry and nobility when abroad. The French gentry and nobles attended him when he reſided in England. Both nations acted in the government as if they were the ſame people; and, on many occaſions, the legiſlatures ſeem not to have been diſtinguiſhed. As the king and all the Engliſh barons were of French extraction, the manners of that people acquired the aſcendancy, and were regarded as models of imitation. Henry II. was the greateſt prince of his time for wiſdom, virtue, and abilities, and the moſt powerful in extent of dominion of all thoſe that had ever filled the throne of England. "His character," ſays our hiſtorian, "in private as well as in public life, is almoſt without a blemiſh, and he ſeems to have poſſeſſed every accompliſhment, both of body and mind, which makes a man either eſtimable or amiable. He loved peace, but poſſeſſed both bravery and conduct in war, was provident without timidity, ſevere in the execution of juſtice without rigour; and temperate without auſterity." His care in adminiſtering juſtice had gained him ſo great a reputation, that even foreign and diſtant princes made him arbiter, and ſubmitted their differences to his judgment. He aboliſhed the barbarous cuſtom of confiſcating ſhips which had been wrecked on the coaſt, and he put an end to the odious tax of Danegelt.

Henry III. ſon of king John, was born in 1207, and ſucceeded to the crown of England in 1216. The reign of this prince is the longeſt in the Engliſh annals, but it is not full of events. The early part of it was managed wholly by thoſe who had been appointed his guardians: as he approached to manhood, Henry diſplayed a character totally unqualified for his royal ſtation. One of his firſt falſe ſteps was the diſcarding his ableſt and moſt faithful miniſter Hubert du Burgh, and giving his confidence to rapacious and unprincipled foreigners. He was ſoon obliged to relinquiſh Normandy and the other French provinces, after which a civil war broke out in England, and the king was taken priſoner by the barons. The tide of affairs turning in his favour, he deprived ſeveral of theſe lords of their eſtates, and gave them to his own friends. He cancelled the great charter, and ſuffered the pope to appoint an archbiſhop of Canterbury, and to collect the tenths of the kingdom. He died at St. Edmondſbury in the 64th year of his age, and 56th of his reign. He was noted for his piety and devotion, and for a regular attendance on public worſhip. He was incapable of ſwaying the ſceptre, but was by no means qualified for being a tyrant; yet there are inſtances of oppreſſion in his reign, which are inconſiſtent with all rules of good government. On the whole, it may be affirmed, that greater abilities, with good diſpoſitions, would have prevented him from falling into his faults; or with worſe diſpoſitions, would have enabled him to maintain and defend them.

Henry IV. ſurnamed *Bolingbroke*, the firſt king of the houſe of Lancaſter, was born in 1367. He was the eldeſt ſon of John of Gaunt, duke of Lancaſter, third ſon of Edward III., by the heireſs of Edmond earl of Lancaſter, ſon of Henry III. In the reign of Richard II. he was made earl of Derby, and then duke of Hereford. Under this title he appeared in the parliament of 1398, and preferred an accuſation of high treaſon againſt Mowbray, duke of Norfolk. A challenge enſued, but the king baniſhed the combatants from his kingdom. Hereford, on the death of his father, in 1399, ſucceeded to the dukedom of Lancaſter, and laid claim to the eſtates belonging to his title, which the king refuſed to grant. The duke therefore landed with a retinue to make good his title, and being joined by ſeveral of the diſcontented nobles, he ſoon found himſelf at the head of 60,000 men. The feeble Richard reſigned his crown, and the duke was proclaimed king under the title of Henry IV. The depoſed monarch was ſpeedily removed out of the way, and after a very ſhort time the nobles conſpired againſt the ſovereign, whom they had juſt before elevated to the throne. Their plots were diſcovered, and the authors conſigned to the hands of the executioner. Henry, to ingratiate himſelf with the clergy, profeſſed a high regard for piety, and the intereſts of the church; and to give proof of his zeal, he committed, without heſitation or remorſe, thoſe convicted of hereſy to the flames. A great part of the reign was diſquieted by civil contentions between the houſes of York and Lancaſter, on account of Henry's uſurpation. The continual conteſts which agitated his government brought him, while in the prime of life, into a declining ſtate of health, and he begun ſeriouſly to conſider upon whom his uſurped crown ſhould deſcend. The licentious conduct of his ſon Henry augmented the monarch's cares for futurity; and in proportion to the decay of the king's ſtrength, he was tormented with the apprehenſion of loſing his authority before his death. He endeavoured to tranquillize his conſcience by a reſolution of taking the croſs and viſiting the Holy Land, but he died in March 1413, before he could execute his plans, in the 46th year of his age, and the 13th of his reign. Henry was exceedingly popular when he came to the throne, but he ſoon loſt the favour of the people, who were probably ſhocked at the means he uſed to get and to ſecure the crown, firſt by depoſing and then murdering Richard II. He henceforth governed his ſubjects more by terror than affection, more by his own policy than by their ſenſe of duty or allegiance. His ſituation, if he retained any ſenſe of virtue, was the moſt unenviable that can well be conceived; and the inquietude with which he poſſeſſed his greatneſs, and the remorſes by which, it is ſaid, he was continually haunted, render him an object of our pity. His prudence, vigilance, and foreſight, in maintaining his power, were admirable; his command of temper remarkable; his courage, both military and political, without a blemiſh; and he poſſeſſed many qualities which fitted him for his high ſtation. His reign, upon the whole, has been regarded as beneficial to the nation, and particularly favourable to the rights of the Commons.

Henry V. was born at Monmouth in 1383, and ſucceeded to the throne on his father's death in 1413. In his youth he was very wild, but on coming to the crown he diſcarded his licentious companions, and conducted himſelf with a dignity ſuited to his ſtation. He treated with high reſpect his father's virtuous miniſters, and eſpecially the chief juſtice Gascoine, who had openly vindicated the cauſe of juſtice at the expence of the prince in his diſſipated career. He cauſed the obſequies of the unfortunate Richard to be ſolemnly performed, received to favour thoſe who had ſhewn the greateſt attachment to their lawful ſovereign, and was ſtudious to obliterate every party diſtinction. He had the magnanimity to treat with kindneſs and confidence the earl of Marche, his ſuperior in legal title to the crown, who repaid this liberality with the moſt undeviating fidelity. From a deſire, probably of pleaſing the clergy, he put into execution the laws againſt the Lollards, though they were at that time headed by Oldcaſtle, lord Cobham, a man of conſiderable rank and character. He revived the claims of his predeceſſors upon France, and his firſt ſtep was to ſend over ambaſſadors, offering peace and alliance. The reception which theſe met with not anſwering his expectation, he formed a project for conquering France; left England in the hands of a regency, and invaded that country with a numerous army, at the head of which he diſplayed uncommon courage. With 15,000 men he gained the battle of Agincourt, though the French had nearly four times that number. In another invaſion of France, Henry ſhewed that he aimed at the crown of that country; but in 1420 the duke of Burgundy made an alliance with the Engliſh, which was followed by the famous treaty of Troyes, made by Henry in perſon with the French king, who was in a ſtate of imbecility, and in the hands of his queen and the Burgundian faction. By this treaty, Henry engaged to marry the princeſs Catharine, and to leave Charles in poſſeſſion of the crown of France, on condition, that after his deceaſe, it ſhould go to Henry and his heirs, and thenceforth be inſeparably united to that of England. Henry, after eſpouſing Catharine, took poſſeſſion of Paris, and made himſelf maſter of ſome neighbouring places. He died at Vincennes, at the early age of thirty-four, in the 10th year of his reign. This prince poſſeſſed many virtues, and his abilities appeared equally in the cabinet and the field. The boldneſs of his enterpriſes was no leſs remarkable than his perſonal valour in conducting them. He had the talent of attaching his friends by affability, and of gaining his enemies by addreſs and clemency. The Engliſh, dazzled by the luſtre of his character, ſtill more than by that of his victories, were reconciled to the defects in his title: the French almoſt forgot that he was their enemy, and his care in maintaining juſtice in his civil adminiſtration, and preſerving diſcipline in his armies, made ſome amends to both nations for the calamities inſeparable from thoſe wars in which his ſhort reign was almoſt entirely occupied.

Henry VI., born at Windſor in 1421, was not nine months old at the death of his father Henry V. The kingdom was placed under the protectorſhip of his uncle the duke of Bedford, and the care of the prince was committed to Beaufort, biſhop of Wincheſter. His grandfather Charles, king of France, died ſoon after, and the duke of Orleans, encouraged by the minority of Henry, aſſumed the title of king by the name of Charles VII. This renewed the war; the Engliſh were at firſt ſucceſsful, and Henry was crowned at Paris. The raiſing the ſiege of Orleans by Joan of Arc gave a new turn to affairs, and the Engliſh intereſt rapidly declined. In 1443 a truce was made with France, which was followed by the king's marriage with Margaret of Anjou, daughter of Regnier, titular king of Sicily, Naples, and Jeruſalem, but actually without a ſingle province. Inſtead of obtaining a dowry, the king agreed to renounce the province of Maine in France. The queen, however, poſſeſſed a treaſure in the extraordinary accompliſhments of body and mind, and her maſculine ſpirit was well fitted to compenſate the weakneſs of her huſband. The death of the duke of Bedford was a fatal blow to the cauſe of Henry; and to add to his misfortunes, the York party in England increaſed in ſtrength, and involved the country in a civil war. They adopted the white roſe as their badge of diſtinction, and the Lancaſtrians the red. After various conteſts the king was defeated and taken priſoner. He was treated with great reſpect; for the weakneſs and innocence of his character had impreſſed every one, friends and enemies, with an idea of the ſanctity of his perſon. The queen had now full ſcope for ſhewing herſelf, and carried on the war with ſpirit, and for a time with ſucceſs. At length it was agreed by parliament, who undertook to adjuſt the claims of the contending parties, that Henry ſhould enjoy the crown during his life, and that the duke of York ſhould be his ſucceſſor. While this negociation was going on the queen aſſembled an army in the north, a battle enſued at Wakefield, and the duke of York was ſlain. He left a ſon, Edward, who reſtored the cauſe of the family, and by his ſucceſs obtained the crown by popular acclamation. The people being aſſembled in St. John's Fields, the earl of Warwick demanded if they would have Edward or Henry for their king? The general cry was, for "A York;" the young duke being preſent they elected him king, by the name of Edward IV., and conducted him with great ceremony to the palace where Henry uſed to lodge, when within the walls of the city. This was in the month of March 1461, and it may be accounted the termination of Henry's diſaſtrous reign. He was, however, ſtill the ſport of fortune, being again recognized, and again impriſoned: at length he died in 1471, in the Tower of London, but whether by a violent or natural death is not known. Henry was gentle, pious, and well intentioned, but too weak ever to act for himſelf. It is to his praiſe that the moſt ſplendid eſtabliſhment in England for claſſical learning, Eton College, reveres him as a founder. To him, likewiſe, King's College in Cambridge owes its original foundation.

Henry VII., firſt of the race of Tudors, born in 1457, was ſon of Edmond, earl of Richmond, and grandſon of Owen Tudor and Catharine of France, the widow of Henry V. His mother was the only child of John, duke of Somerſet, grandſon of John of Gaunt. He was thus the repreſentative of the Somerſet branch of the royal houſe of Lancaſter. During the uſurpation and tyranny of Richard III. the people looked to the earl of Richmond, as a young prince who might reſtore legal government in England, and a match was projected between him and Elizabeth, eldeſt daughter of Edward IV., which ſhould unite the two houſes of York and Lancaſter. Richard diſcovered the plan, and determined to defeat it, by marrying the lady himſelf, and applied to the court of Rome for a diſpenſation for that purpoſe, ſhe being his own niece. Richmond, finding that there was no time to loſe, landed at Milford Haven, at the head of two thouſand troops, and was immediately joined by many perſons of rank and conſequence in that part of the country, by whoſe influence and example he ſoon found himſelf at the head of ſix thouſand men. Richard met him in Boſworth field, with an army of double that number, but victory decided for the earl, the king was ſlain, and the conqueror was hailed on the field of battle with the title of Henry VII. Parliament was ſoon aſſembled, who recognized his right, and he was crowned previouſly to his marriage with Elizabeth, the heireſs of the houſe of York, though the nation was extremely deſirous of this alliance, as uniting the claims of the two rival houſes, and precluding farther civil wars. He was married in the following year; but leſt people ſhould ſuppoſe that he claimed the crown ſolely upon the ſtrength of this alliance, he deferred her coronation for ſome time, by which, he wiſhed the priority of his own claim to be underſtood. He choſe for his confidential ſervants Morton and Fox, two clergymen, from whom he probably expected more obſequiouſneſs, than from the nobility of the realm. Diſcontents ſoon aroſe, and while he was on a journey into the north, an inſurrection took place, which was ſoon ſuppreſſed; but a more ſerious diſturbance, almoſt immediately ſucceeding the other, was excited by a prieſt, who procured Lambert Semnel, a youth of fifteen, ſon of a baker, to perſonate the earl of Warwick, ſon of the duke of Clarence, whom Henry had confined in the Tower. Semnel was ſent to act his part in Ireland, and was actually proclaimed king at Dublin. He then ventured over to England, where he was led to expect ſupport from the adherents to the duke of York, but the king having cauſed the true earl of Warwick to be publicly ſhewn in the ſtreets of London, few were diſpoſed to join the impoſtor. A battle however enſued, in which the leaders of the rebels were ſlain, and all who had given the ſmalleſt countenance to the conſpiracy were ſeverely fined; avarice, rather than revenge, being the ruling paſſion of Henry. Young Semnel he treated with contempt, by giving him freely his life, and making him the ſcullion of his kitchen. Semnel had been encouraged in his projects by the ſiſter of Edward IV., the ducheſs dowager of Burgundy, governeſs of the Low Countries, who never ceaſed to purſue Henry. Her court had been the refuge of the mal-contents; and ſhe now brought forward a new adventurer on the ſtage. She propagated a report that Richard, the younger of the ſons of Edward IV., ſuppoſed to have been murdered in the Tower, had eſcaped that fate, and ſince lived in ſecrecy: ſhe accordingly procured Perkin Warbeck, ſon of a converted Jew, of Tournay, a youth of a very prepoſſeſſing figure, to aſſume the character of that prince. This ſtory ſoon reached the ears of the king, who employed every method in aſcertaining the real birth of the pretender, and in gaining information reſpecting his ſupporters. Many of theſe were arreſted, and convicted of high treaſon, among the reſt Stanley, lord chamberlain, the brother of Henry's ſtep-father, and one who had been very inſtrumental in raiſing him to the throne. This execution prevented, for the preſent, any open inſurrection in favour of Perkin, and when his friends put him forward to ſupport the cauſe he had undertaken to advocate, he was glad, after a trifling ſtand, to ſeek the protection of a ſanctuary. His wife, lady Catharine Gordon, fell into the king's hands, who treated her with reſpect and generoſity, and placed her about the perſon of the queen, with a liberal penſion. Perkin delivered himſelf up on the promiſe of pardon; he was led in mock triumph through the ſtreets of London, and then committed to the Tower. Here he engaged in a conſpiracy for liberating the earl of Warwick; the plot was diſcovered and he was hanged. Soon after this, Henry fixed an indelible ſtain on his memory by the execution of the earl of Warwick, for no other crime than an attempt to recover his liberty, of which he had been unjuſtly deprived. Henry was now at peace, and his favourite purſuit was that of filling his coffers at the expence of his ſubjects. In this he was aſſiſted by two lawyers named Empſon and Dudley, who were well qualified for the work of extortion. The courts of juſtice were in no reign made ſo much the engines of oppreſſion, as under theſe infamous and hard-hearted miniſters, and the king, with the moſt inſatiable rapacity, took his ſhare in all the ſpoils accruing from their pillage. As, however, he declined in life his conſcience ſmote him, and he began to appeaſe the upbraidings of his mind by the uſual methods, then reſorted to, of alms, religious foundations, and other acts of atonement. He even directed reſtitution to be made to ſome whom he had injured. He reigned 24 years, and greatly increaſed the trade and commerce of the country. He died in 1509, in the fifty-ſecond year of his age. The reign of Henry VII. was, in the main, fortunate for his people at home, and honourable abroad. He put an end to the civil wars, with which the nation had long been harraſſed: he maintained peace and order in the ſtate; though often ſevere in his puniſhments, he was commonly leſs actuated by revenge than by maxims of policy. He was always extremely attentive to his affairs, but not a deep-ſighted politician; he was more expert in providing a remedy for his miſtakes, than judicious in avoiding them. Avarice, as we have ſeen, was his ruling paſſion, and he remains an inſtance, almoſt ſingular, of a man placed in a high ſtation, and poſſeſſed of talents for great affairs, in whom that paſſion predominated above ambition. This reign was the era of that depreſſion of the feudal nobility, and elevation of the middle ranks of ſociety, to which England has owed her proſperity. This ſeems to have been the conſtant aim of Henry, and it was eſpecially effected by the ſtatute which allowed of the breaking of entails, and alienation of landed eſtates.

Henry VIII. ſucceeded his father at the age of 18, and the firſt years of his reign were extremely popular. No prince ever aſcended a throne under happier circumſtances. He had a full treaſury, an undiſputed title, ſubjects flouriſhing in the arts of peace, and in friendſhip with all the neighbouring powers. He began his reign by ſacrificing to popular odium, Empſon and Dudley, whoſe extortions were made a matter of judicial proſecution; and he appointed his miniſters from the beſt and moſt virtuous of his father's counſellors. He celebrated a marriage with the Infanta Catharine of Arragon; but a great diſparity of years and diſpoſition rendered it an ill-ſorted union. The emperor Maximilian and pope Julius II. having leagued againſt France, perſuaded Henry to join them; and he accordingly invaded that kingdom, where he made ſome conqueſts, and might probably have carried his arms to Paris had he purſued his advantages, inſtead of which he waſted his time in beſieging frontier towns. His chief conqueſt was Tournay, to the ſee of which he inducted Wolſey, now become his prime miniſter. His arms at home were attended with much more ſucceſs. James IV. of Scotland had invaded England, and was completely defeated at Flodden field, where the king and his principal nobility periſhed. Henry immediately granted peace to the queen his ſiſter, declared regent, and eſtabliſhed an influence which rendered his kingdom ſecure on that ſide. In the following year Henry made peace with France on condition of his retaining Tournay, and receiving a large payment of money, part of which was to be returned as a portion, with the princeſs Mary, Henry's ſiſter, whom Lewis eſpouſed, notwithſtanding a great inequality of age. That king ſurvived his marriage only three months, and his widow afterwards united herſelf to the duke of Suffolk, her brother's principal favourite. Henry ſet no bounds to the confidence repoſed in Wolſey, and heaped upon him, with a moſt laviſh hand, all ſorts of dignities and honours, productive alſo of immenſe revenues. At length he made him his high chancellor. The ambition of this prieſt kept pace with the honours beſtowed on him; and while apparently ſubſervient to the will of the king, his influence directed all and governed all. Francis I. had ſucceeded to the crown of France, and was diſpoſed to employ every method for his own aggrandiſement. His firſt neglect of Wolſey produced hoſtilities from the emperor Maximilian, influenced, it was thought, by Engliſh gold. Francis ſaw his error, and determined, if poſſible, to gain the friendſhip of Henry. By proper applications to Wolſey he induced him to perſuade his maſter to reſign, for a ſum of money, the conqueſt of Tournay, and enter into an amicable correſpondence. In 1520 the two kings met between Guiſnes and Ardres, the magnificence of which aſſembly gave the place the name of "the field of the cloth of gold." Though Francis uſed all his addreſs to ingratiate himſelf with the Engliſh king and miniſter, yet a preponderancy was given to the intereſts of the Engliſh councils. The ſacrifice of the duke of Buckingham to the enmity of Wolſey, on a charge of high treaſon, while it was a further proof of the miniſter's influence, aggravated that general odium under which he began to labour. At this period the principles of the reformation were making progreſs, to the great alarm of the votaries of the Roman Catholic church. Ambitious of glory of every kind, Henry wrote a book againſt the tenets of the reformer, which he preſented to pope Leo X. and was, in return, honoured with the title of "Defender of the Faith," which is ſtill preſerved by his Proteſtant ſucceſſors. Luther publiſhed a reply, in which he treated his antagoniſt with very little ceremony. Henry's attachment to the Roman ſee was of no long duration; for, having conceived an affection for Ann Boleyn, he determined to divorce Catharine, to whom he had been married 18 years. His plea for the divorce was, that Catharine was his brother Arthur's widow. The pope refuſed to grant him his wiſhes, and Henry, ſtung with the refuſal, married privately, and aſſumed the title of Supreme Head of the Engliſh church, put down all monaſteries, and alienated their poſſeſſions to particular purpoſes. Thus was effected the great revolution which has diſtinguiſhed this reign in the annals of eccleſiaſtical hiſtory, and made it the commencement of an era of comparative light and reaſon. Though Henry had given ſo great a blow to the power of the Romiſh church, it was not his intention to diſcard its theological ſyſtem; and he diſplayed a rooted averſion from the principles of the reformers by favouring a perſecution which brought ſeveral of them to the ſtake. Fiſher and More, both learned, wiſe, and pious characters, were the victims of his malignant cruelty. From this period the reign of Henry VIII. is that of a ſtern tyrant, who ſacrificed, without ſcruple, every obſtacle to his capricious will. The new queen, who was attached to the opinions of the reformers, fell under the ſuſpicion of infidelity to her huſband; and by means of the ill offices of her enemies, ſhe was ſent to the Tower, tried, and convicted. All attempts to ſave her life were in vain, and her fate was haſtened by the king's paſſion for Jane Seymour, whom he married the day after Anne Boleyn was executed. In 1537 Henry was delighted with the birth of a male heir; but his joy was allayed by the death of his queen ſoon after delivery. It was not till the year 1538 that the ſuppreſſion of the religious houſes was completed. The king's indignation fell particularly upon Thomas à Becket, the ancient aſſertor of eccleſiaſtical againſt royal authority. He not only pillaged the rich ſhrine, but cited himſelf into the court, had him condemned as a traitor, expunged his name from the calendar, and burnt his bones to aſhes. It had been well if the tyrant had been content with abuſing the dead; but the weight of his royal power fell upon Lambert, an unoffending ſchoolmaſter, who was accuſed of hereſy, and who was tied to a ſtake, and burnt alive, with circumſtances of unuſual cruelty. Soon after a committee of parliament was appointed to draw up articles for uniformity of religion. The act enforcing them was called the Bloody Bill, on account of its ſeverity to Proteſtants; for, by the firſt article, the denial of the real preſence ſubjected a perſon to the fire, even without the privilege of abjuration. The ſervility of the parliament laid the civil and religious liberties of the nation alſo at the king's feet; for an act was paſſed, giving to the royal proclamations all the force of the ſtatute law. Henry next married Anne of Cleves, daughter to the duke of that name, a prince of great influence with German Proteſtants; but as ſhe did not prove agreeable to the king's expectations, he put her away, and cauſed Cromwell, earl of Eſſex, the projector of the match, to be beheaded. He then married Catharine Howard, niece to the duke of Norfolk, who proved unfaithful to him, and was beheaded for adultery. This marriage put him into the hands of the Catholics, and a rigorous perſecution was carried on againſt the Proteſtants. When the queen's infidelity was diſcovered, the king inſiſted that his complying parliament ſhould make it high treaſon for any woman, whom the king might hereafter marry, to paſs herſelf for a virgin, not being ſuch. In 1543 Henry took his ſixth wife, Catharine Par, widow of lord Latimer, a lady of much merit, and inclined to the reformation; and, in the following year, he regulated the ſucceſſion to the crown by a bill in parliament, declaring his ſon Edward, and any future male iſſue, his immediate heir, and after them the princeſſes Mary and Elizabeth, who were thus legitimated. He was now anxious to ſettle the religion of the country, and obtained ſuch powers from parliament as rendered his will the ſole authority in this point. Archbiſhop Cranmer was obnoxious to the Catholic party on account of his hereſy; and his ruin was only prevented by the perſonal eſteem and friendſhip of the king. The queen was in ſimilar danger, and articles of impeachment were actually ordered to be drawn up againſt her; but, being timely warned of her danger, ſhe found means, by artful humility and ſubmiſſiveneſs, to remove her huſband's ſuſpicions, and regain his favour. Diſeaſe aggravated the violence of Henry's paſſions. The duke of Norfolk, and his ſon, the earl of Surrey, fell under his diſpleaſure. They were arreſted, and the latter convicted, on ſcarcely any evidence, of high treaſon, and executed. The duke eſcaped by the approaching end of the king; but, till the laſt ſtage of his illneſs, he was anxious that his old ſervant ſhould be purſued, without evidence, to death. When Henry was informed that his end was nearly arrived, he deſired that Cranmer might be ſent for; but before he could come the king was ſpeechleſs, and could only, by preſſing his hand, give token of his dying faith. He expired on the 28th of January 1547, in the 38th year of his reign, and 56th of his age. The abſolute and uncontrolled authority which he maintained at home, and the regard which he acquired among foreign nations, are circumſtances which entitle him in ſome degree to the appellation of a great prince, while his tyranny and barbarity exclude him from the character of a good one. He poſſeſſed great vigour of mind, which qualified him for exerciſing dominion over men, courage, intrepidity, vigilance and inflexibility. A catalogue of his vices would comprehend many of the worſt qualities incident to human nature; but he was not altogether deſtitute of virtues. He was open, ſincere, gallant, liberal, and capable at leaſt of a temporary friendſhip and attachment. He never was the object of his people's hatred; and he may be ſaid in ſome degree to have poſſeſſed to the laſt their love and affection.

This vindictive and voluptuous monarch had ſtudied muſic very ſeriouſly in his youth, according to lord Herbert of Cherbury, who tells us in his life that "his education was accurate, being deſtined to the archbiſhopric of Canterbury, during the life of his elder brother, prince Arthur. By theſe means, not only the more neceſſary parts of learning were infuſed into him, but even thoſe of ornament, ſo that beſides being an able Latiniſt, philoſopher, and divine, he was (which one might wonder at in a king) a curious muſician; as two entire maſſes compoſed by him, and often ſung in his chapel, did abundantly witneſs." And Burnet, though he denies, in his Hiſtory of the Reformation, part i. p. 11. that Henry was ever intended for the church, yet allows that he was better educated than any other prince had been for many ages; and that he was "a good muſician, as appears by two whole maſſes which he compoſed;" but adds, that "he never wrote well, but ſcrawled, ſo that his hand was ſcarcely legible."

Hollinſhed likewiſe (Chron. iii. 806.) informs us, in deſcribing the manner in which Henry employed his time, during his progreſs from one palace to another, that "he exerciſed himſelf daylie in ſhooting, ſinging, dancing, wreſtling, caſting of the barre, plaieing at the recorders, flute, virginals, in ſetting of ſonges, and making of ballades."

The attention that was paid to choral muſic during the reign of this prince, before his breach with the Roman pontiff, may be collected from a ſet of regulations given to the royal houſhold about the year 1526 by cardinal Wolſey; in which it is ſaid, that "when the king is on journies or progreſſes, only ſix ſinging boys, and ſix gentlemen of the choir, ſhall make a part of the royal retinue; who daylie in abſence of *the reſidue* of the chapel, ſhall have a maſſe of our ladie before noon, and on Sondaies and holidaies, maſſe of the daie, beſides our lady-maſſe, and an anthempne in the afternoon: for which purpoſe, no *great carriage* of either veſtments or bookes ſhall require."

It is generally allowed that Henry could not only perform the muſic of others, but was ſufficiently ſkilled in counterpoint to compoſe the pieces that go under his name. See an anthem in Boyce's collection. He was likewiſe author of a motet, of which Dr. Hayes of Oxford was in poſſeſſion of a genuine copy.

Henry was doubtleſs a judge and encourager of the muſical art; and had, beſides the houſhold band on the eſtabliſhment, according to the ancient cuſtom of our ſovereigns, ſupernumerary muſicians in his ſervice; as we find in Rymer's Fœdera a grant to William Betum of 20*l.* ſterling per annum, A.D. 1537, and another grant of 50*l.* per annum to the eldeſt of four brothers, muſicians, of the name of Baſſam, 1540. The ſecond had 2*s.* 4*d.* per diem, and the two youngeſt 20*d.*

The fluctuating ſtate of religion in England, during this turbulent reign, was ſuch as muſt have kept the inhabitants in perpetual terror both for ſoul and body; as what was ordered under ſevere pains and penalties to be practiſed and believed as neceſſary to ſalvation at one period, at another was pronounced illegal, heretical, and damnable. Muſic in the church, however, appears to have undergone no other change at this time than in being applied in ſome parts of the ſervice to the Engliſh inſtead of the Latin language; but though choral muſic was not much affected by the ſmall progreſs that was made in the reformation under this prince, yet it was in frequent danger of utter abolition by the violence of the times, and fanaticiſm of the moſt furious reformers.

After Henry's breach with the Roman pontiff, ſeveral ſlight alterations were made in the liturgy, yet ſtill the ſervice was in Latin, and ſung in the uſual manner.

The king's Primer, in Engliſh, was publiſhed in 1535.

In 1536, Tyndal's tranſlation of the whole bible was not only printed, but ordered to be received into churches.

In 1538, a folio tranſlation of the bible was ordered to be had in every church; this was Tyndal's, with a few alterations by Coverdale.

In 1539, the Bloody Act, or Six Articles of Convocation, paſſed; and in the ſame year, a book of Ceremonies was publiſhed, in which is the following paſſage favourable to choral muſic: "The ſober, diſcrete, and devout ſinging, muſic, and playing with organs, uſed in the church, in the ſervice of God, are ordained to move and ſtir the people to the ſweetneſs of God's word, the which is ther ſung: and by that ſweet harmony both to excite them to prayer and devotion, and alſo to put them in remembraunce of the heavenly triumphant church, where is everlaſting joy, continual laud, and praiſe to God."

Henry, prince of Wales, and the eldeſt ſon of James I. was born at Stirling in 1594. He was an amiable and accompliſhed prince, and a great patron of learning. He died in 1612 to the grief of the nation, which had formed of him the higheſt expectations.

Henry of Huntingdon, an Engliſh hiſtorian, canon of Lincoln, and archdeacon of Huntingdon, flouriſhed in the 12th century. He wrote a hiſtory of England to the year 1154, which was publiſhed in 1576.

Henry, duke of Viſeo, fourth ſon of John I. king of Portugal, was born in 1393. In very early life he ſhewed an ardent attachment to the ſtudy of mathematics and coſmography, which was encouraged by his father, who provided for him the beſt maſters of the age. He had a paſſion for glory and naval enterpriſe, and ſerved with diſtinction at the reduction of Ceuta, and in other engagements in Africa, and was made by his father commander in chief of the Portugueſe forces in that country. He ſent out, while he was a very young man, a veſſel upon a voyage of diſcovery, which reached Cape Bojador, and its ſucceſs cauſed him entirely to devote himſelf to that object. Near Cape St. Vincent, in Algarvè, he obſerved a commodious ſituation for a ſea-port, and there built his town of Sagrez, which, in its plan and fortifications, ſurpaſſed any other in Portugal. He erected arſenals, made docks and yards for ſhip-building, extended the uſe of the compaſs, and determined the modes of aſcertaining the longitude and latitude by aſtronomical obſervations. In 1418 he attempted to double Cape Bojador, but failed, and proceeded only to an iſland which he named Puerto Santo. In the next year his people diſcovered Madeira: in 1434 one of his captains paſſed Cape Bojador, and in the following year he carried his diſcoveries conſiderably farther. In 1442 another of his captains brought back from the coaſt of Africa ſome Guinea negroes, and a quantity of gold-duſt. This occaſioned the eſtabliſhment of a trading company under the auſpices of the prince. The diſcovery of the Azores took place in 1448, and in 1449 the prince's fleets diſcovered the Cape Verde Iſlands, and coaſted ſixty leagues beyond the Cape. Henry received every aſſiſtance in his darling project from the court of Portugal; but at length a miſunderſtanding, between his brother Don Pedro and his nephew, king Alonzo V. threw obſtacles in his way. He went to court in order to protect his brother; but, failing in his purpoſe, he returned to the town of Sagrez, where he finiſhed his uſeful life about the year 1460. He was, ſays the hiſtorian, one of the greateſt characters that his country ever produced, and may be regarded as the author of all the commercial proſperity to which Portugal attained by her Eaſt Indian poſſeſſions.

Henry, Nicholas, was born at Verdun in the year 1692, but nothing more than this is known of him till he was tutor to the ſons of M. Joly de Fleury, attorney-general to the parliament of Paris. In 1723 he was appointed Hebrew profeſſor in the college royal; and ſhortly after gave a new edition of Vatable's "Biblia Sacra," in two volumes folio, with additional notes. He was very converſant with the hiſtory of his own country, and left behind him ſome curious diſquiſitions relative to the public rights of the French, with a particular reference to the reigns of Philip-Auguſtus, Lewis VIII., and St. Lewis. He was accidentally killed by the fall of a building in 1752, when he was in the ſixtieth year of his age. Moreri.

Henry, Matthew, was born at Broad-Oak, in Flintſhire, in the year 1663. His father, Mr. Philip Henry, was a clergyman of conſiderable learning, and greatly eſteemed for his piety. He was one of the ejected miniſters who choſe rather to quit their livings than abandon the rights of conſcience. His ſon Matthew, the ſubject of this article, was educated at home, and made very conſiderable progreſs in all the branches of learning at that time taught. When he was about eighteen years of age he was ſent to an academy for the education of young perſons for the miniſtry, which was under the ſuperintendance of Mr. Doolittle at Iſlington, where he purſued his ſtudies with much ardour. Here he continued only two years, when his tutor was compelled, by the perſecuting ſpirit of the times, to diſmiſs his pupils. In 1685 Mr. Henry went to Gray's Inn, London, with the intention of ſtudying the law, but the real bent of his mind was for theological purſuits, and here he promoted meetings for the purpoſes of Chriſtian devotion and the ſtudy of the ſcriptures. Having been little more than a year in London, he returned to his father's, and began to preach whenever an opportunity occurred. His ſervices were generally acceptable, and he was ſoon invited to ſettle as paſtor with a congregation of diſſenters at Cheſter, with which he complied. After a reſidence of twenty-five years at Cheſter, he removed to Hackney, where his labours as a preacher in that village, and in London, were almoſt inceſſant. He died at Nantwich, in Cheſhire, in 1714, as he was returning from a viſit to his old congregation. He was only in the fifty-ſecond year of his age, and his death was univerſally lamented among his friends, and the diſſenters at large. His great work as an author was "Expoſitions on the Bible," in five volumes folio, of which four contain the Old Teſtament, and the fifth the Evangeliſts and the Acts of the Apoſtles. Another volume, had he lived to complete it, would have accompliſhed his plan, but he died before he had given the expoſition to the Romans. It was afterwards finiſhed by Dr. Evans. This work has been frequently reprinted, and is now a ſtandard book with the Calviniſtic party. He was author of many other ſmaller works, of which his "Catechiſms" and "Method of Prayer" are the moſt popular.

Henry, Robert, was ſon of a farmer at Muir-town, in the pariſh of St. Ninians, Scotland, where he was born in

1718. Having gone through a courſe of ſchool learning, he went to purſue his maturer ſtudies at the univerſity of Edinburgh. He afterwards became maſter of the grammar ſchool of Annan, and in 1746 was entered a licenſed preacher in the church of Scotland. He accepted an invitation to officiate as paſtor to a congregation of diſſenters at Carliſle, in which ſituation he continued 12 years, when he removed in 1760 to a ſimilar ſtation at Berwick-upon-Tweed. Here, to an aſſiduous diſcharge of the duties of his office, he united the cultivation of general literature. About the year 1763 he turned his thoughts to the compoſition of an extenſive hiſtory of England on a new plan. He ſoon found it impoſſible to carry on his reſearches at ſuch a place as Berwick, which was the principal reaſon for his removal, in 1768, to Edinburgh, where he was appointed miniſter to the New Grey Friars church. After a few years, he exchanged this for the old church, which he ſerved the reſt of his life. The degree of doctor of divinity was conferred on him in 1770, and in 1774 he was choſen moderator of the general aſſembly of the church of Scotland. In 1771 he publiſhed the firſt volume of his hiſtory in quarto; this was followed by four others at different periods between the former year and 1785. The plan of Dr. Henry is to throw the ſeveral topics of hiſtorical information in ſeparate chapters, ſeven in number, all of which are ſynchronous in their period, and each treats of its reſpective ſubject detached from the reſt. The *firſt* chapter in each book contains the civil and military hiſtory of Great Britain; the *ſecond* contains the hiſtory of religion; the *third*, the hiſtory of the conſtitution, government, laws, &c.; the *fourth* comprehends the hiſtory of learning, learned men, and ſeminaries of learning; the *fifth*, the hiſtory of the arts; the *ſixth*, the hiſtory of commerce, money, coin, &c.; and the *ſeventh*, the hiſtory of the manners, &c. of the people of Great Britain. The plan was really new, and it excited much malignant criticiſm from a party of his countrymen, who did what they could to write it down, but he went on ſteadily, and at length eſtabliſhed its reputation, and obtained a very conſiderable ſum as an author's profit. The earl of Mansfield, to whom the octavo edition of the work is dedicated, thought ſo highly of its merit, that he procured from his majeſty, in the year 1781, a penſion of 100*l.* per annum for the author, which he enjoyed till his death. This hiſtory was the principal object of Dr. Henry's attention for almoſt thirty years of his life. His health began to decline as ſoon as he had publiſhed his fifth volume in 1785, but he was not diſabled from purſuing his ſtudies till the ſummer 1790. He died in the following November, in the ſeventy-third year of his age. He bequeathed his books to the magiſtracy of Linlithgow, as the foundation of a public library in that town. Dr. Henry's private character was amiable; he was fond of ſociety; much attached to his friends, and ever ready to perform offices of kindneſs. The five volumes of his "Hiſtory" publiſhed in his life-time, carried the ſubject down to the acceſſion of Henry VII. A ſixth volume, which he had prepared for the preſs, and which concludes the reign of Henry VIII. was publiſhed in 1793, with a life of the author prefixed, from which, and the preface to the hiſtory, the foregoing facts are taken.

Henry, in *Geography*, a mountainous county of Virginia; bounded N. by Franklin, S. and S.E. by Patrick, S.W. by Griſon, and N.W. and W. by Montgomery. It is about 40 miles long, and 15 broad; and contains 3844 free inhabitants, and 1415 ſlaves.—Alſo, a county of Kentucky, containing 3258 inhabitants, of whom 406 are ſlaves.—Alſo, a cape which is the N.E. extremity of Princeſs Ann county in Virginia, 12 miles S. by W. of cape Charles in Northampton county. Theſe capes form the entrance of Cheſapeak bay. Cape Henry lies in N. lat. 37°. W. long. 76° 16'.

Henry, *Cape*, is alſo a cape on the W. coaſt of Queen Charlotte's iſland in the N. Pacific ocean. N. lat. 52 53'. E. long. 227° 45'.

HENSDALE, a town of America, in the ſtate of New Hampſhire; 70 miles W.N.W. of Boſton.

HENSHAW's Town, a town of Africa, in Calbari. N. lat. 5° 27'. E. long. 7° 52'.

HENSIN, or Hensingen, a town of France, in the department of the Foreſts; 12 miles E.N.E. of Baſtogne.

HENSLOW Cape, a cape on the S. coaſt of New Georgia. S. lat. 10°. E. long. 160 38.

HENTINGS, in *Agriculture*, a term uſed by the farmers for a particular method of ſowing before the plough; the corn being caſt in a ſtraight line juſt where the plough is to come, is by this means preſently ploughed in. By this way of ſowing they think they ſave a great deal of ſeed and other charges, a dextrous boy being as capable of ſowing this way out of his hat, as the moſt ſkilful ſeeds-man. Plott's Hiſt. Oxfordſhire, p. 251.

Henting is alſo a term uſed by the ploughmen, and others, to ſignify the two furrows that are turned from one another at the bottom, in the ploughing of a ridge. The word ſeems to be a corruption of *ending*, becauſe thoſe furrows make an end of ploughing the ridges. The tops of the ridges they call veerings.

HENWEED, Guinea, in *Botany*. See Petiveria.

HENZUAN. See Joanna.

HEORDPENNY, in our *Old Writers*, the ſame with what at firſt was called *Romeſcot*, and afterwards *Peterpence*.

The word is Saxon, from *heorth*, *focus*, a *hearth*, and *penning*, *denarius*, a *penny*.

HEP, or Hip, in *Botany*. See Rosa *Canina*.

Heps, or *Hips*, *Conſerve of*, in the *Materia Medica*. See Conserve.

HEPAR, in *Anatomy*. See Liver.

Hepar, in *Chemiſtry*. See Liver.

Hepar, *Sulphuris*. See Sulphuret.

Hepar *Uterinum*, the ſame with placenta.

HEPATALGIA, in *Medicine*, from ἧπαρ, *hepar*, the *liver*, and ἄλγος, *pain*, a term employed by the noſologiſts to denote thoſe chronic diſorders of the liver, which are accompanied with pain in that organ.

In the ſyſtem of Sauvages this conſtitutes a genus, which is ſub-divided into eight ſpecies, according to the modification of the diſeaſe in the liver, which gives riſe to the pain. Hence we have (ſpecies 1.) Hepatalgia *calculoſa*, originating in the violent diſtention of the biliary ducts, occaſioned by the paſſage of a biliary concretion or calculus. 2. H. *ſcirrhoſa*, connected with a ſcirrhous ſtate of the liver. 3. H. *infarctus*, from obſtruction in that organ, the *Hepatis infarctus* of Juncker and others. Among the other ſpecies are alſo Hepatalgia *ſarcomatoſa*, and *apoſtematoſa*, ariſing from a fleſhy growth, or mere enlargement of the liver in the one caſe, and an abſceſs in its ſubſtance in the other. (See Sauvages Noſol. Method. claſs vii. genus 23. alſo the ſyſtem of Sagar.) But as the pain in the region of the liver, in ſuch caſes, is only one among the many ſymptoms, which accompany theſe various derangements of the organ, we ſhall refer the whole to one head. See Liver, *chronic diſeaſes of the*.

HEPATIC, in *Anatomy*, from *hepar*, the liver, the epithet by which various parts belonging to the liver are deſcribed, ſuch as its artery, veins, excretory duct, and nerves. See Liver.

Hepatic *Air.* See Sulphuretted Hydrogen Gas.

Hepatic *Aloes.* See Aloes.

Hepatic *Duct,* is a veſſel more uſually called *porus bilarius.*

Hepatic *Flux*, *fluxus hepaticus*, or *hæpatirrhœa*, in *Medicine*, denominations given by the older writers, upon hypothetical grounds, to a variety of diarrhœa, in which watery ſtools, coloured with ſome blood, are diſcharged without fever, and commonly without pain. Juncker, Sauvages, &c. See Diarrhœa.

Hepatic *Plexus.* See Plexus *hepaticus.*

Hepatic *Vein,* is that otherwiſe called *baſilica.*

HEPATICA, in *Botany*, ſee Anemone. It was ſo called becauſe the ſmooth three-lobed and dull-purpliſh leaf was thought to convey ſome idea of the human liver. Dillenius made it a diſtinct genus, on account of the three-leaved calyx; which, however, being a little remote from the flower, was taken by Linnæus for an *involucrum,* as an undoubted ſpecies of *Anemone,* and not a *perianthium.*

Hepatica alba is an old name for the *Parnaſſia paluſtris*; and *H. paluſtris* was once an appellation of the *Chryſoſplenium.*

Hepatica is alſo the old name of the *Lichen* of *Dillenius, Marchantia* of Linnæus, ſuppoſed to be good for diſeaſes in the liver; ſee Marchantia. Hence the term has recently been adopted to deſignate a newly-eſtabliſhed order of plants, to which that genus belongs. See Hepaticæ.

Hepatica, in *Gardening,* the common name of a tuberous-rooted flowering plant. See Anemone.

HEPATICÆ, in *Botany*, a natural order of the cryptogamic claſs of vegetables; ſee Hepatica. Hoffmann, in his Fl. Germ. v. 2. 81, defines the vegetables of this order as *ecalyptrata*, deſtitute of the hood or veil which is proper to moſſes, and which is elevated from its torn baſe by their ripening capſules. This is incorrect, for the *calyptra* is preſent in the *Hepaticæ*, only not raiſed up with the capſule, but burſting at the top to let it paſs, as is properly expreſſed in Schreber's Gen. Pl. 750. In the *Flora Britannica,* the order in queſtion is thus defined.

Herb frondoſe (conſiſting of leaf and ſtem united). Capſules deſtitute of an operculum.

There is ſome difficulty with regard to the firſt part of this character in the genus *Jungermannia*, ſome of which are indeed as truly frondoſe as any of the order, but the greater part have a diſtinct ſtem, with leaves, and even ſtipulas, at leaſt in appearance. We nevertheleſs are inclined to perſiſt in the above definition, and to conſider the herbage of every *Jungermannia* as a frond, the ſuppoſed leaves being only ſegments or leaflets thereof, and the ſtipulas mere acceſſory ſcales, as in Ferns. In defence of this idea, it muſt be obſerved that the apparent leaves and ſtem are always of one homogeneous cellular texture, perfectly united or continuous, and that there is never any ſolution of continuity between thoſe parts, like the fall of the leaf in other plants, at any period of their growth.

The genera of this order, all Britiſh, ſtand thus in Schreber. *Marchantia, Jungermannia, Targionia, Anthoceros, Blaſia, Riccia* and *Sphærocarpus.*

Their habit is nearly of the ſame vaſcular, or reticulated, reviveſcent nature as that of moſſes. The preciſe mode of their fructification or impregnation is ſcarcely at all underſtood. The internal ſtructure, and arrangement of parts, of their fruit, is often very peculiar and elaborate, chiefly tending, as it ſeems, to the diſperſion of their ſeeds, by means of elaſtic or hygrometric fibres.

HEPATIS Infarctus, in *Medicine*, ſignifies, in the language of the older writers, an obſtruction or congeſtion of blood in the liver, and is ſynonymous with the Hepatalgia infarctus of Sauvages, above mentioned. See *Chronic Diſeaſes of the* Liver.

HEPATITIS, from ἧπαρ, *hepar*, *the liver*, with the termination *itis*, ſignifies inflammation of the liver.

The liver, like moſt other parts of the body, is liable to inflammation under two forms, the *acute* and the *chronic*; and it has generally been ſuppoſed that theſe varieties of diſeaſe conſiſt, in fact, of a difference in the ſeat of the inflammation. Some phyſicians have ſuggeſted that the inflammation is of the acute form, when the enveloping membrane of the liver is affected; and of the chronic form when the parenchyma, or ſubſtance of the organ itſelf is inflamed. (See Dr. Cullen's Firſt Lines, § 418.) While others have conceived, that the acute inflammation appears, when the extremities of the hepatic artery are particularly affected; and the chronic, when the branches of the hepatic vein, or *vena portæ,* which conveys the principal portion of blood to the liver, is the ſeat of the morbid action. (See Dr. Saunders, on the Structure and Diſeaſes of the Liver, chap. iv. p. 259. 3d edit., &c.) Of the laſt ſuppoſition, Dr. Cullen thinks that there is neither evidence nor probability: and we may add, that, as the two analogous forms of inflammation occur in other organs, as in the lungs, and the ſtomach, in which the whole circulation is conveyed by one ſet of veſſels, the difference in the ſeat of the inflammation, as ſtated by Dr. Cullen, appears to be the more probable cauſe of the difference of the ſymptoms. It is of more importance to know, that the two forms of diſeaſe are diſtinguiſhed by certain ſeries of phenomena, which are not eaſily confounded with each other: thoſe of the acute inflammation of the liver, or *hepatitis* ſtrictly ſo called, we ſhall here deſcribe; the chronic form will be found, with the other chronic derangements of this organ, under the article Liver, *Chronic Diſeaſes of.*

The acute hepatitis generally commences with ſome degree of chillineſs or ſhivering, which, in ſome caſes however, is ſo ſlight as to eſcape the attention or recollection of the patient; to theſe follow an increaſe of heat, and quickneſs of the pulſe, and pain in the region of the liver. Sometimes it begins at once with a pungent pain in this part, or the right hypochondrium, which is felt alſo along the margin of the ribs, ſhooting to the top of the right ſhoulder, or to the back and ſhoulder blade. This pain, which is more or leſs acute, is very often in ſuch a part of the ſide as to make it appear like that of a pleuriſy; and like that, too, it is often increaſed on inſpiration, the preſſure of the diaphragm, in this caſe, affecting the inflamed viſcus. This occurs more particularly, when the inflammation is ſeated in that part of the ſurface of the liver, which lies in immediate contact with the diaphragm. The diſeaſe is alſo often attended with a cough, which is dry and irritating, under the circumſtance laſt-mentioned; but is ſometimes looſe, with a free expectoration from the lungs, ariſing probably, as Dr. Pemberton ſuggeſts, (ſee his Practical Treatiſe on the Diſeaſes of the Abdominal Viſcera, p. 20.) from the general inflammatory diatheſis. When the pain thus reſembles that of pleuriſy or peripneumony, the patient lies moſt eaſily upon the ſide affected. If the inflammation attack the convex ſurface of the liver, ſo that the peritoneum becomes affected, the pain is much increaſed by external preſſure, and ſome degree of tumour may be obſerved. The tongue is generally covered with a white cruſt, and, together with the mouth and throat, is extremely dry. The urine is ſecreted in ſmall quantity, is high-coloured, and frequently tinged with bile.

Many practical writers have mentioned jaundice, or yellow colour of the ſkin and eyes, as a very conſtant ſymptom of hepatitis: but, although it is not an uncommon ſymptom of the diſeaſe, it is by no means a neceſſary conſequence of it; ſince the paſſage of the bile into the duodenum will continue open and free, when the inflammation is confined to the convex ſurface of the liver, or other parts not immediately in the vicinity of the gall-ducts. There is commonly no nauſea connected with hepatitis; but occaſionally the ſtomach is ſo exceedingly irritable, that violent retching or vomiting occurs; which Dr. Cullen aſcribes to the communication of a degree of inflammation to the ſtomach, when the diſeaſe is ſeated in the concave ſurface of the liver; in which caſe, alſo, it may be readily communicated to the gall-bladder ducts, as juſt hinted; the only circumſtance, Dr. Cullen believes, under which idiopathic hepatitis is attended with jaundice.

Hepatitis, like other inflammations, may terminate in reſolution, ſuppuration, and abſceſs, and perhaps in gangrene; or it may lead to chronic induration or ſcirrhus of the liver.

The reſolution of hepatitis is often accompliſhed by an early and judicious employment of the remedies to be enumerated immediately. In ſeveral inſtances it has been the conſequence of, or attended with, various ſpontaneous evacuations. Sometimes a hemorrhage from the right noſtril, and ſometimes from the hemorrhoidal veſſels, has been obſerved to precede the ſolution of the diſeaſe; ſometimes a bilious diarrhœa has contributed to the ſame event; and ſometimes a free ſweating, or an evacuation of urine, depoſiting a copious ſediment, has accompanied the reſolution of this, as of other inflammations. And, occaſionally, it would ſeem that a copious expectoration of mucus from the lungs has aſſiſted in producing this reſolution, by diminiſhing the general inflammatory diatheſis. An eryſipelatous inflammation, appearing on ſome external part, has likewiſe appeared to cure this diſeaſe; and it is not improbable that a ſuperficial diſcharge of coagulable lymph has promoted its reſolution, although productive of adheſion to the neighbouring parts. The influence of ſeveral of theſe diſcharges, however, has probably been magnified by the humoral pathologiſts.

If the ſymptoms of fever and local pain do not abate, but, on the contrary, continue violent, or increaſe, for ſeveral days, ſuppuration will probably take place. The commencement of the formation of *pus* is indicated by a diminution of the pain, (while the fever continues,) which is ſucceeded by a ſenſe of weight and oppreſſion in the right hypochondrium, with a throbbing or pulſation, eſpecially when lying on the left ſide. There are alſo frequent rigors or ſhiverings, as the formation of matter proceeds, and an acceſſion of fever towards evening, with fluſhings of the countenance, and a propenſity to profuſe night-ſweats, and other ſymptoms of hectic.

The matter, which is collected in the abſceſs thus formed, continues to accumulate, until it makes its way to one part or another of the ſurface of the liver; it may, therefore, be diſcharged in various ways, more eſpecially if the exudation of coagulable lymph, before mentioned, ſhall have occaſioned an adheſion of the ſurface of the liver to the contiguous parts; and ſuch adheſive proceſs is a common attendant upon thoſe of ſuppuration and ulceration.

Thus when the diſeaſe is ſeated on the convex ſide of the liver, ſome degree of external tumour appears, and a fluctuation may be perceived; and if the adheſion be to the peritoneum lining the common integuments, the pus may make its way through theſe, and be diſcharged outwardly, with or without the aſſiſtance of the ſurgeon, and the patient may recover. If, again, the adheſion ſhould be to the diaphragm, the *pus* may penetrate this muſcular partition, and be diſcharged into the cavity of the thorax, where it will compreſs the lungs, and moſt probably prove fatal. But it has ſometimes happened, that the inflammatory action has pervaded the diaphragm and the contiguous portion of the lung; ſo that the diaphragm has formed an adheſion with the liver on one ſide, and with the lung on the other; in which caſe, the abſceſs of the liver has opened into the cells of the lungs, and the *pus* has been diſcharged by coughing and expectoration. Again, the matter may be evacuated into the inteſtines or ſtomach, and paſs off by ſtool or vomiting, in two ways, when its ſeat is in the concave part of the liver. For either the branches of the hepatic duct may be involved in the ſuppurative proceſs, in conſequence of which the pus will make its way through the duct into the duodenum, and will be diſcharged by the bowels, probably in a very ſlow manner, the aperture of communication being ſmall:—or an adheſion having taken place between the liver and the ſtomach or inteſtine, when the ulceration proceeds, ſo as to penetrate the adhering parts, the pus may be diſcharged into the ſtomach or the bowels. Under ſuch circumſtances, the patient frequently recovers, even after much emaciation and other very unpromiſing appearances had occurred. "Perhaps the moſt uſeful evacuation of hepatic abſceſſes," Dr. Saunders obſerves, "by the inteſtinal canal, is that where, an adheſion taking place between the ſuppurating part and the inteſtines, an ulceration enſues, and the contents of the abſceſs have a ready paſſage into the inteſtines. This may happen in different parts of the inteſtinal canal, according to the ſituation of the abſceſs. When it is ſeated at the concave part, the duodenum may be favourable for that purpoſe; but when the lower edge of the liver is the part concerned, the great arch of the colon is the uſual outlet; and in theſe caſes it is highly probable, from the ſcale of the parts concerned, that the opening of communication will be more extenſive, and the diſcharge of the matter more free."—When no adheſive inflammation has occurred, and the ſuppurated part of the liver does not cloſely adhere to any neighbouring organ, the pus may be diſcharged into the cavity of the abdomen, and will almoſt neceſſarily deſtroy the life of the patient.

It has not been clearly aſcertained, that inflammation of the liver terminates in mortification or gangrene. The author laſt quoted ſays, "I have ſeen ſome inſtances where the pain and inflammation have ſubſided very ſuddenly, and have been ſucceeded by a low fluttering pulſe, cold extremities, deliquium, and death: ſo that there has been reaſon to ſuſpect that this organ may, on ſome occaſions, though much leſs frequently than others, become gangrenous." (Loc. cit. p. 274.) See Morgagni, De Sedibus et Cauſis Morbor. epiſt xxxiv. art. 25, and Baillie's Morbid Anatomy, p. 213.

The ſtate of induration and ſcirrhus, in which we have ſaid that inflammation of the liver occaſionally terminates, is a more frequent conſequence of the chronic inflammation of the viſcus. See LIVER, *Chronic Diſeaſes of.*

The diagnoſis of hepatitis is not always eaſy to be made, in conſequence of the vicinity of the organ diſeaſed to the diaphragm and lungs, as well as to the ſtomach; ſo that it is occaſionally miſtaken for inflammation of theſe organs, that is, for pleuriſy or peripneumony, and gaſtritis. It may likewiſe be miſtaken for ſpaſm of the gall-ducts, and for rheumatic affections of the muſcles in the neighbouring parts. From what we have already ſtated, it muſt be obvious that the leading ſymptoms of inflammation of the lungs and of the

the liver are common to the two diſeaſes ; namely, fever, pain of the ſide, and cough, with impeded reſpiration. This more particularly happens, when the membranous coat of the liver is inflamed in contact with the diaphragm. Sometimes, however, the inflammation actually extends to the diaphragm, and even to the contiguous portion of the lungs. In ſuch inſtances, as Dr. Baillie juſtly remarks, " it would be of little uſe to diſcriminate between thoſe diſeaſes in practice, becauſe the remedies to be employed in both are the ſame." (Loc. cit. p. 230.) Where the inflammation, however, is confined to the liver, and eſpecially in its ſubſtance, the following circumſtances of diſtinction between this and pulmonic inflammation, as pointed out by Dr. Pemberton, are worthy of attention. The difficulty, he thinks, will be in a great meaſure removed, "*firſt*, by remarking, that (in hepatitis) a gradual inſpiration does not produce cough, although it increaſes the pain : *ſecondly*, that the pain is increaſed by gentle preſſure under the margin of the ribs, which would not be the caſe if the inflammation was within the cheſt ; and *thirdly*, that the cough, (if it is preſent,) is found to have *ſucceeded* the pain ſeveral days, and not to have *preceded*, or to have been *coeval* with it, as in pleuriſy." (Loc. cit. p. 21.) To this it may perhaps be added, that the pain in pleuriſy is much aggravated, when the patient attempts to lie on the affected ſide ; whereas, in hepatitis, he can frequently lie moſt eaſily on the ſide diſeaſed ; that the pain in the top of the ſhoulder, though not always preſent in hepatitis, is a frequent ſymptom of this diſeaſe ; and, that the difficulty can ſcarcely exiſt, where there is any yellowneſs of the complexion or of the coats of the eye.

From *gaſtritis* the hepatic inflammation may be diſtinguiſhed by the abſence of that extreme ſenſe of heat and pain, with which the inflamed ſtomach is affected, eſpecially, after taking any thing whatever into it, as well as the great and ſudden ſickneſs which is occaſioned in the ſame way. (See Gastritis.) Nor is the proſtration of ſtrength ſo great in the inflammation of the liver as in that of the ſtomach.

In the caſe of *muſcular pain*, which is ſometimes very acute, affecting the diaphragm and intercoſtal muſcles, there is little or no fever ; the pain is more diffuſed, frequently moves from one place to another, and is much influenced by changing the poſture of the body. Such pain, too, is commonly accompanied by, or alternates with, rheumatic pain in one or more joints or muſcular parts of the body.

From *ſpaſm of the gall-ducts* inflammation of the liver may be diſtinguiſhed, as Dr. Pemberton has ſtated, by there being no nauſea, by the pain being permanent, by the pulſe being upwards of one hundred in a minute, and by the patient always preferring to keep the body in a ſtraight quieſcent poſture ; whereas the greateſt eaſe, when there is a ſpaſm of the gall-ducts, is obtained by bending the body forward on the knees.

Appearances on Diſſection after Death.—Dr. Baillie obſerves, that, when inflammation is confined to the membrane of the liver, it is not frequently extended over the whole of it, but more commonly takes place in that part which covers the anterior or convex part of the liver. But he adds, that he has alſo ſeen inflammation, or at leaſt its effects, not unfrequently on that ſide of the liver which is in contact with the ſtomach and duodenum. When inflammation takes place in the membrane of the liver, it exhibits the ſame appearances as the peritoneum and other membranous parts, when inflamed. It is crowded with a great number of very minute veſſels, which carry florid blood, and is thicker than in its natural ſtate. There is alſo thrown out upon its ſurface a layer of coagulable lymph ; this layer is thicker on ſome occaſions than others, and often glues the liver more or leſs completely to the neighbouring parts. Theſe adheſions, as we have already ſtated, are of great uſe in preventing the pus from abſceſſes from eſcaping into the general cavity of the abdomen. Some quantity of ſerous fluid is alſo thrown out at the ſame time with this lymph. It does not often happen in this country, the ſame able phyſician remarks, that the ſubſtance of the liver is found in actual ſtate of inflammation. In warmer countries the ſubſtance of the liver is much more liable to inflammation than in England. When it is generally inflamed through its ſubſtance, it is found a good deal enlarged in ſize, and of a deep purple colour, probably from the great accumulation of blood in the vena portarum ; it is alſo harder to the touch than in its healthy ſtate. Its outer membrane is ſometimes alſo affected with this inflammation, and ſometimes it is not. It is attended occaſionally with a jaundiced colour of the ſkin, ariſing from the bile not getting readily into the common duct, on account of the preſſure of the inflamed liver on the *pori bilarii*. When this inflammation has continued for ſome time, abceſſes are formed. Theſe are ſometimes of a large ſize, ſo as even to contain ſome pints of pus ; ſometimes the whole of the liver is almoſt converted into a bag containing pus. (See Morbid Anatomy, p. 212.)

The cauſes of hepatitis are not always eaſily diſcerned, and ſome have been aſſigned on a very uncertain foundation : we ſhall confine our notice to thoſe which appear to be often ſatiſfactorily aſcertained. With reſpect to the *prediſpoſition* to this diſeaſe, it has been obſerved moſt frequently in the male ſex, and not until the adult period of life. There is alſo a certain conſtitutional tendency to it, which appears to be connected with a plethoric habit, a tenſe irritable fibre, and a paſſionate temper. The exciting cauſes of hepatitis are partly all thoſe circumſtances which induce general inflammatory affections, and partly thoſe which occaſion excitement in the circulation of the liver. Among the former cauſes may be mentioned, (1ſt,) external violence from contuſions and falls, and eſpecially, as Dr. Cullen remarks, thoſe which have occaſioned a fracture of the cranium : (2) ſudden viciſſitudes of temperature, eſpecially the application of cold externally or internally ; whence the ſame expoſure which produces pneumonic inflammation may alſo produce hepatitis, and whence alſo the two diſeaſes are ſometimes joined together. Among the latter claſs of cauſes we may notice (3) violent bodily labour or exerciſe ; (4) violent paſſions of the mind, and particularly anger ; the fact, that fits of anger augment the biliary ſecretion, ſeems to have been a matter of ancient obſervation ; whence the epithet *choleric* is applied to thoſe who are much under the influence of that paſſion ; but the moſt frequent exciting cauſes are perhaps (5) continued great heat of climate or ſeaſon, and (6) intemperance in the uſe of ſpirituous liquors. We have already ſtated the general and well-eſtabliſhed fact, that an increaſed ſecretion of bile is a frequent conſequence of the continued operation of external heat upon the human body (ſee Heat) ; and Dr. Saunders remarks, that the accelerated, though imperfect, ſecretion of bile, together with the ſenſe of fulneſs in the region of the liver antecedent to inflammation, tend to ſhew that hepatitis is generally preceded by congeſtion, p. 293. And it is well underſtood, that this condition is often produced by the abuſe of ſpirituous liquors. We ſhall not here enter into any detail of the hypotheſes which have been invented to explain theſe facts, as we deem them in a great meaſure gratuitous, and not tending to add any thing to our actual knowledge on the ſubject, or to improve our practical reſources.

Of the Cure of Hepatitis.—The firſt object of the phyſician, in the application of remedies for the cure of acute hepatitis, is to arreſt the inflammatory proceſs before that of ſuppuration has commenced, as in the caſe of inflammation in any other important organ of the body. For this purpoſe, every part of what is termed the *antiphlogiſtic* practice muſt be purſued; but it will require conſiderable attention and diſcernment to determine, according to the circumſtances of the caſe, to what extent this practice ſhould be carried, and at what period it is moſt uſeful, or ceaſes to be ſafe. For it muſt be obvious, that no conſiderable advantage can be expected from the practice, except in the early ſtage of the diſeaſe, when the inflammation has not advanced beyond the probability of reſolution; if the ſymptoms, indicating the commencement of the formation of pus, have already appeared, depletion muſt be reſorted to with much caution.

In the commencement of hepatitis, however, *blood-letting* muſt be conſidered as the moſt effectual method of ſubduing the inflammation, and ſaving the liver from the dangerous and deſtructive proceſs of ſuppuration. No general rule can be given reſpecting the quantity to be drawn, as this muſt depend upon the ſtrength, age, and previous health of the patient, upon the violence of the ſymptoms, the effect of the operation on the pulſe, and other circumſtances of each individual caſe. From an adult of unimpaired conſtitution, ſixteen or twenty ounces of blood may be taken from the arm, from a large orifice, from which it may flow in as ſhort a time as poſſible. This point, *viz.* the *ſudden* depletion of the blood-veſſels, has been obſerved to be of the utmoſt importance in the cure of inflammation from very ancient times, and cannot be too ſtrongly urged. When the blood trickles from a ſmall orifice in the vein, it contributes little to the relief of the inflammatory action, while it robs the patient of that vital fluid, which, in the latter ſtages of the diſeaſe, might tend to ſupport his ſtrength, and aid his convaleſcence.

As a guide, in determining the propriety of repeating the operation of blood-letting, the *buffy coat*, or cruſt of coagulated lymph, which appears on the blood drawn, when it cools, is much attended to. But it can only be deemed a ſafe guide in conjunction with the ſtate of the pulſe, the degree of pain, and other ſymptoms. For it often happens, as Dr. Pemberton has remarked, that the blood firſt drawn is not at all buffy; ſtill, however, ſhould the pain be equally acute, and ſhould the pulſe continue hard for eight hours after the former veneſection, we ſhould again order a like quantity to be taken away; and this blood will uſually ſhew the beginning buff. The following obſervations on this ſubject are important: "I am, with others, well aware," ſays the laſt mentioned author, "that the preſence or abſence of buff ought not *of itſelf* to decide our practice as to future bleeding, inaſmuch as the moſt trifling circumſtance in the *manner* of the blood's flowing will prevent its appearance altogether, even during active inflammation; yet, when it is preſent, I think that an attentive obſervation of its texture will materially aſſiſt us in deciding how far we may again venture upon general bleeding. If, for example, the buff, after ſix hours from the time of veneſection, appears very firm, compact, and opaque, has a concave ſurface, and is puckered at the edges; and if the hardneſs of the pulſe, and the degree of pain is not diminiſhed, we may feel ſecure that the patient will again bear with advantage a bleeding from the ſyſtem. If, on the contrary, the buff (after an equal time) appears with a flat ſurface, is ſemi-tranſparent, and has a greeniſh-yellow colour, with a ſtriated filamentous texture running through it, we muſt not again have recourſe to general bleeding, but place all our reliance on topical bleeding, bliſtering, and purging." (Loc. cit. p. 25.)

When the appearances of the blood, juſt alluded to, or the debility of the patient's conſtitution, forbid the repetition of general bleeding, and yet the inflammation is not ſubdued, the application of a number of leeches, or of cupping glaſſes (after ſcarification), or of a large bliſter, upon the region of the liver, ſhould be reſorted to. At all events, indeed, *bliſters* co-operate with the views of blood-letting; and, therefore, in attempting a reſolution of the inflammation, recourſe ſhould be had to them very early after the blood-letting. Dr. Saunders, and ſeveral other phyſicians, have recommended a quick ſucceſſion of bliſters to the vicinity of the inflamed organ, which they believe to be more efficacious in ſubduing the activity of the inflammation, than long protracted diſcharges from a ſingle veſication.

There is another part of the antiphlogiſtic treatment, which, although important in all diſeaſes in which this treatment is required, is particularly beneficial in the caſe of hepatic inflammation; we allude to the evacuation of the bowels by *cathartics*. For in this inflammation, purgatives operate almoſt directly upon the organ diſeaſed, and contribute to leſſen the diſtenſion of its veſſels, both by aiding the paſſage of the bile into the inteſtines from its ducts, and by procuring a determination of blood to the whole ſurface of the inteſtines, and thus preventing ſo large a quantity from paſſing on to the *vena portarum*, to diſtend the inflamed viſcus ſtill farther. It is deſirable, therefore, that a cathartic be immediately adminiſtered, at the time of the firſt bleeding, and the evacuation kept up by a repetition of it. Now, with reſpect to the nature of the cathartic, which may be moſt beneficially exhibited for this purpoſe, the moſt experienced practitioners are not altogether agreed. Dr. Saunders, Dr. Pemberton, and others, give the preference to ſaline purgatives; and Dr. Saunders thinks that their efficacy is not a little increaſed, by exhibiting them in a diluted ſtate, in which they not only ſeem to be more ſtrictly antiphlogiſtic, but are leſs liable to occaſion nauſea and other diſagreeable ſenſations in the ſtomach. Dr. Pemberton commences with a doſe of ſulphate of magneſia, or Epſom ſalt, in infuſion of ſenna, and keeps up the action of the bowels by giving a drachm of this ſalt, in infuſion of roſes or other aqueous vehicle, every three hours.

There are other practitioners, however, and among them a very intelligent phyſician of Guy's hoſpital, Dr. James Curry, who has had ample opportunities of treating hepatitis both in this country and in India, where it is almoſt endemic, who give a decided preference to mercurial purgatives, and eſpecially to calomel. In ſtating the grounds of this preference, in a letter to Dr. Saunders, (publiſhed by the latter, in the book to which we have ſo often referred,) Dr. Curry expreſsly attributes its efficacy, in the cure of hepatitis, to its qualities as an *evacuant;* for he accords with the opinion of the beſt writers, that the general action of mercury on the conſtitution, were it practicable with ſufficient ſpeed, would be injurious in the early and highly inflammatory ſtage of the diſeaſe. The ſuperior efficacy of this evacuant, he aſcribes to its peculiar quality of evacuating the ducts of the liver; and he conſiders its operation in this way as often diminiſhing or ſuperſeding the neceſſity of copious blood-letting. He illuſtrates the advantage of thus "emulging the biliary ducts," by referring to the great and ſpeedy relief afforded by drawing out the milk from the *mamma*, where this gland becomes inflamed after lying in, or during the period of lactation; in many caſes of which, indeed, "little elſe is neceſſary than emptying the lactiferous ducts at the beginning, and repeating it from time to time as the milk re-accumulates; the inflammatory action of the veſſels often ſubſiding ſpontaneouſly, when this cauſe of diſtenſion and irritation is removed." And he expreſſes his conviction in the ſtrongeſt terms, that, by the early and free adminiſtration of calomel, he has ſaved many a pound of blood; which muſt otherwiſe have been taken away, to alleviate the urgent ſymptoms of hepatic inflammation. Dr. Curry's plan is to give three or four grains of calomel every four or ſix hours, according to the urgency of the ſymptoms. The bowels may be cleared by other purgatives, he ſays, without much relief; and even calomel is often attended with little, if any, more advantage, if it paſs very ſpeedily through the inteſtines. Its *cholagogue* effects in acute hepatitis, he aſcribes to "its leſſening or removing, in the firſt inſtance, that inflammatory conſtriction of the ducts, which occaſions the bile to be retained in the liver; for other medicines, the general cathartic effect of which is much greater than that of calomel, are by no means of equal ſervice;" and when calomel itſelf paſſes ſpeedily, he had been often obliged "to aſſiſt its relaxing power on the biliary ducts," by joining it with opium and antimonial powder, eſpecially the former; giving a grain or more of it every ſix hours, or according to the urgency of the pain. The concluding obſervations are important in a practical view.

"Under this management, I have frequently found the urgent ſymptoms abate conſiderably, many hours before any alvine evacuation took place, and of courſe before the calomel could be ſaid to act as a cathartic: in ſome caſes, too, where no evacuation followed, it became neceſſary to give cathartic medicines afterwards, in order to ſecure the relief which the calomel had procured, and to prevent the pain and dyſpnæa from returning; which they were apt to do, if the liver was not emptied while under the relaxing influence of the calomel and opium. It not unfrequently happens, that the ſtomach partakes ſo much of the inflammatory condition of the liver, and becomes in conſequence ſo extremely irritable, as to reject every thing by vomiting almoſt as ſoon as ſwallowed. In this ſtate of continual retching, which greatly aggravates the diſeaſe, and increaſes the pain almoſt to agony, the efferveſcing draughts, and other means uſually employed, were of no avail, nay, even calomel united with opium proved too irritating. Under theſe circumſtances, inſtead of calomel in its ordinary ſtate, I have with the beſt effects preſcribed calomel freed from its muriatic acid, by carefully triturating it with warm water; whereby it is converted into a dark ſlate-coloured oxyd, virtually the ſame with the hydrargyrus præcipitatus cinereus of the Edin. Pharm. and with that formed in making Plenck's ſolution, which you yourſelf firſt employed and recommended in this country. It is ſo much leſs irritating to the ſtomach and bowels than calomel, that when joined with opiates it will be retained with eaſe; and the effects of it in allaying pain, retching, and other urgent ſymptoms in hepatic inflammation, have been often no leſs aſtoniſhing to myſelf, though long in the habit of uſing it, than to a number of gentlemen who have had an opportunity of inveſtigating a practice which was altogether new to them." (Dr. Curry's Letter to Dr. Saunders, in the Treatiſe on the Liver, p. 335. 3d edit.)

When authorities are thus balanced, it is not eaſy to determine on which ſide the greater accuracy lies. We cannot doubt that ſucceſs has attended both the modes of evacuating the *primæ viæ*, which we have above deſcribed: but it would ſeem more conſiſtent with the general principles of practice eſtabliſhed in the treatment of acute inflammation of the internal organs, to truſt more to the depletion of the blood-veſſels, and to be more cautious in the adminiſtration of opium, than the author of the preceding paſſage recommends. Not to mention, that the alleged "*relaxing* influence" of calomel appears to be a gratuitous ſuppoſition, or at leaſt an hypothetical expreſſion of a fact not yet ſufficiently aſcertained. At all events, it ſeems to be eſtabliſhed by the moſt able practitioners, that theſe three remedies, blood-letting, bliſters, and cathartics, are the principal expedients by which the acute hepatic inflammation can be ſubdued in its early ſtage; and that they are to be actively employed, until a diminution of the pain and an abatement of the febrile ſymptoms ſhall be obtained. At the ſame time, a light and chiefly liquid nutriment muſt be adhered to, and every ſpecies of fermented, vinous, and ſpirituous liquors, excluded from the diet of the patient. By theſe means, if adopted at the commencement of the inflammation, in this country, we may generally ſucceed in checking every tendency to the ſuppurative proceſs. But in warm climates, and eſpecially in the Eaſt Indies, where hepatitis may be regarded as the peculiar endemic of the country, the tendency of the diſeaſe to run on to ſuppuration is ſo great, as ſcarcely to be reſiſted even by the moſt active practice: therefore, if an early and vigorous purſuit of the antiphlogiſtic plan of treatment be neceſſary in this country, where the courſe of the diſeaſe is comparatively moderate, the extenſion of ſuch treatment to the utmoſt limits of prudence becomes expedient, if we would oppoſe with ſucceſs the rapidity of its progreſs. (See Dr. Saunders, loc. cit. p. 318, and a Letter to him from Mr. Chriſtie, Med. and Phyſ. Journal, vol. ii. p. 4.)

We have purpoſely omitted, hitherto, to mention the adminiſtration of mercury in the treatment of hepatitis. A very miſchievous opinion, derived from the practitioners in India, has for ſome time prevailed, that mercury is a ſpecific in every diſeaſe of the liver; and that even in active phlegmonous inflammation of this viſcus it will prevent ſuppuration. This opinion, which has been built on the ſucceſs of mercurials in the chronic inflammations of the liver, has led to an empirical practice, in which no diſcrimination is made between forms of the diſeaſe, which differ more in their nature, than in the name impoſed upon them. And there can ſcarcely be a doubt, from the known effects of mercury on the body, that, if it be incautiouſly employed in the active period of inflammation, it will increaſe the action of the arterial ſyſtem, (already too much quickened,) and therefore tend directly to accelerate, and not to retard, the ſuppurative proceſs. It appears, indeed, that many judicious and ſucceſsful practitioners in India do not adminiſter mercury, until the violence of the inflammatory action has been moderated by bleeding, active purging, and the antiphlogiſtic plan of treatment. We are now ſpeaking of the adminiſtration of mercury in ſuch a way as to produce the peculiar effects of that metal on the conſtitution at large.

As ſoon as an abatement is perceived in the pain and febrile ſymptoms, then the period is arrived at which the uſe of mercury may be reſorted to with great advantage. It appears, on attentive obſervation, that the tranſition of active inflammation to a ſtate of reſolution, is not immediately followed by a healthy condition of the part; but it remains for a time debilitated, and diſpoſed to lapſe into a chronic ſtate. This may poſſibly be owing to the peculiarity of the *venous* circulation through the liver, and to the greater difficulty of recovering their tone, after inflammatory diſtenſion, inherent in the extremities of thoſe veins, than in the branches of the arterial ſyſtem. When this period is arrived, the exhibition of mercury is to be begun; and its introduction into the ſyſtem through the abſorbent veſſels of the ſkin, by means of friction, is generally preferred to the internal uſe of it. About half a drachm of the ſtrong mercurial ointment may be rubbed upon the right ſide every night; care being taken to watch minutely whether the pain or fever be at all reproduced by it; in which caſe it ſhould be inſtantly laid aſide, as no advantage can be expected from it under ſuch circumſtances. The right ſide has been generally pointed out as proper for the friction, perhaps from a notion of its efficacy being greater when applied to the vicinity of the diſeaſed organ, than to a diſtant part. But the knowledge derived from anatomy, reſpecting the origin and direction of the abſorbent veſſels, ſufficiently proves, that no part of the mercury can be made to paſs through the liver, in its way into the ſyſtem, either by internal or external exhibition: it can only, therefore, act on the liver, by being firſt introduced into the blood-veſſels. Hence it is of little importance, on what part of the ſkin the mercurial ointment is applied, provided the effects produced on the conſtitution be equally ſtrong; except, indeed, that friction on the hypochondrium may ſerve the office of gentle exerciſe to the part, and thus aſſiſt in emulging the biliary ducts.—When the chronic ſtate of diſeaſe is obſtinate, or if jaundice accompanies it, inſtead of uſing the mercury ſo as to induce a ſlight change upon the pulſe, with only a tenderneſs of the mouth, we ought to extend its effects to the production of a gentle ſalivation, which, when continued for a length of time, generally effects a cure.

From the time that the patient enters upon the courſe of mercury, it is proper to change the internal medicine, and to give a ſlight infuſion of ſome bitter, ſuch as quaſſia or gentian; to each doſe of which as much of a neutral ſalt may be added, as will procure daily one evacuation. By degrees, too, the diet may be improved, by the addition of animal broths, &c. till the patient is perfectly reſtored to health.

When the inflammation has gone on to ſuppuration, the abſceſs diſcharges its contents in various ways, as we have already ſtated. Over the direction to which the abſceſs tends we have no controul; but when its progreſs is towards the external ſurface, its diſcharge may be facilitated by ſurgical means. As ſoon, therefore, as the ſuppuration is obviouſly going on, we ſhould ſupport the ſtrength of the patient by a nouriſhing, though mild diet; and ſhould examine minutely, from time to time, into the ſtate of the ſide, both between the ribs and under them; and as ſoon as any bulging of the ribs, or any tumour below their margin, which gives the ſenſation of fluctuation, is obſerved, the matter may be diſcharged through a ſmall orifice made by a lancet. Such abſceſſes are ſeldom in haſte to heal, nor is it deſirable, until the cavity of the abſceſs ſhall have been filled up by healthy granulations. During this proceſs, which is ſometimes very tedious, the ſtrength gradually returns: and inſtances have occaſionally occurred, in which the health was perfectly re-eſtabliſhed, after the diſcharge accompanying the proceſs of granulation had continued for years.

Hepatitis *Lapis*, in *Natural Hiſtory*, a name given by ſome of the ancients to a ferruginous ſtone of a yellowiſh red colour; others called a coarſe jaſper, and ſome a dirty kind of hyacinth, by this name: in ſhort, they ſeem to have called any thing hepatitis that was of a liver-colour. The ſtone moſt generally ſo called, however, ſeems to have been of the nature of ſome of our poor iron ores.

HEPATOCE'LE, in *Surgery*, a term derived from ἧπαρ, *the liver*, and κηλη, *a tumour*, and ſignifying a hernia or rupture containing the liver. One would ſuppoſe, from the magnitude of this viſcus, and the manner in which it is fixed in its natural ſituation, that it could never compoſe any part of the contents of a hernia. The records of ſurgery, however, tend to prove the contrary. "Mr. Gay and Mr. Nourſe found the liver in the ſac of an umbilical hernia; and Bohnius ſays, that he did alſo." (Pott's Chirurgical Works, vol. ii.) We conclude, that a part of the liver was ſeen in the hernia, to which alluſion is made. The examples, in which a partial protruſion of this large viſcus ſeems moſt poſſible, are thoſe which have been denominated by the French "eventrations," where an extenſive portion of the abdominal parietes yields, ſo as to form a kind of pouch, with an exceedingly wide entrance. Such eventrations are apt to take place, when the ſides of the abdomen have been deprived of their tone by blows, the diſtenſion occaſioned by repeated pregnancies, &c.

HEPATOSCOPIA, Ἡπατοσκοπια, formed of ἧπαρ, *liver*, and σκοπεω, *I conſider*, in *Antiquity*, a ſpecies of divination, wherein predictions were made by inſpecting the livers of animals.

Hepatoscopia is alſo uſed as a general name for divination by intrails. See an account of the ſymptoms of the liver, whence good or evil were foretold, in Potter's Archæol. Græc. lib. ii. cap. 14. tom. i. p. 316. See Extispex.

HEPATUS, in *Ichthyology*. See Labrus and Teuthis.

HEPETIS, in *Botany*. See Pitcairnia.

HEPHÆSTIA, Ἡφαιστεια, in *Antiquity*, an Athenian feſtival in honour of Ἡφαιστος, *i. e.* Vulcan; the chief ceremony of which was a race with torches. For an account of the ceremonies and games, on this occaſion, ſee Potter's Archæol. Græc. lib. ii. cap. 20. tom. i. p. 399.

Hephæstia, in *Ancient Geography*, a town in the eaſtern part of the iſland of Lemnos, E.S.E. of Myrina.—Alſo, a town of Aſia, in Lycia.

HEPHÆSTIAS, in the *Writings of the Ancients*, the name of a plaiſter uſed among the ſurgeons to excite a cicatrix. It was principally compoſed of burnt earth, or of the tiles that had been long burnt in the kilns, reduced to powder.

HEPHESTION, in *Biography*, a Greek grammarian of Alexandria, in the reign of the emperor Verus, wrote a work, which is ſtill extant, under the title of "Enchiridion de Metris et Poemate," of which an edition in Greek and Latin was given by Pauw at Utrecht 1726. He is likewiſe quoted by Meibomius, and other muſical writers, on the relation between the metrical part in poetry, and time in muſic. The work alluded to is "De Re Metrica." Suidas. Jul. Capitolinus.

HEPHTHEMIMERIS, compoſed of ἑπτα, *ſeven*, ημισυς, *half*, and μερος, *part*, in the Greek and Latin *Poetry*, a ſort of verſe conſiſting of three feet and a ſyllable; that is, of ſeven half feet.

Such are moſt of the verſes in Anacreon.

Θελω	λεγειν	Ατρει	δας
Θελω	δε Καδ	μον α	δειν, &c.

And that of Ariſtophanes, in his Plutus;

Ἑπεσθε μητρι χοιροι.

They are alſo called *trimetri catalectici*.

Hephthemimeris, or *Hephthemimeres*, is alſo a cæſura after the third foot; that is, on the ſeventh half-foot. It is a rule, that this ſyllable, though it be ſhort in itſelf, muſt be made long, on account of the cæſura, or to make it an hephthemimeris. As in that verſe of Virgil:

"Et furiis agitatus amor, et conſcia virtus."

It may be added, that the cæſura is not to be on the fifth foot, as it is in the verſe which Dr. Harris gives us for an example:

"Ille latus niveum molli fultus Hyacintho."

This is not an hephthemimeris cæſura, but a henneamimeris, *i. e.* of nine half feet.

HEPIALUS, in *Entomology*, a new genus inſtituted by Fabricius, for the reception of thoſe moths or phalænæ, of the bombyx kind, which have the antennæ moniliform; the feelers two, reflected, and hairy, with the rudiment of a bifid tongue between.

Theſe inſects are ſo nearly allied to the bombyx family, that the ſeparation of the ſpecies which compoſe the genus, from the bombyces, is conſidered by ſome entomologiſts as a needleſs innovation; by others it is regarded differently, and we are clearly of the latter opinion. The hepialus is a good natural family. There is an evident diſſimilarity in the general appearance from the true bombyces, and a diſtinction equally material in their manners, the latter of which cannot have eſcaped the obſervation of the practical entomologiſts. They have been long known among Engliſh collectors by the trivial name of ſwifts, or ſwift moths. They are the firſt tribe of moths that appears on the wing in the evening, riſing from their lurking places at twilight, and thus preceding the flight of the true bombyces for ſome ſpace of time; they alſo fly much nearer the ground than the others, like the ſwift among birds; repeatedly darting down and ſkimming the ſurface; then riſing to the height of a few feet, hovering for a while over ſome particular ſpot, and then again darting away, and deſcribing circles in its aerial progreſs in the ſame manner as the ſwift or the ſwallow. Its evolutions on the wing (in ſome ſpecies eſpecially) reſemble the quick motions of the pendulum of a clock; and is always diſtinguiſhed by a far briſker vibratory movement of the wings than any other tribe of moths. The "ſwift moths" diſappear as the darkneſs of the night prevails, at which time the flight of the bombyces has only juſt commenced; in ſhady places the ſwift moths ſometimes riſe and are ſeen on the wing, even before ſunſet.

The larvæ of the hepialus family, ſo far as they have been aſcertained, feed entirely under ground on the roots of plants; they are uſually naked and furniſhed with ſixteen feet. The pupa folliculate, cylindrical, and pointed at the tip. In the winged ſtate the difference in the appearance of the two ſexes of the ſame ſpecies is oftentimes very conſiderable.

Species.

Humuli. Wings of the male ſnowy and ſtriated; of the female yellow, with fulvous marks. Linn. Donov. Br. Inf. *Ghoſt moth.*

Theſe moths are often ſeen, during the early part of ſummer, hovering about incloſed grounds near the ſkirts of woods at twilight, and not unfrequently in burying grounds; from which latter circumſtance, in addition to the ſnowy whiteneſs of the male inſect, this ſpecies has long ſince obtained the trivial appellation of the ghoſt moth. Both ſexes nearly correſpond in ſize, being about two inches and a half in breadth when the wings are expanded; and the female rather larger than the male. The difference in colour is ſo very conſiderable, that they might be eaſily miſtaken for diſtinct ſpecies, the whole of the upper ſurface in the male being a pure ſnowy white with a gloſs like ſatin; the female yellow, with orange marks on the upper wings, and brown on the lower. Inhabits Europe.

The larva feeds on the roots of graſs, and is naked, its colour pale, and the head teſtaceous.

Jodutta. Wing livid, with two darker bands. Fabr. Inhabits Germany.

Lupilinus. Wings cinereous, with a whiter ſtreak. Linn.

Found in the north of Europe.

Hectus. Wings deflected, yellow, with two oblique whitiſh bands compoſed of interrupted dots. Linn. Donov. Br. Inf.—*Golden ſwift.*

Inhabits woods in Europe. The lower wings livid brown. Breadth, when the wings are expanded, about an inch and a quarter.

Obliquus. Wings deflected, brown, with a white line at the baſe, and two oblique bands of interrupted dots. Fabr.

Native of France; and is allied to the laſt. The antennæ are ferruginous; head and thorax hairy, cinereous.

Carnus. Wings brown; upper pair with ſcattered dots of black and white. Fabr.

Inhabits Auſtria.

Crux. Wings reddiſh-yellow, with two oblique white lines; antennæ ſerrated. Fabr.

An European ſpecies; the antennæ rufous; head and thorax hairy, grey; lower wings and all beneath darker.

Bufo. Wings deflected, yellowiſh, with a broad brown band. Fabr.

Native of Germany.

Mappa. Wings brown, with large irregular waved marks of a livid colour, and four diſtinct white triangular ſpots near the apex.—Donov. Brit. Inf. *Map-winged ſwift moth.*

A very elegant and rare ſpecies found in England; the ſize larger than the golden ſwift.

Venus. Anterior wings dark, with many oblong pearly ſpots; poſterior pair brown and immaculate; body ferruginoue. Cramer.

Inhabits the interior of Africa.

HEPPACH, in *Geography*, a village of Wurtemberg, famous for its wine; eight miles S.E. of Stuttgart.

HEPPENHEIM, a town of Germany, in the circle of the Lower Rhine; 10 miles E. of Worms.—Alſo, a town of France, in the department of Mont Tonnerre, lately in the palatinate of the Rhine, on the Wees; four miles S.E. of Worms.

HEPSETUS, *Ichthyology.* See Esox and Atherina. The Atherina hepſetus has 12 rays in the anal fin; it is found in the Mediterranean and Red ſeas.

HEPTABOLUS, or Eptabolus, in *Geography*, a lake of Mauritania, which received the Dyris, a river that iſſued from Mount Atlas, and that afterwards took the name of Niger, according to Vitruvius (l. viii. c. 2.), who ſuppoſes that this was the ſource of the Nile.

HEPTACA, in *Botany*, (ἑπτάχα, *ſeven-fold*,) in alluſion to the ſeven cells of the fruit, as Father Loureiro, the author of the name, informs us. Loureir. Cochinch. 657.—Claſs and order, *Polygamia Dioecia*, Loureir. It more properly belongs to *Polyandria Monogynia*, or *Icoſandria Monogynia*, it is impoſſible, from his deſcription, to ſay which.

Gen. Ch. *Cal.* Perianth of three ovate, concave, ſpreading leaves. *Cor.* Petals 10, ovate-oblong, ſpreading in a wheel-like form, longer than the calyx. *Stam.* Filaments about 100, thread-ſhaped, ſhorter than the corolla; anthers linear, erect. *Piſt.* Germen roundiſh; ſtyle thick, as long as the ſtamens; ſtigma in ſeven deep, channelled, ſpreading ſegments. *Peric.* Berry roundiſh, of ſeven cells, with many ſeeds. *Seeds* roundiſh.

There are flowers deſtitute of a piſtil, found on a ſeparate plant.

Eſſ. Ch. Calyx of three leaves. Petals ten. Berry of ſeven cells, with many ſeeds. Some flowers male.

1. H. *africana*, the only ſpecies, found in woods on the eaſtern coaſt of Africa, near Moſambique, where it is called *Mu cao cao.* A ſmall tree, with ſpreading *branches*. *Leaves* alternate, ſtalked, ovate, entire, veiny, ſmooth. *Flowers* white, on many-flowered, lateral ſtalks. *Berry* green, two inches in diameter.

As no account is given of the ſituation of the germen, or inſertion of the ſtamens, we can neither determine the artificial nor natural claſs of this plant. It is one of the good Father Loureiro's botanical riddles, which we cannot gueſs, and may be a genus entirely unknown to other botaniſts. Poſſibly it may belong to the natural order of *Myrti*, the author having miſtaken a coloured calyx for five of the petals, and bracteas at the baſe of the germen for a calyx of three leaves; at leaſt we can ſuggeſt nothing better.

HEPTACHORD, of ἑπτα, *ſeven*, and χορδη, *chord* in the *Ancient Muſic. Heptachord* was applied, according to the etymology of the term, to the lyre, when it had but ſeven ſtrings, and is generally ſaid of any inſtrument that has but that number; one of the intervals is alſo called heptachord, as it contains that number of degrees between its extremes. See SEVENTH.

In the ancient poetry, it ſignified verſes that were ſung or played on ſeven chords, notes, or ſounds, and probably on an inſtrument with ſeven ſtrings. See LYRE.

HEPTACHORD, *Major*, is the major greater, or ſharp ſeventh, an interval whoſe ratio is $\frac{8}{15} = 555\,\Sigma + 11\,f + 48\,m$. See *Major* SEVENTH.

HEPTACHORD, *Minor*, is the minor ſeventh, or greater of the flat ſevenths, an interval whoſe ratio is $\frac{5}{9} = 519\,\Sigma + 10\,f + 45\,m$. See *Minor* SEVENTH.

HEPTACHORD, *Minor*, of Galileo, is the minor ſeventh or leſſer of the flat ſevenths, an interval whoſe ratio is $\frac{9}{16} = 508\,\Sigma + 10\,f + 44\,m$. See *Minor* SEVENTH.

HEPTACOMETÆ, in *Ancient Geography*, a people who inhabited the coaſt of the Euxine ſea, and who, according to Strabo, were denominated "Moſynœci," and extended themſelves to the extremity of Mount Scydiſſes. They exceeded all other barbarians in ferocity, and fixed their habitations in trees and ſmall towers.

According to the Greek etymology Heptacometæ ſignify ſeven villages, and Moſynœci, their other name, derived from *Moſſynes* and *Oicos*, denoted their being inhabitants of towers. Theſe people maſſacred three cohorts of Pompey's army in paſſing through their mountains.

HEPTAGON, of ἑπτα, *ſeptem*, *ſeven*, and γωνια, *angle*, in *Geometry*, a figure conſiſting of ſeven ſides and ſeven angles. If the ſides and angles be all equal it is called a regular heptagon. The area of a regular heptagon is = the ſquare of one of its ſides multiplied by 3.6339126, or = the ſquare of the ſide multiplied by $\frac{7}{4}\,t$, where t denotes the tangent of the angle made by a line drawn from the centre to either extremity of the ſide, radius being 1. For the method of finding it, ſee POLYGON.

HEPTAGON, in *Fortification*, a place ſtrengthened with ſeven baſtions for its defence.

HEPTAGONAL NUMBERS, are a ſort of polygonal numbers, in which the difference of the terms of the correſponding arithmetical progreſſion is five; thus,

Arithmeticals, 1, 6, 11, 16, 21, 26, &c.
Heptagonals, 1, 7, 18, 34, 55, 81, &c.

where the heptagonals are formed by continually adding the terms of the arithmeticals, above them, whoſe common difference is 5.

One property, among others, of theſe numbers, is, that if any one of them be multiplied by 40, and 9 be added to the product, the ſum is always a ſquare number; thus,

$$\begin{aligned} 1 \times 40 + 9 &= 49 = 7^2 \\ 7 \times 40 + 9 &= 289 = 17^2 \\ 18 \times 40 + 9 &= 729 = 27^2 \\ 34 \times 40 + 9 &= 1369 = 37^2, \text{ \&c. \&c.} \end{aligned}$$

Here it is remarkable that the ſeries of ſquares thus formed is 7^2, 17^2, 27^2, 37^2, &c. the common difference of whoſe roots is 10, the double of the common difference of the arithmetical ſeries from which the heptagonals are formed. See POLYGONALS.

HEPTAGYNIA, in *Botany*, from ἑπτα, *ſeven*, and γυνη, *a female*, the name of ſuch orders in the principal claſſes of the Linnæan ſyſtem, as are characterized by ſeven ſtyles in each flower, or where the ſtyles are wanting, ſeven ſeſſile ſtigmas. It is an order of very rare occurrence, and is entirely unknown to the Britiſh Flora; indeed we meet with it no where but in the ſeventh claſs, where this order was formed to admit the genus *Septas*, the uncertainty of which is mentioned under the article HEPTANDRIA.

HEPTAMERIDE, from ἑπτα, *ſeven*, and μερις, *a part*, in *Muſic*, is one of the intervals in the ſyſtem of M. Sauveur, (Mem. de l'Acad. des Sc. 1701,) who divides the octave into 40 parts, which he calls *merides*; then each of theſe into ſeven heptamerides; ſo that the whole octave comprehends 301 heptamerides, which he ſtill divides. See DECAMERIDE.

HEPTAMERIS literally ſignifies a *ſeventh part*; being formed of the Greek ἑπτα, *ſeven*, and μερις, *part* or *portion*.

The heptameris, or eptameride, of M. Sauveur, is the $\frac{1}{301}$ſt part of the octave, and $\frac{1}{7}$th part of the meris or *meride* (which ſee). It is equal to 2.040574Σ; its common logarithm is .9989999.0035, its Euler's log. = .00332226, and it is equal to .185374 of a major comma. Dr. Buſby, in his "Dictionary of Muſic," mentions this interval as belonging to the ancient muſic; we are not aware, however, of its uſe more than a century ago, when M. Sauveur introduced it in his logarithmic tempered ſyſtem, with all the principles of which the ancients were unacquainted, as far as we know.

HEPTAMERON, a term literally implying *ſeven days*; being compounded of ἑπτα, *ſeven*, and ἡμερα, *day*.

It is chiefly uſed as a title of certain books, containing the tranſactions of ſeven days.

The heptameron of Margaret de Valois, ſiſter to Francis I. of France, and queen of Navarre, is a very ingenious piece, in the manner of Boccace's Decameron.

HEPTANDRIA, in *Botany*, from ἑπτα, *ſeven*, and ανηρ, *a man*, the ſeventh claſs of the ſexual or artificial ſyſtem of Linnæus, conſiſting of plants with ſeven ſeparate or diſtinct ſtamens, in the ſame flower with the piſtil or piſtils. It is a very ſmall claſs, including four orders;—*Monogynia*, in which is found the *Trientalis*, a pretty Lapland genus which Linnæus deſcribes with ſo much pleaſure in the *Flora Lapponica*, as being the firſt plant he found in that region with ſeven ſtamens, ſo that it ſerved to complete the uniformity of his ſyſtem. The horſe cheſnut alſo belongs to this order, and modern writers have removed ſeveral genera to it;—*Digynia*, of which *Limeum*, an African plant, is the only example;—*Te-*

tragynia, including *Saururus,* a genus from Virginia (*Aponogeton* was originally placed here, but is now more correctly referred to the claſs *Dodecandria*) ;—*Heptagynia* is the fourth order, containing *Septas,* a Cape plant, conſidered by Thunberg as belonging to *Craſſula.* It was originally called *Trientalis capenſis* in the Species Plantarum, and is remarkable for the character by which Linnæus defines it, namely, that it has a calyx of ſeven deep ſegments, ſeven petals, ſeven ſtamens, ſeven germens, and conſequently ſeven capſules.

HEPTANGULAR Figure, in *Geometry,* a figure with ſeven angles, and of courſe ſeven ſides.

HEPTANOMIS, in *Ancient Geography,* or Middle Egypt, was ſo called from the ſeven nomes, or prefectures, into which it was divided, though Strabo ſays it contained 16 ; a difference probably occaſioned by the addition of new nomes to thoſe it originally compriſed, ſuch as thoſe of Oaſis.

The Heptanomis comprehended the whole country on each ſide of the Nile, from Thebais to the point of the Delta, where that river divides into thoſe branches by which it enters into the ſea. Some of the ancients make this tract a part of the Thebais ; and ſome of the eaſtern geographers alſo give the ſaid extent to Al-Said. This part of Egypt was, in ancient times, full of large and noble cities. See Egypt.

HEPTAPHARMACUM, a relaxing, ſuppurating, and incarnating medicine, compoſed of ſeven ingredients. This is much talked of among the ancient writers in medicine. The ingredients were, ceruſs, wax, pitch, litharge, colophony, bull's fat, and frankincenſe. It is deſcribed by Aëtius in his Tetrab. ſerm. 3. cap. 27.

HEPTAPLEURUM, in *Botany,* from ἑπτα, *ſeven,* and πλευρον, *a ſide,* on account of the ſeven-ſided capſule. Gærtn. v. 2. 472. t. 178. f. 3.

Gærtner has given this name to a fruit that came under his inſpection, in the collection preſerved at the garden of Leyden. It was there marked with a Ceylon name, *Bukera.* He calls it in his letter-preſs *H. ſtellatum,* in the plate *H. acutangulum.* His character and deſcription are as follows.

Eſſ. Ch. Flower unknown. Capſule ſomewhat pyramidal, with ſtar-like angles, without valves. (Cells ſix or ſeven.) Seeds ſolitary.

Deſcr. *Peric.* a ſmall coriaceous capſule, pyramidal, ſomewhat ovate, marked with an obſolete ring, perhaps where the flower was inſerted, a little below the top, above which ring it is extended into a furrowed reddiſh point ; its ſhape is angular or ſtar-like ; it conſiſts of ſix or ſeven cells, without valves, and ſtands on a little ſlender, oblique ſtalk, like that of umbelliferous plants.—*Recept.* none, the ſeeds being affixed to the tops of the cells.—*Seeds* ſolitary, ovate, narrower upwards, compreſſed, pale, reddiſh. – *Integument* quite ſimple, very thin and membranous.—*Albumen* ſhaped like the ſeed, fleſhy, pale.—*Embryo* in the uppermoſt part of the albumen, very minute, poſſibly monocotyledonous ?

Among 25 ſpecimens, three only had but ſix cells, the reſt having ſeven. The recent fruit ſeems to be covered with a ſoft or fleſhy coat, as the outſide of the dried capſule is very rugoſe. Gærtner.

HEPTARCHY, compounded of the Greek ἑπτα, *ſeven,* and αρχη, *imperium, government,* a government compoſed of ſeven perſons ; or a country governed by ſeven perſons, or divided into ſeven kingdoms.

The Saxon heptarchy included all England, which was cantoned out into ſeven petty independent kingdoms, peopled and governed by different clans and colonies ; *viz.* thoſe of Kent, the South Saxons, Weſt Saxons, Eaſt Saxons, Northumberland, the Eaſt Angles, and Mercia. The heptarchy was formed by degrees from the year 455, when firſt the kingdom of Kent was erected, and Hengiſt aſſumed the title of king of Kent immediately after the battle of Eglesford ; and it terminated in 827 or 828, when king Egbert reunited them into one, formed the heptarchy into a monarchy, and aſſumed the title of king of England.

We ſhall here ſubjoin a brief account of the ſeveral kingdoms of the heptarchy, of the manner of their formation, of the term of their duration, of the cauſes of their diſſolution, and of the monarchy which was ſubſequently eſtabliſhed in conſequence of their union.

It was about the year 449 or 450 that the two brothers, Hengiſt and Horſa, ſaid to be the great grandſons of Woden, and poſſeſſing great reputation among the Saxons, on account both of their valour and nobility, brought over with them 1600 men, who landed in the iſle of Thanet, and immediately marched to the defence of the Britons, who had implored their ſuccour againſt their northern invaders, the Scots and Picts. Having eaſily conquered theſe invaders, they were induced to direct their arms againſt the Britons themſelves. Accordingly they were ſoon reinforced with a ſupply of 5000 men. Thus recruited, and previouſly apprized of the vices and puſillanimity of Vortigern, the Britiſh leader, they ſought a quarrel with the Britons, by complaining that their ſubſidies were ill paid and their proviſions withdrawn ; and immediately throwing off the maſk, they formed an alliance with the Picts and Scots, and proceeded to open hoſtility againſt the Britons. In the battle of Eglesford, now Ailsford, Horſa was ſlain, and the ſole command of his countrymen devolved on Hengiſt. This active general, deriving continual reinforcements from Germany, extended the terror of his arms, and with this view ſpared neither age, nor ſex, nor condition, wherever he marched with his victorious forces. The private and public edifices of the Britons were reduced to aſhes ; the prieſts were ſlaughtered on the altars by theſe idolatrous ravagers ; the biſhops and nobility ſhared the fate of the vulgar ; the people, flying to the mountains and deſerts, were intercepted and butchered in heaps : ſome were glad to accept of life and ſervitude under their victors : others, deſerting their native country, took ſhelter in the province of Armorica, where, being charitably received by a people of the ſame language and manners, they ſettled in great numbers, and gave the country the name of "Brittany."

Among other cauſes which facilitated the entrance of the Saxons into this iſland, one has been aſſigned by Britiſh writers, which was the paſſion indulged by Vortigern for Rowena, the beautiful daughter of Hengiſt, of which this artful warrior availed himſelf in order to blind the eyes of the imprudent monarch. It is added by the ſame hiſtorians, that when Vortigern was reſtored to the throne, on the death of Vortimer, he accepted a banquet from Hengiſt, at Stonehenge, where 300 of his nobility were treacherouſly ſlaughtered, and himſelf detained captive. But theſe ſtories are probably apologies invented by the Welſh authors for the feeble reſiſtance of their countrymen, and for the rapid progreſs and licentious devaſtations of the Saxons. When Ambroſius, after the death of Vortimer, was inveſted with the command over his countrymen, he endeavoured to unite them in their reſiſtance againſt the Saxons. But though his efforts were not altogether unſucceſsful, Hengiſt maintained his ground in Britain, and in order to divide both the attention and the forces of the natives, he called over a new tribe of Saxons, under the command of his brother Octa, and of Ebiſſa, the ſon of Octa, and ſettled them in Northumberland. He himſelf remained in the ſouthern parts of the iſland, and laid the foundation of the kingdom of *Kent,* comprehending the county of that name, Middleſex, Eſſex, and part of Surrey. This kingdom was advantageouſly ſituated, having the ſea on the S. and E.; the Thames on the N.; and the little kingdom of Suſſex on the W. As long as it ſubſiſted, it ſerved as a bulwark to the kings of Kent againſt the ambitious encroachments of the kings of Weſſex. But after it was ſubdued by the Weſt Saxons, the kingdom of Kent was in continual danger of falling under the dominion of theſe powerful neighbours. This kingdom was not above 60 miles in length and 30 in breadth. Hengiſt fixed his royal ſeat at Canterbury, where he died in 488, leaving his newly acquired dominion to his poſterity, who retained it till the diſſolution of the heptarchy.

The ſucceſs of Hengiſt induced other northern Germans to invade this iſland. Theſe conquerors were chiefly compoſed of three tribes under the denominations of Saxons, Angles, and Jutes, who, ſpeaking the ſame language and being governed by the ſame inſtitutions, and actuated alſo by a common intereſt, were naturally led to unite againſt the ancient inhabitants. The reſiſtance of the Britons was gradually enfeebled: and after a ſucceſſion of diſaſters, they were driven into Cornwall and Wales, where they were indebted for their protection to the remote ſituation or inacceſſible mountains of thoſe countries.

Of all the ſovereigns of this kingdom, Ethelbert is the moſt worthy of notice, partly becauſe he gained an aſcendant among the Saxon ſtates, by reducing all the princes, except the king of Northumberland, to a ſtate of dependence, and eſtabliſhing himſelf by force on the throne of Mercia, which indeed he afterwards reſigned; and partly becauſe the Chriſtian religion was introduced among the Engliſh Saxons during his reign. (See ETHELBERT and AUGUSTIN.) The royal family of Kent was extinguiſhed after the death of Alric in 794, and the ſtate was thrown into confuſion, by every factious leader who aſpired to the throne. Baldred, an illegitimate branch of the royal family, was the laſt ſovereign; and after a troubleſome and precarious reign, he was expelled in 823, by Egbert, king of Weſſex, who diſſolved the Saxon heptarchy.

The next Saxon ſtate, after that of Kent, which was eſtabliſhed in Britain, was the kingdom of *South-Saxony* or *Suſſex*, which contained the county of Suſſex and a great part of Surrey, and was not above 50 miles long and 40 broad. It was bounded on the N. by the Thames, on the S. by the ſea, on the E. by the kingdom of Kent, and on the W. by Weſſex. The capital city was Chicheſter. This kingdom was founded by Ælla, a Saxon chief, who, in 477, brought over an army from Germany, and landing on the ſouthern coaſt, proceeded to take poſſeſſion of the neighbouring territory. The Britons were defeated in many battles by their warlike invader; and at length, having laid ſiege to Andred-Ceaſter, which was defended by the inhabitants and garriſon with deſperate valour, he took it, and, irritated by the oppoſition with which he had to contend, put all his enemies to the ſword without diſtinction. This deciſive advantage ſecured the conqueſts of Ælla, who in 491 aſſumed the title of king; but his progreſs was reſtrained on the E. by the kingdom of Kent, and on the W. by another tribe of Saxons, who had taken poſſeſſion of that territory. Ælla, being a prince of great reputation among the Saxons, had been thought worthy to ſucceed Hengiſt in the command of their armies. Upon his death in 514, he left the crown to his only ſurviving ſon, Ciſſa. Upon the death of Ciſſa, in 590, without iſſue, Ceaulin, king of Weſſex, and monarch of the Anglo-Saxons, ſeized the kingdom of Suſſex; and from this time the South-Saxons made ſeveral attempts to ſhake off the yoke of the kings of Weſſex, till at length the kingdom was entirely ſubdued. Their laſt revolt took place in the year 754, in the reign of Sigebert, king of Weſſex; and it is probable that his ſucceſſor Cenulph reduced them again to a ſtate of ſubjection. From that time the South Saxons do not appear to have made any attempt for recovering their liberty; their country being conſidered ever after as a province of Weſſex. The ſubjugation of this kingdom was the firſt ſtep taken by the Weſt Saxons towards acquiring the ſole monarchy of England.

The kingdom of *Weſſex*, or of the *Weſt Saxons*, was ſituated S. of the Thames, being in breadth about 70 miles from the Thames to the Britiſh channel, and in length 150 miles from the frontiers of Suſſex, to the river Tamar, which parted it from Cornwall. It comprehended the counties of Hants, Dorſet, Wilts, Berks, and the Iſle of Wight. Its principal cities were Wincheſter, the capital, Southampton, Portſmouth, Saliſbury, Dorcheſter, Sherborn, Exeter, where many Britons were intermixed with the Saxons. It derived its name from its ſituation, becauſe it lay W. of Suſſex, Kent, and Eſſex. It was guarded on the N. by the Thames, and on the S. by the ſea; on the E. it was bounded by the little kingdom of Suſſex; and on the W. by the Britons of Cornwall, divided from their countrymen the Welſh by the mouth of the Severn, in ſuch a manner, that it was almoſt impoſſible for them to aſſiſt one another. The Weſt Saxons, who were the founders of this kingdom, were Saxons, who landed in the year 495, under the command of Cerdic, and of his ſon Kenric. Cerdic, upon his landing, met with ſuch reſiſtance, that he found it neceſſary to ſeek the ſuccour of his countrymen in the kingdoms of Kent and Suſſex, as well as Germany. Thus ſtrengthened, he gained ſeveral advantages over the Britons; but he was arreſted by them in his progreſs, in conſequence of the aſſiſtance which was afforded them by Arthur, king of the Silures, whoſe heroic valour now ſuſtained the declining fate of his country, and who has been much celebrated in the ſongs of Thalieſſin, and the other Britiſh bards. (See ARTHUR.) The ſiege of Badon, near Bath, was raiſed by the Britons in the year 520, and the Saxons were there defeated in a ſevere battle. This misfortune ſtopped the progreſs of Cerdic; but it was not ſufficient to wreſt from him the conqueſts which he had already made. Cerdic was crowned for the firſt time king of the Weſt Saxons in 519, after having had ſurrendered to him the two counties of Hampſhire and Somerſetſhire, and a ſecond time at Wincheſter in 532 or 533, upon the delivery of Berkſhire, Wiltſhire, Devonſhire, and Dorſetſhire. Cerdic died in 534, and left his crown to his ſon Kenric, who died in 560.

Kynegils, who ſucceeded to the throne in 611, embraced Chriſtianity, through the perſuaſion of Oſwald, king of Northumberland, who had married his daughter, and who had attained a great aſcendant in the heptarchy. Ceodwalla, who commenced his reign in 686, entirely ſubdued the kingdom of Suſſex, and annexed it to his own dominions. He alſo made inroads into Kent, but could not ultimately prevail. Tired at laſt with wars and bloodſhed, he was ſeized with a fit of devotion; beſtowed ſeveral endowments on the church; and made a pilgrimage to Rome, where he was baptiſed by pope Sergius II., and died in 689.

Ina, his ſucceſſor, inherited the military virtues of Cœdwalla, and added to them the more valuable ones of juſtice, policy, and prudence. He made war upon the Britons in Somerſet; and having finally ſubdued that province, he treated the vanquiſhed with a degree of humanity hitherto unpractiſed by the Saxon conquerors. He allowed the proprietors to retain poſſeſſion of their lands, encouraged marriages and alliances between them and his ancient ſubjects, and gave them the privilege of being governed by the ſame laws, which he augmented and aſcertained. Although he was diſturbed by ſome inſurrections at home, his long reign of 37 years may be regarded as one of the moſt glorious and moſt proſperous of the heptarchy. In the decline of his age he made a pilgrimage to Rome, and after his return ſhut himſelf up in a cloiſter, where he died.

Brithric, the laſt king of Weſſex, was poiſoned in 799, by Eadburga his wife, natural daughter of Offa, king of Mercia, a profligate woman, equally infamous for cruelty and for incontinence; upon which the Weſt Saxons offered the crown to Egbert.

While the Saxons made this progreſs in the South, their countrymen were no leſs active in other quarters. In the year 527, a great tribe of adventurers, under ſeveral leaders, landed on the eaſt coaſt of Britain; and, after fighting many battles, eſtabliſhed three new kingdoms in this iſland, *viz.* Eſſex, Eaſt-Anglia, and Mercia. The kingdom of *Eſſex*, or of the *Eaſt Saxons*, was bounded on the N. by Eaſt Anglia, on the E. by the German ocean, on the S. by the Thames, and on the W. by Mercia. Its greateſt length was 75 miles, and its breadth 38; it contained the counties of Eſſex and Middleſex, diſmembered from that of Kent, and part of Hertfordſhire; its principal cities were London and Colcheſter. This country, which had been erected into a colony in the time of the Romans, but which was much reduced after the arrival of the Saxons, had been extorted from Vortigern by Hengiſt, after the maſſacre of the Britiſh lords, and was formed into a kingdom by Erchenwin, the firſt king who began his reign about the year 585, though the preciſe period has not been aſcertained.

Erchenwin, or Erkinwin, was ſucceeded by his ſon Sleda; and he made way for his ſon Sebert, who, being nephew to Ethelbert, king of Kent, was perſuaded by that prince to embrace the Chriſtian faith. His ſons and joint ſucceſſors, Sexted or Saxned, and Seward, relapſed into idolatry. Sigebert the good, who reigned in 653, reſtored Chriſtianity. Offa, who aſcended the throne in 705, having made a vow of chaſtity, notwithſtanding his marriage with Keneſwitha, daughter of Penda, king of Mercia, went in pilgrimage to Rome, and ſhut himſelf up during the reſt of his life in a cloiſter. Selred, his ſucceſſor, reigned 38 years, and was the laſt of the royal line, which failure produced confuſion, and reduced the kingdom into dependence under Mercia.

The laſt king was Sigered, who commenced his reign in 746, and if he was alive at the diſſolution of the heptarchy, he muſt have reigned 78 years

The kingdom of *Eaſt Anglia*, or of the *Eaſt Angles*, was bounded on the N. by the Humber and the German ocean; on the E. by the ſame ocean; on the S. by the kingdom of Eſſex; and on the W. by Mercia. Its greateſt length was 80, and its greateſt breadth was 55 miles. It contained the two counties of Suffolk and Norfolk, and part of Cambridgeſhire. The chief towns were Norwich, Thetford, Ely, and Cambridge. Uffa aſſumed the title of king in 575, and died in 578.

Earpwold, the fourth king, and great grandſon of Uffa, the founder of the monarchy, was converted to Chriſtianity by the influence of Edwin, king of Northumberland; but his wife, who was an idolatreſs, brought him back to her religion. After his aſſaſſination, and an interregnum of about three years, the throne was occupied by Sigebert, his half-brother, who had been educated in France, reſtored Chriſtianity, and introduced learning among the Eaſt Angles. Some pretend that he founded the univerſity of Cambridge, or rather ſome ſchools in that place.

Ethelbert, the laſt king, was put to death by Offa, king of Mercia, in order to ſeize his kingdom in 792; and from this time Eaſt Anglia and Mercia formed one kingdom.

The kingdom of *Mercia* was bounded on the N. by the Humber, which ſeparated it from Northumberland; on the W. by the Severn, beyond which were the Britons, or Welſh; on the S. by the Thames, by which it was parted from the kingdoms of Kent, Suſſex, and Weſſex; and on the E. by the kingdoms of Eſſex and Eaſt-Anglia. Guarded on three ſides by large rivers, that ran into the ſea and ſerved as a boundary to all the other kingdoms, it was called Mercia, from the Saxon word *merc*, ſignifying a boundary. The principal cities of Mercia were Lincoln, Nottingham, Warwick, Leiceſter, Coventry, Litchfield, Northampton, Worceſter, Glouceſter, Derby, Cheſter, Shrewſbury, Stafford, Oxford, and Briſtol. Of all the kingdoms of the heptarchy, this was the fineſt and the moſt conſiderable. Its greateſt length was 160 miles, and its greateſt breadth about 100. Crida, its founder, arrived in England in 584, and, in that, or the following year, was crowned king, and died in 594.

Penda, who at the age of 50 years aſcended the throne, acted the part of a ſanguinary tyrant; but being defeated and ſlain in a deciſive battle by Oſwy, brother to Oſwald, king of Northumberland, Penda, his ſon, took poſſeſſion of the throne of Mercia, and lived under the protection of Oſwy, whoſe daughter he had married. This princeſs was educated in the Chriſtian faith, and ſhe employed her influence with ſucceſs, in converting her huſband and his ſubjects to the ſame religion. "Thus the fair ſex," ſays Hume, "have had the merit of introducing the Chriſtian doctrine into all the moſt conſiderable kingdoms of the Saxon heptarchy." Of Offa, who mounted the throne of Mercia in 755, we ſhall give an account under his article. The laſt kings of Mercia were Bernulph, or Bernulf, in 821; Ludican, in 823; and Witgalph, or Wiglaff, in 825.

The kingdom of *Northumberland* was ſituated, as its name imports, on the north of the Humber. It was bounded on the ſouth, and parted from Mercia by that river, on the weſt by the Iriſh ſea, on the north by the country of the Picts and Scots, and on the eaſt by the German ocean. It contained the preſent counties of Lancaſhire, Cumberland, Weſtmoreland, Northumberland, York, and Durham. The principal cities were York, Dunelm, ſince called Durham, Carliſle, named by the Romans Luguballia, Hexham, or Hagulſtadt, Lancaſter, and ſome others of leſs note. This country was divided into two parts, Deïra and Bernicia, each of which was for ſome time a diſtinct kingdom of itſelf. Bernicia was partly ſituated on the north of Severus's wall, and ended in a point at the mouth of the Tweed. Deïra contained the ſouthern part of Northumberland, as far as the Humber. The greateſt length of the whole kingdom, including both parts, was 160 miles, and its greateſt breadth 100. The firſt king of Northumberland was Ida, a Saxon prince of great valour, who claimed a deſcent from Woden, brought over a reinforcement from Germany, and enabled the Northumbrians to carry on their conqueſts over the Britons. He entirely ſubdued the county now called Northumberland, the biſhopric of Durham, as well as ſome of the ſouth-eaſt counties of Scotland, and he aſſumed the title of king of Bernicia in 547. About the ſame time Ælla, another Saxon prince, having conquered Lancaſhire, and the greater part of Yorkſhire, received the appellation of king of Deïra. Theſe two kingdoms were united in the perſon of Adelfrid, grandſon of Ida, who married Acca, the daughter of Ælla; and expelling her brother, Edwin, eſtabliſhed one of the moſt powerful of the Saxon kingdoms by the title of Northumberland. He ſpread the terror of the Saxon arms to the Scots and Picts, as well as Welſh, and extended on all ſides the bounds of his dominions. During his ſiege of Cheſter, the Britons marched out with all their forces to engage him; and at a diſtance ſtood 1250 monks from the monaſtery of Bangor, who attended in order to encourage the combatants by their preſence and exhortations. Adelfrid, inquiring into the cauſe of this unuſual appearance, was informed, that theſe prieſts had come to pray againſt him: "Then," ſays he, "they are as much our enemies as thoſe who intend to fight againſt us." And he immediately ſent a detachment, who fell upon them, and ſuffered only 50 to eſcape with their lives. The Britons were totally defeated; Cheſter ſurrendered; and Adelfrid, purſuing his victory, made himſelf maſter of Bangor, and entirely demoliſhed the monaſtery:—a building ſo extenſive, that there was a mile's diſtance from one gate of it to another; and it contained 2100 monks, who are ſaid to have been maintained there by their own labour. See BANGOR.

Young Edwin, who had been unjuſtly diſpoſſeſſed of the crown of Deïra, and who wandered from place to place in order to eſcape the hoſtile deſigns of Adelfrid, found protection at laſt in the court of Redwald, king of the Eaſt-Angles, where his engaging and gallant deportment procured him general eſteem and affection. Redwald nobly refuſed to deliver him up to the emiſſaries of Adelfrid; and in order the more effectually to preſerve him, he attacked Adelfrid while he was unprepared for defence. This monarch was defeated and ſlain; and Edwin obtained poſſeſſion of the crown of Northumberland. Edwin was the greateſt prince of the heptarchy in that age, and diſtinguiſhed himſelf, both by his influence over the other kingdoms, and by the ſtrict execution of juſtice in his own dominions. He reclaimed his ſubjects from the licentiouſneſs to which they had been accuſtomed; and it became a common ſaying, that during his reign a woman or child might openly carry every where a purſe of gold, without any danger of violence or robbery. The Eaſt-Angles conſpired againſt their ſovereign, Redwald, and had put him to death. They offered the crown to Edwin, who not only declined accepting it, from a ſenſe of gratitude to his benefactor, but obliged them to ſubmit to Earpwold, the ſon of Redwald. Edwin, after his acceſſion to the throne, married Ethelburga, the daughter of Ethelbert, king of Kent; who, emulating the glory of her mother Bertha, who had been inſtrumental in converting her huſband and his people to Chriſtianity, carried Paullinus, a learned biſhop, along with her; and beſides ſtipulating a toleration for the exerciſe of her own religion, which was readily granted her, ſhe uſed every reaſon to perſuade the king to embrace it. Edwin, after mature deliberation, and frequent conferences with Paullinus, declared in favour of the Chriſtian religion; and the people ſoon after imitated his example. The death of this excellent prince, in a battle which he fought againſt Penda, king of Mercia, and Cœdwalla, king of the Britons, in the 48th year of his age, and 17th of his reign, divided the monarchy of Northumberland, which that prince had united in his own perſon. Eanfrid, the ſon of Adelfrid, returned with his brothers, Oſwald and Oſwy, from Scotland, and took poſſeſſion of his paternal kingdom, Bernicia; and Oſric, Edwin's couſin-german, eſtabliſhed himſelf in Deïra. Both theſe kings returned to Paganiſm, and the whole people ſeem to have turned with them: ſince Paullinus, who was the firſt archbiſhop of York, and who had converted them, thought proper to retire with Ethelburga, the queen dowager, into Kent. Both theſe princes died prematurely ſoon after; when Oſwald, the brother of Eanfrid, of the race of Bernicia, united again the kingdom of Northumberland in 634, and reſtored the Chriſtian religion in his dominions. Oſwald is much celebrated for his ſanctity and charity, and even for the miracles wrought by his relics, by the monkiſh hiſtorians. The laſt king of Northumberland was Ethelbert, ſon of Mollo, who, though not of the royal family, had ſeized the crown; and after the death of Ethelbert, which was no leſs tragical than that of almoſt all his predeceſſors, an univerſal anarchy prevailed in this kingdom; and the people having, by ſo many fatal revolutions, loſt all attachment to their government and princes, were well prepared for ſubjection to a foreign yoke, which Egbert, king of Weſſex, finally impoſed upon them.

The government of the heptarchy, reckoning from the founding of the kingdom of Mercia, the laſt of the ſeven Anglo-Saxon kingdoms, laſted two hundred and forty-three years; but if the time ſpent by the Saxons in their conqueſt from the arrival of Hengiſt in 449 be added, the heptarchy will be found to have laſted three hundred and ſeventy-eight years, from its commencement to its diſſolution. The cauſes of the diſſolution of the heptarchy were the great inequality among the ſeven kingdoms, three of which greatly ſurpaſſed the others in extent and power; the default of male heirs in the royal families of all the kingdoms, that of Weſſex excepted; and the concurrence of various circumſtances which combined in the time of Egbert.

Egbert, the laſt king of the Weſt Saxons, had in his youth excited the jealouſy of his predeceſſor, Brithric, partly becauſe he had a better title to the crown, and partly becauſe he had acquired, to an eminent degree, the affections of the people. Apprehenſive of danger from the ſuſpicious and jealous temper of Brithric, the young prince withdrew into France, where he was well received by Charlemagne. By living in the court, and ſerving in the armies of that prince, he acquired thoſe accompliſhments which qualified him for occupying the throne to which he was deſtined with dignity and advantage. Having familiarized himſelf to the manners of the French, who were then eminent for valour and civility above all the weſtern nations, he learned to poliſh the rudeneſs and barbarity of the Saxon character. In the laſt year of the eighth century, he was called, as we have already ſtated, to aſcend the throne of his anceſtors. The circumſtances of the times afforded him an opportunity of accompliſhing by his arms and by his prudent policy the object, which had been attempted in vain by ſo many princes. In conſequence of a prevailing opinion of the merit of chaſtity, and of the admiration of a monaſtic life, the royal families had been entirely extinguiſhed in all the Saxon kingdoms, except that of Weſſex; and the emulations, ſuſpicions, and conſpiracies, which had formerly been confined to the princes of the blood alone, were now diffuſed among all the nobility in the ſeveral Saxon ſtates. Egbert was the ſole deſcendant of thoſe firſt conquerors who ſubdued Britain, and who enhanced their authority by claiming a pedigree from Woden, the ſupreme divinity of their anceſtors. Egbert, however, declined for ſome time giving any diſturbance to his Saxon neighbours, and choſe rather to turn his arms againſt the Britons in Cornwall, whom he defeated in ſeveral battles. At length he was recalled from theſe conqueſts by an invaſion made upon his own dominions, by Bernulf, king of Mercia. The Mercians, indeed, before his acceſſion, had very nearly attained the abſolute ſovereignty in the heptarchy; they had reduced the Eaſt-Angles to ſubjection, and eſtabliſhed tributary princes in the kingdoms of Kent and Eſſex. Northumberland was involved in anarchy; and no ſtate of any conſequence remained but that of Weſſex, which, much inferior in extent to Mercia, was ſupported ſolely by the great qualities of its ſovereign. Egbert led his army againſt the invaders; and in a ſingle battle, fought at Ellandum in Wiltſhire, gave a mortal blow to the power of the Mercians. He then entered their country on the ſide of Oxfordſhire, and threatened the heart of their dominions: he ſent an army into Kent, under the command of Ethelwolph, his eldeſt ſon, and made himſelf maſter of that country, by the expulſion of Baldred, the tributary king. The kingdom of Eſſex was conquered with equal facility; and the Eaſt-Angles, from their hatred to the Mercian government, eſtabliſhed and maintained by treachery and oppreſſion, were glad to riſe in arms, and to crave the protection of Egbert. Bernulf, the Mercian king, who marched againſt them, was defeated and ſlain; and Ludican, his ſucceſſor, ſhared the ſame fate. Theſe inſurrections and calamities facilitated the enterpriſes of Egbert, who, advancing to the centre of the Mercian territories, eaſily ſubdued a diſpirited and divided people. That they might the more readily ſubmit, he allowed Wiglaf, their countryman, to retain the title of king, whilſt he exerciſed the real powers of ſovereignty. The anarchy of Northumberland afforded him the opportunity of an eaſy conqueſt; but he allowed to Northumberland, as he had done to Mercia and Eaſt-Anglia, the power of electing a king, who was to be his dependent, and to pay him tribute. The territories of Egbert, after the incorporation and union of theſe ſeveral ſtates, were nearly of the ſame extent with what is now properly called England; and a favourable proſpect was afforded to the Anglo-Saxons of eſtabliſhing a civilized monarchy, poſſeſſing tranquillity within itſelf, and ſecure againſt any foreign invaſion. This great event happened in the year 827. Rapin's Hiſt. vol. i. Hume's Hiſt. vol. i.

HEPTASTADIUM, *q. d.* ſeven ſtadia, in *Ancient Geography*, a country, or mole, which joined the iſle of Pharos at Alexandria to the continent. See ALEXANDRIA and PHAROS.

HEPTATEUCH, in *Matters of Literature*, a volume, or work, conſiſting of ſeven books.

The word is compounded of ἑπτα, *ſeven*, and τευχω, *I do, I work*; whence τευχος, *a work, book*; and ἑπτατευχος, *heptateuch*, a work of ſeven parts, or ſeven different works joined in one volume.

Heptateuch is chiefly applied to the firſt ſeven books of the Old Teſtament; *viz.* Geneſis, Exodus, Leviticus, Numbers, Deuteronomy, Joſhua, and Judges; that is, the five books of Moſes, called the *Pentateuch*, and the two following ones, which are uſually joined with the others.

HER, EL, in *Geography*, a town of the deſert of Syria; 18 miles E. of Taibeh.

HERA, mountains of Arabia, to which Mahomet often retired before he appeared in the world as a prophet; three miles from Mecca.

HERACLEA, in *Ancient Geography*, a name given to more than 40 towns in Europe, Aſia, Africa, and the iſlands of the Mediterranean. They are ſuppoſed to have derived this appellation from Heracles, correſponding to Hercules, and to have been either built in honour of Hercules, or placed under the protection of this deity: *e. g. Heraclea* is an ancient name of Calpé in Spain. (See CALPÉ.)—Alſo, a town of the Gauls, at one of the mouths of the Rhone, according to Pliny.—Alſo, a town of Italy, upon the Aciris, near its mouth, in the gulf of Tarentum, now *Policoro.*—Alſo, an ancient town of Sicily, called alſo Macara, and ſituated in the territory of the Agrigentines, near the mouth of the river Halycus, and towards the place now called *Campo Bianco.*—Alſo, a town of the iſland of Sardinia, named *Ad Herculem* in the Itinerary of Antonine.—Alſo, a town of Tyrrhenia.—Alſo, a town of Triphylia, almoſt N. of Olympia.—Alſo, a town of Greece, in the Sintic territory, a country of Macedonia, called by Pliny *Heraclea Sintica.*—Alſo, a town of Macedonia, on the coaſt, N. of the iſthmus of mount Athos.—Alſo, a town of Greece, in the Phthiotide, a country of Theſſaly.—Alſo, a town of Acarnania, according to Pliny, who ſays that it was ſituated on the ſea coaſt, on the confines of Etolia.—Alſo, a town of Aſia, in the country of the Maryandænæ, and a colony of Megara, according to Xenophon and Diodorus Siculus. The river Lycos tranverſed the plain before this town.—Alſo, an iſland of the Adriatic ſea. Steph. Byz.—Alſo, a town of the Peloponneſus, in the Elide, near Salmona. According to Strabo it was ſituated on the river Cytherius, about 40 ſtadia from Olympia.—Alſo, a town of the Thracian Cherſoneſus, ſituated at the mouth of the Erginus, and at the iſthmus of the Cherſoneſus.—Alſo, a town of Thrace, placed by Pliny at the foot of mount Pangæa.—Alſo, a town of Thrace, near Calatis, towards the mouth of the Danube, which did not ſubſiſt in the time of Pliny.—Alſo, a maritime town ſituated on the northern coaſt of the iſle of Crete, N. of Gnoſſus, of which, according to Strabo, it was the ſea-port. Pliny ſays that it was oppoſite to the iſland of Dia; and it is ſuppoſed to have ſtood on the ſame ſpot where the town of Candia, which gave name to the whole iſland, was built in after ages. (See CANDIA.)—Alſo, an iſland of the Carpathian ſea. Steph. Byz.—Alſo, a town of Aſia Minor, in Ionia; it was previouſly called *Latmos*, ſituated at the bottom of the Latmic gulf, upon the bank of the river Latmus, and E.S.E. and very near the ſmall iſle of Latmus. Latmus remained under the dominion of queen Artemiſia till her death, but afterwards recovered its liberty. In the time of Strabo it was called *Heraclea ad Latmum*, and was conſiderable. In its ruins may be diſcovered veſtiges of a temple, and of a theatre, dug in a mountain. Near this town was a cavern in which the ſhepherd Endymion is ſaid to have ſlept 30 years by order of Jupiter, and where his tomb was long held in veneration.—Alſo, a town of Aſia, in Syria, ſituated on a peninſula formed on the coaſt.—Alſo, a river of Aſia Minor, in Caria.—Alſo, a village of Aſia Minor, before the gulf of Adramyttium, over-againſt the iſland of Mitylene.—Alſo, a town of Aſia, in Parthia, ſituated near Ragæ.—Alſo, a town of the Tauric Cherſoneſus, according to Pliny, who ſays that the Romans made it a free city, and called it *Megarice.*—Alſo, a town of Aſia, in Sogdiana, beyond the Caſpian ſea, in the country of the Caduſians, according to Pliny, who ſays that it was built by Alexander, and, after having been deſtroyed, rebuilt by Antiochus, who gave it the name of *Achaide.*—Alſo, a town of Egypt, between Peluſium and Tmuis, according to Joſephus.—Alſo, a town of Africa, in Libya. Steph. Byz.

HERACLEA *Pontica*, a town of Aſia Minor, ſituated on a ſmall gulf formed by the Euxine ſea. This city maintained its independence as a republic, governed by its own magiſtrates, between the two powerful ſovereigns, Mithridates and Nicomedes, and ſerved as a common barrier. Xenophon and Pauſanias ſay that it was founded by a colony from Megara, to which were joined Bœotians, natives of Tanagra. It was afterwards expoſed to the invaſions of the Gauls; but recovered its liberty by the exertions of Nymphis the hiſtorian, a native of the place, who deviſed means for delivering his country. Heraclea furniſhed ſuccours to Ptolemy againſt Antigonus, and though it afforded aſſiſtance by its marine to Rome, and notwithſtanding a treaty of alliance, offenſive and defenſive, between Rome and Heraclea, it was pillaged by Cotta, under a pretext of its reſiſting the exactions impoſed upon it by the publicans of Rome. It was famous for its ſplendid library, its temple, and public places, adorned with a number of fine ſtatues, which were plundered by Cotta, who alſo took away a magnificent ſtatue of Hercules.

HERACLEON, in *Botany*, a name given by ſome of the Greek writers to the lithoſpermum, or gromwell. It was originally called the *heracleon ſporon*, ηρακλειον σπορον, the *herculean-ſeed*, from the remarkable hardneſs of the ſeed; but the latter word was dropped, and the heracleon only preſerved. There is great reaſon againſt uſing the word dioſpyros as a ſynonym for the gromwell, becauſe it is a name given by ſome of the Greeks to a very different kind of vegetable, a ſort of cherry. Pliny, lib. xxvi. cap. 11.

HERACLEONITES, ancient heretics of the ſect of the Gnoſtics; thus called from their leader, Heracleon.

St. Epiphanius, Hær. 36. is very ample on this hereſy.

He repreſents Heracleon as one who had reformed the theology of the Gnoſtics in many points; though, at bottom, he had retained the principal articles thereof. He refined on the ordinary interpretations of abundance of texts of ſcripture; and even altered the words of ſome, to make them conſiſt with his own notions.

He diſtinguiſhed two kinds of words; the one divine, the other corruptible; and reſtrained the word παντα, *all things*, to this laſt. He held, that the Word did not create the world immediately, and of himſelf; but only that he gave occaſion to the demiurgos to do it.

The Heracleonites, after the example of their maſter, annulled all the ancient prophecies; holding that St. John was really the voice that proclaimed and pointed out the Meſſiah; but that the prophecies were only empty ſounds, and ſignified nothing. They held themſelves ſuperior, in point of knowledge, to the apoſtles; and on that footing, dared to advance the moſt extravagant paradoxes, on pretence of explaining ſcripture in a ſublime, elevated manner. They were ſo fond of theſe myſtic interpretations, that Origen, though inclined to that mode of interpretation, was obliged to reproach Heracleon with his abuſing ſcripture by that means.

HERACLEOPOLIS, in *Ancient Geography*, a town of Egypt, which was the country of the philoſopher Theophanes.

HERACLEOTIS, an iſland of the Mediterranean, between Italy and Sicily, according to the Itinerary of Antonine.—Alſo, one of the Æolian iſles, now called *Baziluzzo*.

HERACLEUM, in *Botany*, from ἡρακλῆς, *Hercules*, an herb ſacred to him. The original plant is uncertain. Some have ſuppoſed it to be Yarrow, *Achillea*; others one of the umbelliferous tribe; all agree in attributing to it virtues of a vulnerary or healing nature. Bœhmer, in his Diſſertation upon plants named in honour of botaniſts, publiſhed at Wittenberg in 1770, has ſuppoſed this to have been called after Heraclides, the father of Hippocrates. Whatever may have been its origin, or primary application, it is now appropriated by Linnæus, Juſſieu, and moſt other writers, to the *Sphondylium* of Tournefort, or Cow Parſnep; though Gærtner retains the Tournefortian appellation. We cannot but think him more correct in this inſtance than in many others where he has contradicted, or refuſed to follow, Linnæus. The ancient *Heracleum* is, as he juſtly ſays, uncertain and enveloped in obſcurity, whereas there is little doubt of the Cow Parſnep being the σφονδύλιον of Dioſcorides.—Linn. Gen. 137. Schreb. 186. Willd. Sp. Pl. v. 1. 1421. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 1. 345. Sm. Fl. Brit. 306. Prodr. Fl. Græc. v. 1. 192. Juſſ. 222. Lamarck. Illuſtr. t. 200. (Sphondylium; Tourn. t. 170. Gærtn. v. 1. 86. t. 21.)—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Umbelliferæ*.

Gen. Ch. *General umbel* of many rays, very large; *partial* flat. *General involucrum* of many leaves, deciduous; *partial* halved on the outſide, its leaflets from three to ſeven, linear-lanceolate, the outer ones longeſt. *Perianth* ſcarcely diſcernible. *Cor. Univerſal* not uniform, radiated; flowers for the moſt part all fertile; *partial* of the *diſk* equal, of five inflexed, hooked, emarginate petals; of the radius unequal; of five oblong, hooked petals, the outer ones largeſt and moſt deeply cloven. *Stam.* Filaments five, longer than the petals of the diſk; anthers ſmall. *Piſt.* Germen inferior, nearly ovate; ſtyles two, approximated, ſhort; ſtigmas ſimple. *Peric.* Fruit elliptical, compreſſed, emarginate, ſtriated on each ſide in the middle. *Seeds* two, ovate, compreſſed, ſomewhat leafy at the edge.

Eſſ. Ch. Fruit elliptical, notched, compreſſed, ſtriated, dilated in the margin. Flowers radiant. Petals notched, with an inflexed point. General involucrum deciduous.

Obſ. Linnæus remarks that in ſome ſpecies the radiant flowers are female and fertile, thoſe of the diſk being deſtitute of ſtigmas, and conſequently abortive. He adds that *H. Sphondylium*, which compriſes the two firſt ſuppoſed ſpecies of Tournefort, has both organs perfect in all its flowers; while its involucrum is ſometimes altogether wanting.

A genus of the moſt gigantic umbelliferous plants; except perhaps *Ferula*, which is taller, and ſome ſpecies of *Laſerpitium*, whoſe leaves are more compound, and on the whole larger. Willdenow has 10 ſpecies; three new ones are defined in the *Prodr. Fl. Græc.*—The following examples are ſufficient.

H. *Sphondylium*. (Linn. Sp. Pl. 358. Engl. Bot. t. 939. Sphondylium; Rivin. Pent. Irr. t. 4. Ger. em. 1009. Raii Syn. 205.)—Leaves pinnate; leaflets dilated, pinnatifid, cut and ſerrated.—Native of thickets, hedges, borders of fields, and meadows, in moſt parts of Europe. Dr. Sibthorp found it in Greece, growing in wet places, as mentioned by Dioſcorides. It is the *Branca urſina*, or *Acanthus*, of ſome old herbaliſts, though very little reſembling the true one. The *root* is biennial, tap-ſhaped, whitiſh. *Stem* erect, branched, leafy, ſtout, hollow, furrowed and rough, about four feet high. *Leaves* large, ternate or pinnate, hairy, moſt downy and whitiſh beneath, variouſly pinnatifid, cut and ſerrated. The form of each leaflet is uſually broad and ſhort, heart-ſhaped at its baſe; but there is a long-leaved variety, miſtaken by ſome for the *anguſtifolium* of Linnæus. This variety, as Mr. Woodward remarked, ſometimes grows from the ſame root with the common ſort. It is repreſented in Petiver's Engliſh Plants, t. 24. f. 2. Whether it may be the *longifolium* of Jacquin, Fl. Auſtr. t. 174, and how far that and his *anguſtifolium*, t. 173, or *elegans*, t. 175, are diſtinct ſpecies, we find it difficult, even with his plates and ſpecimens before us, to decide, nor are the firſt European botaniſts agreed. The queſtion can be determined only by culture and repeated obſervation.

H. *anguſtifolium* of Linnæus, which by a miſtake found its way into the Fl. Brit. appears, by his herbarium, a very diſtinct ſpecies, the leaves being pinnatifid, with extremely long, narrow, decurrent, entire ſegments, rough at the edges only.

Whether *H. auſtriacum*, Linn. Sp. Pl. 359. Jacq. Auſtr. t. 61, which has pinnate leaves, and *H. alpinum*, Linn. Sp. Pl. 359, which has ſimple and lobed ones, well repreſented in Bauhin's Prodromus, p. 83, be diſtinct ſpecies, is another queſtion, which Seguier, a very exact obſerver, has decided in the negative.

H. *pumilum* of Villars, Delph. v. 2. 640. t. 14, is, on the other hand, ſo unlike the reſt, that at firſt one cannot but doubt its genus; yet the ſeeds remove every uncertainty. The *leaves* are twice ternate, ſmooth, and cut into many ſmall, elliptical, acute ſegments.

The three following ſpecies are hitherto nondeſcript, except the ſhort characters given in the *Prodromus Floræ Græcæ*.

H. *tomentoſum*. Sm. Prodr. Fl. Græc. v. 1. 192. Fl. Græc. inedit. t. 281.—Leaves repeatedly compound, downy, cut; their ſegments lanceolate, acute. Umbel of very numerous rays.—Gathered in Greece by Dr. Sibthorp, but in what particular ſpot is not recorded. The *root* is tap-ſhaped, annulated, apparently perennial, or at leaſt biennial, being crowned with old fibres from the leaf-ſtalks of the former year. Whole herb clothed with fine, white, ſoft, prominent down. *Stem* ſolitary, erect, near 18 inches high, ſimple, ſometimes with a few ſhort lateral branches, round, deeply furrowed, naked in the upper part. *Leaves* moſtly radical, a ſpan long, ſtalked, thrice pinnate, the main diviſions oppoſite, the reſt alternate; the ultimate ſegments ſpreading, lanceolate, acute, decurrent, nearly equal. Principal *umbel* terminal, ſolitary, a ſpan wide, denſe, ſlightly convex, of above 30, nearly horizontal, furrowed, rough rays; thoſe from the ſide branches much ſmaller. General and partial *involucrum* each of a few ſhort, awl-ſhaped leaves. *Flowers* perfectly white, radiant. *Seed* obovate, very flat, brown in the middle and ſlightly downy, encircled with an elevated oval ring in the otherwiſe flat border.

H. *aureum*. ibid.—Fl. Græc. ined. t. 282.—Leaves pinnate, lobed, cut, downy; the radical ones rounded. Umbel of about three rays. Stem much branched.—Gathered by Dr. Sibthorp on mount Parnaſſus. This has much of the aſpect of *Paſtinaca ſativa* in a wild ſtate, eſpecially from the full yellow colour of its *flowers*, whoſe general *umbels* conſiſt, for the moſt part, of three ſpreading rays, very rarely of two or of four, with but ſlight traces of a partial *involucrum*, and none of a general one. The partial *umbels* are ſmall and denſe. *Flowers* radiant, their petals concave. *Seed* orbicular, much compreſſed.—The *root* of this ſpecies is ſmall and biennial. *Stem* 18 inches or more in height, rough, furrowed, repeatedly and alternately branched. Radical *leaves* of two pair of heart-ſhaped, blunt, pinnatifid or three-lobed, cut leaflets, with a ſomewhat larger terminal one; ſtem-leaves ſmaller, narrower, and more acute.

H. *humile*. ibid. 193.—Leaves moſtly bipinnate, cut, downy. Stem but little branched. Seeds with four lines on their upper part.—Native of the Bithynian Olympus. *Sibth.*—*Root* perennial, very long. *Stem* ſcarcely a ſpan high. *Umbels* large in proportion, of from four to ſeven rays. *Seeds* pale, nearly ſmooth, orbicular, elegantly marked with four red lines, reaching from the middle to the ſummit on each ſide of the fruit.

HERACLEUM, in *Ancient Geography*, a place of Africa, in Egypt, which is placed by Strabo between Canopus and the Canopic mouth, and in which was a temple of Hercules.—Alſo, a promontory of Africa, in Marmarica. Strabo.—Alſo, a promontory of the Black ſea, to the weſt of the mouth of the Thermodoon, according to Ptolemy. Arrian places it between the rivers Iris and Thermodoon.—Alſo, a promontory of Aſiatic Sarmatia, upon the Black ſea, near the river Neſis, between the Borgys and Maſætica, according to Arrian.—Alſo, a town of the Tauric Cherſoneſus, on the weſtern ſide of the Palus-Mæotis; which, according to M. de Peyſſonnel, is now the fort of Ribat, at the entrance of the iſthmus, which ſeparates the *Sapra lacus* from the *Palus Mæotis*.—Alſo, a maritime town of Crete, called *Heraclea*, which ſee.—Alſo, a town of Aſia, in the Colchide, upon the coaſt of the Euxine ſea, near the mouth of the river Cianeſus, according to Pliny 70 miles from Sebaſtopolis.

HERACLEUS LAPIS, in the *Natural Hiſtory of the Ancients*, a name by which many have called the loadſtone. This was the name given to it by the ancient Greeks from Heraclea, a city of Lydia, near which it uſed to be found; but ſubſequent writers ſo far erred from the origin and orthography of the word, as to call it *herculeus lapis*, as if it had been named from Hercules.

The after-ages of the Greeks called it alſo *magnetis lapis*, but this was a name by no means applied to it in the earlier times, but then was uſed to expreſs a very different ſubſtance, a white ſilvery-looking ſtone, which had no power of attraction, but was turned into beautiful veſſels for the uſe of the table; and the not attending to the ages in which the authors lived who uſed the word *magnetis*, has been the occaſion of great errors in their commentators, who did not conſider that in the ſucceſſion of a few ages, the ſame word became the name of two very different things. Hill's Theoph. p. 79. See BASALTES.

HERACLIA, Ἡρακλεια, in *Antiquity*, an Athenian feſtival celebrated every fifth year in honour of Hercules.

The Thiſbians and Thebans in Bœotia obſerved a ſolemn feſtival in honour of Hercules, ſurnamed Μηλων, becauſe apples were offered to him. Beſides theſe there were other feſtivals kept in honour of Hercules; for a deſcription of all which, ſee Potter's Archæol. Græc. lib. ii. cap. 20. tom. i. p. 398, ſeq.

HERACLIAS, in *Geography*, an iſland in the Grecian Archipelago, about eight miles in circumference; five miles S. of Naxia. N. lat. 36° 49'. E. long. 25° 29'.

HERACLIDÆ, in *Antiquity*, the deſcendants of Hercules, whom the Greeks called Ἡρακλης, *Heracles*, from Ἡρα, *Juno*, and κλεος, *glory*, on account of the glory he acquired by executing what Juno induced him to undertake.

The Heraclidæ were expelled from Peloponneſus by Euriſtheus, king of Mycenæ, after the death of Hercules; in conſequence of the contention for the dominion of the peninſula ſubſiſting between the rival families of Perſeus and Pelops. The fortune of the Pelopidæ, however, prevailed; but their ſuperiority led them rather to perſecute, than to forgive, their enemies. The deſcendants and partiſans of the great Hercules, the moſt illuſtrious hero of the line of Perſeus, were diveſted of their poſſeſſions and driven into baniſhment. The exiles were firſt received by the Athenians, whoſe more humane, or more enlarged policy, rendered Attica, ever ſince the reign of Theſeus, the ordinary reſource of the miſerable. Their leader, Hyllus, was afterwards adopted by Epalius, the aged king of Doris; and the death of their benefactor ſoon made the Heraclidæ maſters of that mountainous province. But the wilds of Oeta and Parnaſſus were little adapted to ſatisfy men, whoſe anceſtors had enjoyed much more valuable poſſeſſions. Their natural ambition was long repreſſed by the increaſing greatneſs of the Pelopidæ, and the glory of Agamemnon. After the unexpected diſaſters of that prince, they twice attempted, unſucceſsfully, to break through the Corinthian iſthmus, and to recover their ancient dominion in Argos and Lacedæmon. Inſtructed by paſt miſcarriages, Temenus, Creſphontes, and Ariſtodemus, deſcendants in the 5th degree from Hercules, finally abandoned the hopeleſs deſign of entering the Peloponneſus by land. Determining, however, to make every exertion for regaining their hereditary eſtabliſhments, they prepared tranſports in every convenient harbour, at the northern extremity of the Corinthian gulf, which hence received the name of "Naupactus." The warlike and rapacious Ætolians, whoſe leader Oxylus was nearly related to the family of Hercules, aſſiſted their labours, propoſing to themſelves a ſhare in the booty which might accrue from the expedition. The Dorians, who inhabited the vicinity of mount Pindus, cheerfully deſerted the gloomy ſolitude of their woods, in order to ſeek poſſeſſions in a more agreeable, and better cultivated country. Animated by theſe reinforcements, the Heraclidæ redoubled their diligence. By ſecret intrigues they ſecured a party in Lacedæmon; and before they ſet ſail, they prudently detached a body of light-armed troops, whoſe appearance at the iſthmus drew the ſtrength of the enemy towards that quarter. In the mean while their armament was carried by a favourable gale towards the eaſtern coaſt of the Peloponneſus. The Heraclidæ (B.C. 1104) landed their forces without oppoſition, and aſſailed the defenceleſs territories to which they had long laid claim, comprehending the whole peninſula, except the central province of Arcadia, and the maritime diſtrict of Achaia. The five other provinces were conquered at the ſame time by different means. Laconia was betrayed to the invaders; Argos acknowledged their authority; Corinth, Elis, and Meſſenia ſubmitted to their arms. The revolution was complete, but not without great oppreſſion of the ancient inhabitants, many of whom emigrated, whilſt many were reduced to ſlavery. The Heraclidæ, according to the cuſtom of that age, divided their new acquiſitions by lot. The kingdom of Argos fell to the ſhare of Temenus; Creſphontes obtained Meſſenia; and, as Ariſtodemus happened then to die, Laconia was aſſigned to his infant ſons, the twin brothers, Euryſthenes and Procles. Corinth was beſtowed on their kinſman Aletes; and Elis given to Oxylus, their brave Ætolian ally. The reſt of the territory was divided amongſt the warlike Dorians and Ætolians, who had conquered for themſelves, and not for their leaders; and who, having over-run, without oppoſition, the fineſt provinces of the Peloponneſus, would not be diſpoſed to lead a life of hardſhip and miſery in their native mountains. This partition of the Peloponneſus occurred in the year 1102 B.C. Gillies's Hiſt. Anc. Greece, vol. i. See PELOPONNESUS, and the next article.

HERACLIDÆ, *return of the*, into Peloponneſus, is a celebrated epocha in the ancient chronology.

The time of this return is differently aſſigned; becauſe authors take the different attempts which they made to return, for the return itſelf. The firſt attempt was twenty years before the taking of Troy; the ſecond was a hundred years later, or eighty years after the taking of Troy: B.C. 1104. This laſt is ſuppoſed to have ſucceeded; at leaſt, according to Petavius, who mentions only theſe two. Rat. Temp. p. 1. lib. i. cap. 12. and Doct. lib. ix. cap. 30.

Scaliger diſtinguiſhes three attempts; and fixes the firſt fifty years later than Petavius; *viz.* thirty years after the taking of Troy. He ſays nothing of the ſecond, which was unfortunate, like the firſt; but he places the third in the ſame year with Petavius. See the preceding article.

As it occaſioned many changes and revolutions in the affairs of Greece, inſomuch that ſcarce a ſtate, or people, but were turned upſide down thereby, the return of the Heraclidæ is the epocha of the beginning of profane hiſtory; all the time that preceded it, is reputed fabulous. Accordingly, Ephorus, Cumanus, Caliſthenes, and Theopompus only begin their hiſtories from hence. See CHRONOLOGY.

HERACLIDES of Pontus, in *Biography*, a phyſician and philoſopher, was born at Heraclea, and was educated partly under Ariſtotle, and partly under Speuſippus, a diſciple of Plato. He wrote a treatiſe "On the Cauſes of Diſeaſes," and another on "The Diſeaſe in which the Reſpiration is ſuſpended," (περὶ τȣ ἄπνȣ;) a diſeaſe which Empedocles boaſted of having cured, when of thirty days duration. See EMPEDOCLES.

HERACLIDES of Tarentum, a phyſician of the ſect of Empirics, on whom Cælius Aurelianus, Galen, and Aëtius have beſtowed conſiderable praiſe. Galen conſidered him as the moſt eminent and able phyſician of that ſect, and as having poſſeſſed a degree of knowledge and practical ſkill equal to that of any of his contemporaries. He ſeems to have made a more liberal uſe of active medicaments, eſpecially of the narcotic claſs, than his predeceſſors; and was very induſtrious in his inveſtigation of animal, vegetable, and mineral ſubſtances, with a view to enrich the catalogue of the materia medica. To the books which he wrote upon this ſubject, he gave the name of the individuals to whom he dedicated them, according to Galen, entitling one "Aſtydamas," and another "Antiochis." He likewiſe wrote on the ſubject of diet, and the regimen to be obſerved in diſeaſes, in which abſtinence ſeems to have been puſhed to a great extent. See Le Clerc. Hiſt. de la Medecine, part ii. Cæl. Aurel. Acutor. lib. ii. cap. 9.

HERACLITISM, in *Antiquity*, denotes the philoſophy of Heraclitus, who was born at Epheſus, and flouriſhed about the ſixty-ninth Olympiad. This philoſopher was the founder of a ſect, derived from Pythagoras, the parent of the Italic ſchool. In early life he manifeſted a propenſity to the ſtudy of wiſdom, and was initiated into the myſteries of the Pythagorean doctrine by Xenophanes and Hippaſus, and afterwards incorporated them into his own ſyſtem. He declined the ſupreme magiſtracy of Epheſus, which was offered him; and when he was afterwards obſerved to be playing with the boys in the court of the temple of Diana, and aſked why he was not better employed, he replied "it is ſurely better to paſs my time with children, than to govern the corrupt Epheſians." With his fellow citizens he was diſpleaſed for having baniſhed a man ſo wiſe and able as Hermodorus; and being of a melancholy and ſplenetic temper, he deſpiſed the ignorance and follies of mankind, ſhunned public intercourſe with the world, and devoted himſelf to retirement and contemplation. His place of reſidence was a mountainous retreat, and his food the natural produce of the earth. When Darius, having heard of his fame, invited him to his court, he treated the invitation with contempt. His diet, and mode of life, at length occaſioned a dropſy, for which he could obtain no relief from medical advice; and he therefore attempted to cure himſelf, by ſhutting himſelf up in a cloſe ſtable of oxen. The event is doubtful, and the manner of his death, which happened at the age of 60 years, is not aſcertained. Of Heraclitus it has been reported that he was perpetually ſhedding tears on account of the vices of mankind, and particularly of his countrymen. But the fable is probably as little founded as that of the perpetual laughing of Democritus. The poet deſcribes them both:

> " ——De Sapientibus, alter
> Ridebat, quoties a limine moveret unum
> Protuleratque pedem; flebat contrarius alter."
> Juvenal.

> " Will you not now the pair of Sages praiſe
> Who the ſame end purſued by different ways?
> One pitied, one contemn'd the woeful times;
> One laugh'd at follies, and one wept o'er crimes."
> Dryden.

The writings of Heraclitus were compriſed in a treatiſe, which, according to Laertius, contained a continued diſcourſe on nature, and was divided into three books; one concerning the univerſe; the ſecond, concerning politics; and the third, of theology. This book he depoſited in the temple of Diana; and it is ſaid that he affected to write obſcurely, leſt it ſhould be read by the vulgar, and become contemptible. Accordingly he obtained the name of Σκοτεινος, the obſcure philoſopher; appropriated to him by the unanimous conſent of the ancients. It is ſaid by Tatian, that the poet Euripides, who frequented the temple of Diana, committed the doctrines and precepts of Heraclitus to memory, and accurately repeated them. The fragments of this work are preſerved by Sextus Empiricus, and it appears to have been written in proſe, a circumſtance which invalidates the above relation of Tatian.

According to Heraclitus, reaſon, by means of the ſenſes, is the judge of truth. This common and divine principle is derived by inſpiration from that which ſurrounds us. In dreaming, the paſſages of the ſenſes are obſtructed, and the connection of the human mind with that which ſurrounds us is interrupted; on waking, this connection is reſtored, and the power of reaſon returns. All common maxims, being comprehended by common and divine reaſon, are to be received as true. Fire is the principle from which all things in nature are produced: this principle conſiſts of ſmall indiviſible parts or atoms, in their nature ſimple, and duration eternal, and in continual motion. From the combination of theſe elementary fire and all the forms of nature are produced; and into theſe, at certain periods, they are all reſolved. This ſelf-moving fire is underived and eternal, and having within itſelf neceſſary motion, its force produces the ſyſtem of nature. This principle is the ſoul of the world, and is God, δημιεργος, the maker of all things. Fire condenſed is water; water farther condenſed is earth; and *vicê verſâ*. The heavenly bodies are in the form of boats, preſenting to us the hollow ſide; and they become luminous when certain fiery exhalations from the earth are collected within them. The ſun is no larger than he appears to the ſight, and becomes eclipſed when its convex ſurface happens to be turned towards the earth. The moon is of the ſame form and nature; and its monthly variations are occaſioned by the gradual changes of its poſition towards the earth, from concave to convex, and the reverſe. All the ſtars are nouriſhed by exhalations from the earth, and theſe, as they are more or leſs ſplendid and warm, cauſe the variations of day and night, of the ſeaſons, and of weather. Of the nature of the ſoul, Heraclitus ſpeaks with heſitation and doubt; but he thinks it moſt probable, that it is an exhalation from the fiery ſubſtance, which pervades all things, and is the ſoul of the world, paſſing into human bodies through the ſenſes. All nature is full of ſouls, or dæmons. Human ſouls are liable to perpetual changes; and being loaded with moiſt vapours, they paſs into the watery maſs and periſh; but when purified from theſe, they return into the ſoul of the world.

Although this philoſopher introduces into his ſyſtem the term God, he ſeems to uſe it for expreſſing, not a diſtinct being of a peculiar nature, but merely that innate force in the primary fire, by means of which its particles have been in eternal motion, and have at length united to form the preſent regular ſyſtem of nature. To this force, conſidered as diſtinct from the matter to which it belongs, he gave the appellation of God; and he called it rational and divine, becauſe the effects, which he aſcribes to it as a cauſe, were produced in a regular ſeries, and according to a certain and immutable law.

On the ſubject of morals, Heraclitus taught, that the end of life is to enjoy happineſs; that for this purpoſe it is neceſſary to repoſe the body and confine its wants within as narrow limits as poſſible; that it is of greater importance for men to know themſelves than to acquire extenſive learning; that human life is, in fact, the death of the ſoul, as, whilſt it continues in the body, it is confined and depreſſed, and never gains its true freedom and activity, till it returns to the divine nature from which it proceeds; that the firſt virtue is temperance, and the firſt leſſon of wiſdom to follow nature; and that all human laws are founded upon one divine law of neceſſity, which governs all things.

The Stoics were indebted to Heraclitus for many parts of their phyſical and moral doctrine. Many ſubſequent philoſophers taught his ſyſtem, or incorporated it with their own. Plato, learning it from Cratylus, adopted that part of it which treated of the nature and motion of matter. The Heraclitean ſect, however, ſeems to have been of no long duration, as no traces of its exiſtence are diſcernible after the death of Socrates: which was owing, partly to the obſcurity of the writings of Heraclitus, and principally to the ſuperior ſplendour of the Platonic ſyſtem by which it was ſuperſeded. Among the philoſophers of Athens, Heraclitus maintained a conſiderable degree of reputation, as we may infer from the great pains taken by Zeno to transfer ſeveral tenets of the Heraclitean ſyſtem into his own. Among the admirers of Heraclitus we may reckon *Hippocrates*. (See his article.) Brucker's Philoſ. by Enfield, vol. i.

HERACLITUS, the Sicyonian, was author of a treatiſe on ſtones, which Plutarch has quoted in the ſecond book of his treatiſe on rivers, when ſpeaking of the Scamander. To him has been aſcribed a work entitled "De Incredibilibus," the MS. of which was found in the Vatican library. It was printed at Rome in the year 1641, and it has been reprinted at London and Amſterdam. Moreri.

HERACLIUS, emperor of the Eaſt, ſon of the governor of Africa, of the ſame name, was ſent by his father with a fleet from Carthage to Conſtantinople to relieve the people from the tyranny of Phocas. The objects of his miſſion he performed ſo well, that he was himſelf inſtantly raiſed to the throne. This was in the year 610, a period when Choſroes, king of Perſia, was extending his conqueſts over the whole of the Aſiatic empire. The enemy had at length ſubdued and over-run all the Thracian provinces as far as the long wall of Conſtantinople, and Heraclius was preparing to quit his capital, and had put his treaſures on board the fleet, when the patriarch and clergy extorted from him a promiſe not to deſert his people: and they readily ſacrificed the wealth of their churches, in order to enable him to make head againſt his enemies. He ſolicited peace from the Perſian monarch, who was ſo inflated with ſucceſs as to demand an exorbitant tribute, and to inſiſt upon the emperor becoming a worſhipper of the ſun. Heraclius had paſſed ſeveral years in a kind of inglorious indolence, when Choſroes, by his unjuſt demand, forced him to become a hero. He now changed the imperial purple for the garb of a warrior, and, by ſtrict diſcipline, put his army on the moſt reſpectable footing. A battle enſued, in which the emperor obtained a complete victory over the Perſian army; after this he paſſed mount Taurus, marched through Cappadocia, and eſtabliſhed his winter quarters on the banks of the Halys. He returned to Conſtantinople, and in the ſpring of 623 purſued his ſucceſſes, ravaging the Perſian territories, deſtroying the temples of the Magi, and delivering a great number of Chriſtian captives. He paſſed the following winter near the ſhores of the Caſpian ſea. In another campaign he had the glory of recovering three hundred Roman ſtandards, and liberating from their thraldom a vaſt number of captives. This career of ſucceſs was fatal to Choſroes, who was depoſed by his own ſubjects, and his ſon placed on the throne. A treaty of peace followed in 628, by which the new Perſian king reſtored all captives, put an end to the perſecution of the Chriſtians, renounced his father's conqueſts upon the Roman empire, and gratified the piety of Heraclius by the reſtitution of the true croſs, as it was called, taken from Jeruſalem. This precious relict was in the next year replaced by the emperor on a religious viſit to the holy ſepulchre, an event which was the cauſe of a feſtival denominated "The Exaltation of the Croſs." Towards the cloſe of life, Heraclius engaged in religious controverſies, and withdrew from thoſe active cares which ſo glorioully diſtinguiſhed the middle period of his life. He was a zealous diſciple of Monothelism (which ſee), to which he adhered as long as he lived. He divided the ſucceſſion to the empire between his eldeſt ſon Conſtantine, and Heracleonas, a ſon by Martina, a ſecond wife, his own niece. To this act he had been urged by the ſolicitations of his wife. Conſtantine enjoyed, in a mature age, the title of Auguſtus, but the weakneſs of his conſtitution, it was urged by his mother-in-law, required a colleague and a guardian, and he yielded with reluctance to a partition of the empire. The ſenate was ſummoned to the palace to ratify or atteſt the aſſociation of Heracleonas, and the impoſition of the diadem was conſecrated by the prayer and bleſſing of the patriarch. The ſenators and patricians, with their uſual ſervility, adored the majeſty of the great emperor, and the partner of his reign. The ceremonies were afterwards repeated in the cathedral, and the concord of the royal brothers was affectedly diſplayed by the younger leaning on the arm of the elder. After this the emperor ſoon fell into a dropſical diſorder, which, as he was attempting to enforce his religious opinions, carried him off in February 641, in the 31ſt year of his reign. Gibbon.

HERÆA, Ἡραια, in *Antiquity*, a feſtival celebrated at Argos in honour of Juno, called, in Greek, Ἡρη. See a deſcription of the ceremonies attending this ſolemnity, in Potter's Archæol. Græc. lib. ii. cap. 20. tom. i. p. 397.

There was another feſtival of this name, celebrated every fifth year in Elis, where ſixteen matrons were appointed to weave a garment for the goddeſs.

There were other ſolemnities of this nature. See Potter, loc. cit. ſeq.

Heræa, in *Ancient Geography*, a town of Arcadia, near the river Alpheus, S. W. of Telphuſa. Its ſituation was pleaſant, and it derived its name from Hereus, the ſon of Lycaon. Along the Alpheus were the horſe-courſes, the baths, two temples dedicated to Bacchus, and a ſacred place in which were celebrated the Orgia. Pan alſo had a temple in this town. After undergoing ſeveral viciſſitudes, and at the cloſe of the war againſt Philip, when the Romans were diſpoſed to give liberty to the Greeks, in the year 196 B.C. Heræa recovered many of its privileges.

HERÆUM, derived from Ἡρη, the name given by the Greeks to Juno, denoted the temple conſecrated to her honour and worſhip. Of this kind there were ſeveral: *e. g.* the temple of Juno between the grove, ſacred to Argos, and the town of Argos:—another, or perhaps the ſame, in the Argolide, which, according to Strabo, was ſituated 40 ſtadia from Argos, and 10 from the town of Mycenæ, embelliſhed with a lofty ſtatue of Juno, conſtructed of ivory and gold, a golden peacock enriched with precious ſtones, and other ornaments:—a temple of Juno in Bœotia, 20 ſtadia diſtant from the fountain Gargaphia:—and another in the iſland of Samos, conſtructed by Rhœcus, the ſon of Philaus, who, with Theodore of Samos, invented the art of making moulds of clay, which were caſt in a font of braſs for making ſtatues.—Alſo, a town of Thrace, built by the Samians, and ſituated near Perinthus.

HERAKLI, anciently Heraclea, in *Geography*, a town of European Turkey, in Romania, in which are the ruins of an amphitheatre, built by the emperor Severus, on the north coaſt of the ſea of Marmora; the ſee of a Greek archbiſhop; 45 miles W. S. W. from Conſtantinople. N. lat. 40° 53′. E. long. 27° 54′.

HERAKRA, a town of Sweden, in the province of Smaland; 30 miles N. W. of Calmar.

HERALD, an officer of arms, anciently in great repute, and poſſeſſed of ſeveral conſiderable functions, rights, and privileges. They were ſubject to the ſovereign and the two great officers denominated *Conſtable* and *Marſhal*, (ſee each term,) and executed their commands.

The word *herald*, according to Du-Cange, comes from the Saxon *here*, or German *heer*, *army*, and *ald*, *ſervant;* becauſe chiefly ſerving in the army. Others will have the two words ſignify *champion of the army;* in alluſion to their office of denouncing war, proclaiming peace, &c. Du-Cange adds, that they were called *clarigarii*, as well as heralds. Borel derives the word from the Latin *herus*, *maſter;* q. d. one coming from his maſter; others from *herhaut;* q. d. *high lord;* others from *herold*, which is the ſame with *dominus veteranus;* and others, laſtly, from *heer*, *maſter*, or *army;* and *hold*, q. d. *bound to his lord*, or the *army*. For a variety of conjectures with regard to the etymology of this appellation we refer to Edmondſon's "Complete Body of Heraldry," vol. i. p. 81—83.

The origin of herald is very ancient; and the advocates of its antiquity have detailed many fables, which it is needleſs for us to recite. Stentor is repreſented, by Homer, as herald of the Greeks, who had a voice louder than fifty men together. The Greeks called them κηρυκες, and ειρηνοφυλακες; and the Romans *feciales*.

The Romans had a college of heralds, appointed to decide whether a war were juſt or unjuſt; and to prevent its coming to open hoſtilities, till all means had been attempted for deciding the difference in a pacific way.

As to the era of the appointment of heralds, ſome writers have contented themſelves with ſuppoſing, that the office was contemporary with the diſtribution of ſubjects into nobles and commoners; whilſt others have referred their origin to that period, in which princes firſt engaged in wars, which, as we have reaſon to lament, muſt have been very remote; and ſome, without pretending to this unwarrantable antiquity, have affixed it at a much later date. As to the country in which it originated, there is hardly a nation throughout Europe, not to extend our views to other quarters of the globe, to which the firſt inſtitution of heralds hath not been attributed. In this inveſtigation ſome have contended, that the office was firſt erected by thoſe people, from whoſe language the appellation of herald is derived. But this kind of argument involves the difficulty of aſcertaining its etymology. Æneas Sylvius, in an epiſtle written in the year 1451, refers to a MS. about heralds, which he had ſeen in St. Paul's church, London, compiled, as he aſſerts, about 600 years before that time: and admitting the alleged antiquity of ſuch a MS. it would lead us to allow the exiſtence of heralds to be as early as the year 851; and it would ſerve to vindicate the long and much ſuſpected genuineneſs of the ſtatute about tournaments, ſaid to have been made by the emperor Henry I., in the year 938, in which are mentioned kings of arms, heralds, and their reſpective duties. But ſir Henry Spelman hath inconteſtibly proved, that this MS.

ought to be referred to the time of the emperor Charles IV., and not to that of Charlemagne, when Æneas Sylvius imagined it to have been written. Mutius has furniſhed us with a conſtitution of Frederick Ænobarbus, who came into the empire in 1152, about the immunity of heralds, which is leſs exceptionable than the above cited ſtatute of Henry I. Accordingly the eſtabliſhment of heralds has been referred by a learned and noble author to an event that occurred about this period, conjecturing that they owed their origin to the cruſades, or expeditions into the Holy Land; and this opinion has been adopted by many modern writers. The duties aſſigned them, and the purpoſes for which they were firſt intended, could they be ſatisfactorily aſcertained, would aſſiſt in the inveſtigation of their origin. The emperors, it is ſaid, were accuſtomed to take under their protection, ſuch of their moſt experienced and valiant ſoldiers of gentilitial birth, who had been grievouſly wounded or maimed in their wars; and theſe ſoldiers were diſtinguiſhed by the name of "Veterans." To their judgment and counſel the emperors paid great deference, and their attendance on the perſons of their maſters became neceſſary. The emperors employed them in negotiating matters that were litigated with their enemies and rebellious ſubjects. In the performance of theſe duties they gained confidence and reſpect from all parties. The inſtitutions of juſts, tilts, and tournaments, which originated in Germany, opened a new field for the employment of theſe Veterans. The feudal ſyſtem alſo began to ſpread itſelf over the weſtern and northern parts of Europe nearly about the ſame time when tilts and tournaments became faſhionable, and ſerved to introduce and eſtabliſh tenures by knights' ſervice. Tenants of this deſcription, in order to their being readily known and diſtinguiſhed, aſſumed ſome particular device or token, which they bore on their banners, targets, and ſhields; and ſuch devices afterwards called arms, became the gentilitial tokens and enſigns of the families that had ſo aſſumed them. Thus alſo, the challengers, who offered to engage in tournaments, tilts, and juſts, in proof of their gentility, hung up at the entrance of the liſts, ſhields charged with their devices and ſymbols; and the caſe was the ſame with thoſe who accepted the challenges. No one who had not a certificate from the veterans of his being a gentleman, and of which his device, ſymbol, or arms, was the criterion, was permitted to tourney. The veterans were, therefore, obliged to acquaint themſelves, not only with the enſigns of princes, but with the diſtinct devices each family had aſſumed to itſelf. Upon the introduction of the cruſades, towards the latter end of the 11th century, theſe veterans would be ſelected as proper perſons for carrying on a correſpondence between the confederated princes; and as each prince had then his peculiar ſymbol, and armorial enſign, what could be more obvious than the inveſting the meſſengers with a coat of arms ſimilar to that borne by his prince, which would ſerve to ſanction and accredit them, and contribute to their ſafety and reception? As theſe meſſengers paſſed frequently to and fro through the army, they became particularly acquainted with the enſigns borne throughout the hoſt; and of courſe they would be ſtyled "heralds," either as the ſame was the language of the prince who commanded, or of him who primarily either propoſed ſuch an expedient, or firſt thus equipped an officer, or upon ſome other account not now to be diſcovered. Soon after this time, the word *Heraldus* occurs in the Imperial Conſtitutions of Frederick Ænobarbus, and they provided for the ſafe paſſports and inviolable ſecurity of ſuch officers. With equal probability it may be further conjectured, that the benefit which the princes then in alliance and confederacy derived from ſuch an officer, was ſo evident, that after their return into their own countries, they retained this manner of intercourſe, which was at length extended to all meſſages to be ſent, and to all negotiations to be carried on and concluded, between friends and enemies.

It is not eaſy to determine when the office of *heralds*, under that or any other appellation, was firſt introduced into England. The oldeſt public muniments, in which any mention is made of Engliſh heralds, are a pell-roll of the twelfth of king Edward III., and a wardrobe account of the ſame year; and yet it is certain that they were eſtabliſhed in this kingdom long before that time. From facts furniſhed by ſir Henry Spelman, we may infer, that England had *its heralds* at the commencement of the reign of king Edward I., and that they were then actually divided into claſſes. Some have ſuggeſted, without ſufficient reaſon, that the office of an herald was known to the Saxon monarchs. When the Normans invaded England, offices of this deſcription were unknown. Robert, the conqueror's eldeſt ſon, who undertook an expedition into the Holy Land, it may be reaſonably ſuppoſed, became acquainted with the inſtitution of heralds; but after his return he does not ſeem to have eſtabliſhed ſuch officers in his dukedom of Normandy. Richard, ſurnamed Cœur de Lion, who was the firſt of our monarchs that perſonally engaged in the cruſades, muſt have been acquainted with the office and utility of heralds; but they had been eſtabliſhed in Germany, and alſo in France, and elſewhere, long before that period; and, therefore, it is not likely that he ſhould primarily have introduced them into England. Henry Fitzempreſs muſt have been well acquainted with their eſtabliſhment and importance in the empire before he aſcended the Engliſh throne; and his intercourſe afterwards with France, Germany, &c. muſt have occaſioned the heralds of other princes to have been frequently ſent to him. Hence, and from other collateral circumſtances, we may conclude, that heralds were tranſplanted either from Germany or France, and that they gained an eſtabliſhment in England ſome time in that monarch's reign, and that they grew up from this period to that ſtate in which we find them at the beginning of the reign of king Edward I. It is not improbable that Engliſh heralds, like thoſe of Germany, were originally choſen out of the veteran ſoldiers; becauſe their functions were the ſame, and military men were beſt qualified to execute them. "The primary duty of Engliſh heralds," ſays Edmondſon, "at the time of their eſtabliſhment, quadrated exactly with that of the heralds of foreign princes, in carrying and delivering all meſſages of importance to allies, enemies, and rebels; in giving ſolemn defiance and denunciations of war; in ſummoning cities, caſtles, &c. to ſurrender; in making propoſitions of peace, truce, and accommodation; and in offering mercy and pardon to rebellious ſubjects and inſurgents. At the times of ſigning leagues, truces, and treaties of peace and alliance, they attended the legation, and ſometimes were joined in it; honours, which they occaſionally enjoyed until the reign of Henry VII." By this admiſſion of the heralds to a ſhare in public negociations, they acquired importance; they had eaſy acceſs to the ſovereign; they became reſpectable and confidential; and they were placed in ſuch a ſtate as ſecured to them ample allowances, fees, and rewards, together with conſiderable privileges and immunities, among which was an exemption from all taxes, aids, and aſſeſſments. From the time of their introduction into this kingdom, they were in every reſpect the immediate and ſubordinate miniſters of the conſtable and marſhal of England, and as ſuch executed the orders, and aſſiſted in the management and conduct of the ſeveral branches of duty within the departments of thoſe two great officers. Hence it was, that they had the cognizance, inſpection, marſhalling, and regulations of coats-armour, and the ſeveral marks of diſtinction relating to them; that they received all foreign nobility and others coming to England, to perform feats of arms, and gave them ſafe conduct from the time of their arrival to that of their leaving the kingdom; that they aſſiſted at all tilts, tournaments, and feats of arms, and that they had a very conſiderable charge and interference in the order and progreſs of legal combats. Hence, alſo, they were employed in marſhalling and conducting coronations, marriages, baptiſms, funerals, interviews, and thoſe other auguſt aſſemblies, proceſſions, pomps, and ſolemnities, in which conſiſted the ſplendour and magnificence of our ancient monarchs; in taking care that the orders, rites, and ceremonies, fixed for the guard and ornament of thoſe ſhows and triumphs were duly obſerved; in ſeeing that the rules of precedency were ſtrictly regarded, and in preventing all confuſion and diſputes that might otherwiſe happen to diſturb them.

Our kings, anciently, not only created heralds with their own hands, and with magnificent and expreſſive rites, in the moſt public manner, and on the moſt ſolemn feſtivals, chriſtening them by pouring wine on their heads from a gold cup, and giving them their herald's name, which is now done by the earl marſhal; but in order that they might bear ſome external and conſpicuous tokens of their rank and character, inveſted them, agreeably to the practice of other princes, with the royal military habit, or ſur-coats of the ſovereign's arms, the known ſymbols of authority and honour; and commanded them to wear ſuch ſur-coats, as enſigns of their office, when they were in execution of any branch of their duty. Their perſons, being thus habited and diſtinguiſhed, were kept ſacred and inviolable; they paſſed with ſafety through foreign dominions, unmoleſted even by enemies in times of war, in the field, or in the hour of battle; on the contrary, they were permitted free acceſs to thoſe princes with whom their ſovereign was at variance, and were diſmiſſed by them with ſafe conduct to the dominions of the king their maſter. At the time of their creation by the earl marſhal, they take the oath of an herald on the ſword, and are inveſted with a tabart of the royal-arms, embroidered on ſatin, not ſo rich as that of the kings, but better than the purſuivants', and a ſilver collar of SS. Amongſt the nobility we alſo find heralds in their funeral rites and ceremonies, as well as in the celebration of their marriages, chriſtenings, and other feſtivities, exerciſing the ſame forms and ſuſtaining the ſame grandeur as in thoſe of the royal family. The management of all public ſhows and triumphs was committed by the ſovereign to their care and conduct; and, in ſhort, the heralds, being thus qualified, were uſually engaged to form, regulate, and ſuperintend ſuch feſtivities and ſolemnities as the nobility determined to have obſerved and performed on any occaſion that reſpected their own families, or which they apprehended would redound to their honour and aggrandizement. When family arms became the external criterion which diſtinguiſhed the gentleman from the peaſant, and it was neceſſary, in any feat of arms, that perſons ſhould prove themſelves to the ſatisfaction of the heralds to be gentlemen of coat-armour, our gentry took care to have their arms embroidered on their common-wearing ſur-coats, and would not ſuffer inferior perſons, although maſters of acquired wealth, to uſe ſuch token of gentilitial diſtinction. So jealous indeed were they of any infringement of the armorial rights to which they were entitled, that whenever the arms which they and their families had borne, happened to be claimed by any other gentleman, they vindicated their rights even by duel. It became neceſſary, therefore, for the heralds to draw out with accuracy the authentic genealogies of noble and gentiliteal families; to continue from time to time, and preſerve their pedigrees in direct and collateral lines; and to have a perfect knowledge of all hereditary arms, enſigns armorial, badges of honour, and the outward marks as well of perſonal as of family rank and diſtinction. Theſe parts of heraldic employment have been ſubſervient to ſeveral important purpoſes, beſides thoſe for which they were originally undertaken. Genealogical tables, and authentic pedigrees, regularly deduced, contain memorials of paſt tranſactions and events; and from them chronologers and hiſtorians have derived conſiderable aſſiſtance; they have alſo operated to the detection of frauds, forgeries, and impoſtures; eſtabliſhed marriages; defended legitimacy of blood; aſcertained family alliances; proved and maintained affinity and conſanguinity; vindicated and corroborated the titles of lands to their poſſeſſors; and have furniſhed effectual evidence for ſettling claims and rights of inheritance.

The original viſitation books of heralds, compiled when progreſſes were ſolemnly and regularly made into every part of the kingdom, to inquire into the ſtate of families, and to regiſter ſuch marriages and deſcents as were verified to them upon oath, are allowed to be good evidence of pedigrees. (Comb. 63.) And it is much to be wiſhed, ſays judge Blackſtone, that this practice of viſitation at certain periods were revived; for the failure of inquiſitions *poſt mortem*, by the abolition of military tenures, combined with the negligence of the heralds in omitting their uſual progreſſes, has rendered the proof of a modern deſcent, for the recovery of an eſtate or ſucceſſion to a title of honour, more difficult than that of an ancient. This will be indeed remedied for the future, with reſpect to claims of peerage, by a late ſtanding order of the houſe of lords (11 May, 1767); directing the heralds to take exact accounts and preſerve regular entries of all peers and peereſſes of England, and their reſpective deſcendants; and that an exact pedigree of each peer and his family ſhall, on the day of his firſt admiſſion, be delivered to the houſe by garter, the principal king at arms. But the general inconvenience affecting more private ſucceſſions, ſtill continues without a remedy.

The modern heralds, *i. e.* thoſe we properly call heralds, have loſt a good deal of the diſtinction and office of the ancient ones. What relates to the making out arms, the rectifying of abuſes therein, &c. is chiefly committed to the king at arms. And in the army, drums and trumpets have ſucceeded to the functions of heralds, being ſent by the generals on the ſame errands; and on that account enjoying the ſame rights and privileges. Their perſons are under the protection of the law of nations, when they bear the marks of their offices publicly, *i. e.* the trumpeter his trumpet, and the drummer his drum; in the ſame manner as the herald his coat.

The moſt common diſtinction of theſe officers hath been into claſſes or degrees, *viz.* kings, heralds, and purſuivants of arms. All theſe three orders are ſtyled heralds, which may not be a very improper attribute to the kings of arms; becauſe the order of a herald is comprehended within that of a provincial king: the office of ſuch a king having in it the office of a herald, *ex vi ordinis*, and ſomething more; for to be a herald, was but a ſtep to the kingſhip, as the being a purſuivant, or a novice, to the office of a herald. Theſe orders, or degrees, bear the impreſs of a diſtinct character; that is, the perſon who is created king of arms is qualified with a new capacity to perform certain functions, which before his new promotion, whilſt he was only a herald, he had no power to do;

but the purſuivants, being only candidates, probationers, or noviciates, and not really officers, were therefore very improperly included under the term herald. It has been ſaid, that perſons could not arrive at the dignity of herald, without having been ſeven years *purſuivant*, (which ſee,) and that they could not quit the function of herald but to be made king at arms.

Heralds, being at firſt military men, had on that account only, as it has been ſaid, the addition of "armorum," "ad arma," and "d'armes," and not upon any relation to coats-armour, or enſigns of honour. Indeed, coat-arms themſelves originally belonged to no other than military men, as Mr. Selden, in his "Titles of Honour," hath fully proved. Sir Henry Spelman is of opinion, that the title of king of arms was attributed to ſuch officers in England as belonged immediately to the king's majeſty; whilſt thoſe who appertained to princes of the blood-royal, or to the nobility, were ſimply ſtyled heralds.

For an account of kings of arms, ſee King *of arms*.

Of the ſix heralds in England, who have had a long ſucceſſion, and continued to receive ſalaries from the public, *Windſor* has his denomination from the royal caſtle or palace; *Cheſter*, *Lancaſter*, *Richmond*, *Somerſet*, and *York* from counties or ſhires, which have at ſundry times, as ſir Henry Spelman obſerves, been the honours or appendages of the younger ſons of the crown. And indeed we find the heralds with moſt of theſe titles, ſometimes belonging to the ſovereign, and ſometimes to the nobility, who had theſe honours. We ſhould obſerve, however, that although their titles are taken from territories or earldoms, yet theſe officers are not local as to any particular charge or juriſdiction to be executed in thoſe places only; for no one herald is either circumſcribed within any province, or excluded from officiating within the precincts of thoſe counties whoſe titles are borne by others, but the titles are merely nominal, as they are officers at large, ſomewhat like titular biſhops. *Cheſter* herald is ſaid by ſir Henry Spelman to have been inſtituted under Edward III.; but though no ſuch officer is mentioned in any of the records of that king's reign, it is certain that he was a known and eſtabliſhed herald in the time of Richard II. From that time a regular ſucceſſion hath been continued in that office. During the reigns of Henry IV., Henry V., and Henry VI., there was a king of arms, by the appellation of *Lancaſter*; but the firſt record in which a *Lancaſter* herald is mentioned, is a privy ſeal for a protection granted by the prince of Aquitaine and Wales, *i. e.* the Black prince, who had thoſe titles from the 36th to the 47th year of Edward III.; and though the title of *Lancaſter* herald doth not occur in any records from the firſt year of Henry V., until the 18th year of king Henry VI., yet from that time to the preſent the ſucceſſion hath been regularly continued. *Richmond* was a title given to an officer of arms belonging to the nobility as well as to the crown. The title of *Richmond* herald occurs in the eighth year of Henry VI., likewiſe in the 12th year of Edward IV., in the reign of Henry VII., in the ſecond year of Henry VIII., from which time the ſucceſſion hath continued. *Somerſet* is a title, which, like the preceding, ſometimes belonged to a herald of the nobility, and at others to a herald of the crown. Some have referred the creation of *Somerſet* herald to the reign of Henry VIII., but it appears that Henry VII., in his 9th year, conſtituted an officer under this title. Difficulties occur in making a due diſtinction between *Windſor* king of arms and the herald of arms, denominated *Windſor*. About the eighth year of Edward IV. a *Windſor* herald is expreſsly mentioned. From about the year 1502, the ſucceſſion of Windſor heralds hath been uninterruptedly continued. The earlieſt record in which the *York* herald is mentioned is a patent-roll of the firſt year of Richard III. From the reign of Henry VII. to the preſent time, the ſucceſſion hath been uninterrupted.

After the ſix titles already enumerated, in which a ſucceſſion hath been continued down to this time, it may not be improper to mention ſome others, who were probably heralds to the nobility, and took their titles from the counties, cities, and places which had, at ſome time or other, been dukedoms or earldoms: ſuch were Arundel, Bedford, Buckingham, Carliſle, Clarence, Cornwall, Derby, Dorſet, Exeter, Glouceſter, Hertford, Hereford, Huntingdon, Leiceſter, Northampton, Nottingham, Norfolk, Northumberland, Pembroke, Saliſbury, Shrewſbury, Suffolk, Wales, Warwick, and Worceſter. Some of our heralds have derived their titles from provinces and territories which either are or formerly have been ſubject to our ſovereigns, as Bourdeaux, Brunſwick, Guienne, Guiſnes, Hanover, Maine, &c. The arms, quarterings, ſupporters, and badges of the crown, have alſo given denominations to heralds; ſuch are Faucon, Fleur-de-lis, Leopard, Roſe, and Blanc Courſier. This is likewiſe the caſe with reſpect to places where ſignal victories have been obtained; as Agincourt and Nazer. Others, again, from ſome collateral circumſtance, which it is not neceſſary to mention.

For ſome ages paſt the crown hath occaſionally iſſued a warrant directed to the earl marſhal, commanding him, in the name and on behalf of the king, to create the perſon named, an *herald extraordinary*, by ſome title expreſſed in ſuch warrant, and different from any of thoſe given to the uſual heralds in ordinary, and to inveſt him with the privileges belonging to ſuch office. No ſalary is annexed to the office, but merely his creation with ceremony takes place in purſuance of the warrant. This diſtinction of heralds doth not occur before the 19th year of Henry VIII. The creation of ſuch heralds, ſays Edmondſon, has uſually occurred when there was a plenarty in all the titles of thoſe in ordinary, and it has been adopted ſometimes with a deſign that theſe new officers ſhould, in preference to the ſenior purſuivant, ſucceed in the firſt vacancy that might happen in any of the titles in ordinary, and then have a patent with a ſalary from the crown; ſometimes, in order that the perſon favoured might, immediately after his creation, be promoted to the next vacant kingſhip, as it were *per ſaltum*; it being an eſtabliſhed rule, ſays Anthony Wood (Athen. Oxon.) that no man can be made a king of arms, before he is an herald; and at other times to enlarge the number of heralds, for the better and eaſier performance of the ſervices required by the crown, from the officers of arms. The three heralds extraordinary are *Arundel*, *Norfolk*, and *Mowbray*. The office of the heralds, ordinary and extraordinary, is to wait at court, to order and attend public ſolemnities, as coronations, inſtallations, funerals, &c. to proclaim war and peace, to attend to the regulation of the bearings of arms, and to ſearch pedigrees, &c. under the authority of the earl marſhal and his deputy.

The ſix heralds, with the three kings at arms, and the four purſuivants, are a college, (which ſee,) or corporation; erected into ſuch by charter of Richard III. who granted them divers privileges, as to be free from ſubſidies, tolls, and all troubleſome offices. Clarencieux and Norroy king at arms are alſo called *provincial* heralds.

HERALDRY, the art of armoury and blazoning, or the knowledge of what relates to the bearing of arms, and the laws and regulations thereof.

According to its modern acceptation, heraldry is conſidered, not only as the ſcience of armories and their blazons, but as comprehending the knowledge of every thing that relates to the ſeveral military marks of honour and dignity, regularly compoſed of certain figures and tinctures, borne upon ſhields, enſigns, creſts, ſurcoats, &c. which have been aſſumed by ſovereigns, appropriated to communities and high offices, or, according to the laws of arms, have been either taken, and authoriſed to be retained, or originally granted by potentates or ſuch as they have duly authoriſed for that purpoſe, as hereditary tokens, by which families and perſons of ancient and worthy deſcent are not only illuſtrated, diſtinguiſhed, and differenced among themſelves, but ſeparated and known from the ignoble and common rank of people, who are not entitled to uſe ſuch badges of honour and reſpect. Many advantages obviouſly reſult from the knowledge of theſe gentilitial marks of diſtinction. It ſerves to illuſtrate national and family hiſtory, and it has a tendency to preſerve the obſervance of a due ſubordination among the ſeveral ranks and claſſes of mankind. See HERALD.

Few ſubjects have engaged ſo much attention, and led to ſuch a variety of inveſtigations and opinions, as the origin of armories. The commencement of their uſe has been referred to various eras and countries, not excepting the moſt ancient and the moſt remote. Some have traced them to the antediluvian world, and even to the poſterity of Seth, who are ſaid to have been thus diſtinguiſhed from the children of Cain. Rabbinical writers allege, that the divine command ſignified to the children of Iſrael, in the ſecond year after their entrance into the wilderneſs and mentioned in the book of Numbers (ch. i. 52 ii. 2.), that they ſhould pitch their tents every one by his own ſtandard, with the enſigns of their father's houſe, is a full proof of the uſe of armories among the Egyptians, at the time of the departure of the Iſraelites; and they even pretend that their antiquity is aſcertained by the 49th chapter of Geneſis, where notice is taken of the patriarch Jacob's bleſſing his children, and alſo by the breaſt-plate of the high prieſt, which was garniſhed with 12 precious ſtones of different colours. They thus boldly venture to aſcertain the blazon of the reſpective ſtandards and banners uſed by each particular tribe, and which, as they fancy, were aſſigned to them by Jacob. Each Iſraelitiſh family, as they ſay, had its peculiar flag, on which was repreſented ſome certain figure, or device, by which ſuch family was diſtinguiſhed from others of the ſame tribe. Accordingly many fanciful writers have deſcribed the armories of Moſes, Joſhua, Job, Eſther, Judith, David, and other Hebrews of note. Others have pretended that the Pagans of the heroic ages made uſe of armorial bearings; alleging that the Aſſyrians wore, for their arms, a dove argent, in alluſion to the name of their queen Semiramis, and thus ſome commentators explain the expreſſion of Jeremiah, "a facie iræ columbæ." Moreover, the devices on the bucklers of the beſiegers of the city of Thebes, deſcribed by Euripides, and the ſymbols placed on thoſe of the Argonauts, mentioned by Valerius Flaccus, are adduced in confirmation of this opinion. The figures on the ſhields of Agamemnon, and other principal Greeks, who engaged in the ſiege of Troy; the hydra and 100 ſerpents, painted on the ſhield of Aventinus, called by Virgil his paternal enſign, and a paſſage in Pliny (Nat. Hiſt. l. xxxv. c. 3.), where he ſays, "Scutis qualibus apud Trojam pugnatum eſt continebantur imagines," have been thought by ſome writers a ſufficient warrant for aſcribing the invention of armories to the Greeks, previouſly to their expedition againſt the Trojans. The account given by Xenophon, in his "Expedition of Cyrus," and by Philoſtratus, in his "Eulogium on Themiſtocles," of a golden eagle borne on a buckler, being the royal enſign of the Medes; the aſſurances of the Scholiaſt on Ariſtophanes, that it was cuſtomary for thoſe people to paint and repreſent eagles on their ſhields; and the frequent mention, made by the Greek writers, of the devices uſed by Arſaces, Cyrus, Cambyſes, Darius, Xerxes, &c. have induced many to conclude, that armories were originally uſed by the Medes and Perſians, at the time of the eſtabliſhment of their monarchy. The inſtitution of heralds has been referred by ſome perſons to Alexander the Great, who, as they ſay, not only regulated the uſe of armories and their blazons, but granted peculiar arms to many of his principal officers, as tokens of his favour and recompences of their valour. (See HERALD.) The "Jus imaginum" of the Romans has been conſidered by ſome perſons as intended for the ſame purpoſe with the uſe of armories in later times. (See ARMS, in *Heraldry*.) Others attribute the origin of armories to the Spaniards, during their wars with the Moors, in the reign of Julian the Apoſtate; others again refer their origin to the reign of the emperor Theodoſius. Our Engliſh king Arthur, the Saxons, Danes, and other northern nations, have likewiſe been honoured with being the inventors of armory. The emperor Charlemagne is ſuppoſed, by the writers of his life, to be the great regulator of armories, which, as they pretend, were not only known, but generally uſed, in his time. Some, with greater probability, trace their invention to the Germans in the 10th century, and ſuppoſe that they were coeval with tilts and tournaments. But the cruſades or expeditions to the Holy Land have more generally, and perhaps more juſtly, been ſuppoſed to have given riſe to the uſe of armories. Some again aſcribe the introduction of them to the emperor Frederic Barbaroſſa; and others attribute their origin to the powerful factions of the Guelphs and Gibelins, who diſtinguiſhed their reſpective partizans by ſuch devices. Upon the whole we may obſerve, that thoſe writers ſeem to approach neareſt to the truth, who are of opinion, that the primary inſtitution of armories is to be referred to the tournaments held toward the end of the 10th century, their growth to the cruſades, and their perfection to juſts and other feats of arms. For a brief ſketch of the hiſtory of armories, ſee ARMS, in *Heraldry*.

We ſhall cloſe this detail with obſerving in general, that the diverſity of opinion which has prevailed among heraldic writers concerning the origin of arms, and the fooliſh fondneſs which ſome have manifeſted for aſcribing them to a very remote antiquity, have been principally owing to their not diſtinguiſhing between the ſymbols that were uſed as military and national enſigns; the ornaments and figures anciently placed by warriors on their ſhields, helmets, and armour; and thoſe devices, compoſed of different figures and tinctures, which have been aſſigned or authoriſed by ſovereigns to different families, as hereditary tokens and marks of diſtinction, honour, gentility, and nobility, tranſmiſſible from father to ſon, and which are uſually ſtyled coats armour, or coats of arms. See COAT of *Arms*.

Our great Camden, whoſe opinion we have briefly cited under the article ARMS, ſuppoſes, that "ſhortly after the conqueſt, the eſtimation of arms began in the expeditions to the Holy Land, and afterwards, by little and little, became hereditary, when it was accounted an eſpecial honour to poſterity to retain thoſe arms which had been diſplayed in the Holy Land in that holy ſervice againſt the profeſſed enemies of Chriſtianity; and that we received, at that time, the hereditary uſe of them; but that the ſame was not fully eſtabliſhed until the reign of king Henry III.; for that, in the inſtances of the laſt earls of Cheſter, the two Quincies, earls of Wincheſter, and the two Lacies, earls of

Lincoln, the arms of the father ſtill varied from thoſe of the ſon." Sir Henry Spelman is of opinion, that they are of ſtill more modern growth in this kingdom; for, ſpeaking of the antiquity generally allowed to the uſage of arms in England, he obſerves, that "this nation being for ſome hundreds of years harraſſed with wars, in the ſtorm of foreign aſſaults, and civil commotions, there is little reaſon to be over-confident in matters of pedigree and arms beyond 400 years;" and he even expreſſes his doubt, whether they are entitled to that antiquity, by adding; "Neſcio an ea prorſus antiquitate."

Blazon, or the art of blazoning of arms, is a ſubject of importance in the ſcience of heraldry, and it conſiſts in the knowledge of thoſe colours and metals which are proper to be uſed, and of the ſeveral parts, lines of partition, ordinaries, and charges, of which the coat is compoſed. The colours and metals, for an account of which ſee COLOUR in *Heraldry*, are commonly blazoned by tinctures; and, according to the ſentiments of ſome refiners in the art, the arms of gentlemen, eſquires, knights, and baronets, are to be blazoned by tinctures, thoſe of nobles by precious ſtones, and thoſe of ſovereign princes, kings, and emperors, by planets. The two metals, or and argent, and the four colours, yellow, white, black, and red, are the ſeveral tinctures of which the fields, and all charges of arms, ought in ſtrictneſs to be made, excepting, however, ſuch charges as are to be borne in their own proper, or natural colour; which bearings, not having in blazon, any particular, technical, or fixed terms, are all comprehended under the word "Proper." As to all the tinctures, *purpure*, *tenny*, and *ſanguine*, they being mixtures, are now ſeldom, if ever, uſed, either for fields, or charges, although they are ranked amongſt thoſe, to which ſome whimſical heralds have given myſtical ſignifications, and repreſenting the *moral*, *political*, and *military* virtues of thoſe who originally bore their arms ſo coloured or tinctured. *White*, they ſay, denotes chaſtity; *black*, conſtancy; *blue*, loyalty, &c. but the mere mention of theſe ridiculous fancies is ſufficient.

In blazoning a coat of arms, you are to begin with the field, then proceed to the ordinary, and next to the charges. If the coat conſiſts of two colours only, as *e. g.* the coat of Hatton, you may ſay "azure, a cheveron between three garbs or," which implies, that both the cheveron and garbs are or. When you have mentioned the charges that are next to the field, then proceed to thoſe charges that are more remote. When a field is divided by lines, they muſt always be mentioned before the colours.

It is an eſtabliſhed rule among the heralds, that in blazoning, animals are always to be interpreted in the beſt ſenſe; that is, according to their moſt noble and generous qualities, and ſo as may redound moſt to the honour of the bearers.

Thus the fox, being reputed witty, and withal given to filching for his prey; if this be the charge of an eſcutcheon, we are to conceive the quality repreſented to be his wit and cunning, not his theft.

Guillim adds, that all ſavage beaſts are to be figured in their fierceſt action; as, a lion erected, his mouth wide open, his claws extended, &c.: thus formed, he is ſaid to be *rampant*; and if full-faced, *rampant-gardant*. When lions are looking behind them, then the word *regardant* is added to that which ſpeaks their attitude, as *rampant-regardant*, &c.: when lions are repreſented feeding, they are called *rapin*; and in the attitude of ſpringing, with their hind legs cloſe, they are termed *ſaliant*, and ſo of all other beaſts, except griffins, which are termed *ſegreant*, and not *rampant*. A leopard or wolf is to be pourtrayed going, as it were, pedetentim; which form of action, ſaith Chaſſanæus, fits their natural diſpoſition, and is termed *paſſant*. The gentler kinds are to be ſet forth in their nobleſt and moſt advantageous action; as, a horſe running or vaulting, a greyhound courſing, a deer tripping, a lamb going with ſmooth and eaſy pace, &c.

Every animal is to be moving or looking to the right ſide of the ſhield; and it is a general rule, that the right foot be placed foremoſt, becauſe the right ſide is reckoned the beginning of motion: add, that the upper part is nobler than the lower; ſo that things conſtrained either to look up or down, ought rather to be deſigned looking upwards. It muſt be noted, that notwithſtanding theſe ſolemn precepts of Guillim, and the other maſters of armoury, we find by experience, that there are lions paſſant, couchant, and dormant, as well as rampant, and that moſt animals in arms look down, and not up. The tongues and claws of all beaſts are in heraldry generally repreſented as of a different colour from that of their bodies, and are termed *langued* and *armed*, and, therefore, theſe words ſhould be always mentioned in blazon. It is a rule, that when any beaſt is coloured azure, the tongue and claws muſt be gules; and *vice verſâ*, unleſs it is otherwiſe expreſſed in the grant of arms. When any beaſt proceeds from the bottom of a chief, feſs, &c. they are termed *iſſuant*, and when it proceeds from the feſs or ordinary, it is termed *naiſſant*.

Birds are eſteemed a more honourable bearing than fiſh; and wild and ravenous birds than tame ones.

Birds, according to Leigh, are to be numbered as far as ten; according to Chaſſanæus, to ſixteen; after which they are to be blazoned without number.

Birds painted of their natural colour in arms are termed *proper*, and their claws or talons, and beaks, are called *arms*. If falcons or eagles are drawn feeding, they are then termed *preying*; when the wings of the eagle, falcon, &c. are both behind the head, and back to back, they are termed *expanded*, or *adoſſed*; and when the wings are on each ſide of the head, they are termed *elevated*. An eagle with wings elevated, and legs extended, is called *diſplayed*. When birds are looking behind them, they, as well as beaſts, are called *regardant*.

All birds, except birds of prey, having their beaks and legs of a colour different from that of their body, are termed *membered*, and as to their claws and talons, *armed*. Birds on wing are ſaid to be *volant*.

In the blazoning of fowls much exerciſed in flight, if the wings be not diſplayed, they are ſaid to be borne *cloſe*; *e. gr.* he beareth an eagle, a hawk, or a ſwallow, *cloſe*. In the general, wherever a bird is found in any action or poſture, to which nature does not ordinarily incline it, ſuch action or poſture is to be named, otherwiſe not.

Fiſh are of themſelves of leſs eſteem in a coat armour than beaſts and fowls, as being poſterior to them in the order of creation; but they ſometimes become ſo dignified by the perſons or families who bear them, as to be preferable to many birds or beaſts.

Fiſh are borne different ways; upright, embowed, extended, indorſed, ſurmounted of each other, fretted, triangled, &c.

All fiſh borne feeding ſhould be termed *devouring*.

Fiſh, when placed in a horizontal direction, as if they were ſwimming, are ſaid to be *naiant*; and when they are placed perpendicular, ſo that the head is in chief, and the tail in baſe, they are ſaid to be *hauriant*, that is, drawing or ſucking in air.

Heraldry likewiſe comprehends what relates to the marſhalling of ſolemn cavalcades, proceſſions, and other ceremonies at coronations, inſtalments, creations of peers, funerals, nuptials, &c.

HERAPOUR, in *Geography*, a town of Hindooſtan, in Baglana; 37 miles N.E. of Chandore.

HERAT, a city of Perſia, and formerly the capital of Choraſan, till the firſt Sefi of Perſia transferred this rank to the northern city of Meſhid, is ſeated on a river of the ſame name, which runs into the Caſpian ſea, near Zaweh. It is ſurrounded with walls and ditches, and defended by an old caſtle. Although it is a ſmaller city than Candahar, it maintains a reſpectable trade, and the market place occupying a whole ſtreet, covered with an arched roof, is fitted with ſhops of various wares. Bread, rice, and freſh meat, with various fruits and vegetables, are cheap and abundant. Coarſe woollens are manufactured in the adjacent diſtricts; a great quantity of which, made into garments, is exported to various parts of Northern Perſia. Surtouts of ſheepſkins, with the wool on the inſide, are ſeen hanging at almoſt every ſhop, and are uſed by all claſſes of people in the winter ſeaſon. A ſmall quantity of European commodities is brought to this city from the gulf of Perſia, conſiſting of French broad cloths, cutlery, ſmall looking-glaſſes, and prints; but the demand for them is very limited, and, of courſe, their price low. The police of Herat is judiciouſly regulated, and the adminiſtration of juſtice vigorous. The roſes in its vicinity are ſo plentiful, that it has obtained the name of "Sargultzar," or the city of roſes. N. lat. 34° 34′. E. long. 60° 50′.

HERAULD, Dideer, in *Biography*, an advocate in the parliament at Paris, who flouriſhed in the beginning of the ſeventeenth century, and died in the year 1649, publiſhed ſeveral works which have been highly eſteemed. Of theſe the principal are "Notes upon Tertullian's Apologetic, Minutius Felix, Arnobius, and Martial;" "Adverſaria," and various works on legal ſubjects. He diſguiſed himſelf under the name of David Leidhreſſerus, to write a political diſſertation upon the independence of kings, ſome time after the death of Henry IV. Salmaſius and Herauld were antagoniſts The latter was writing a work in vindication of himſelf when he died, and was ſuppoſed to be about ſeventy years of age. He had the reputation of being a very learned man, and wrote very pleaſantly upon whatever ſubjects he pleaſed. Bayle.

HERAULT, in *Geography*, one of the nine departments of the ſouthern region of France; being a portion of Lower Languedoc, in 43° 50′ N. lat. S. of Lozere, containing 317 ſquare leagues, and 291,957 inhabitants; divided into four diſtricts, *viz.* Lodeve, with 48,280 inhabitants; Montpellier, with 100,815; Beziers, with 106,176; and St. Pons, with 36,686 inhabitants. Its cantons are 36, and its communes 333. The contributions for land-tax, &c. are 4,060,543 francs, and its expences for adminiſtration, juſtice, and public inſtruction are 334,317 fr. 33 cents. It is bounded on the N. by the departments of the Tarn and Aveiron, on the N. E. by that of the Gard, on the S. E. by the Mediterranean, on the S. W. by the department of the Aude, and on the W. by that of the Tarn. It takes its name from a river which traverſes it from N. to S. nearly in the centre, and diſcharges itſelf into the Mediterranean a little below Agde. Its capital is Montpellier. This department conſiſts of hills, vallies, and plains of various ſoil, yielding little grain but abundance of good fruit, good wine, and paſtures. It has conſiderable foreſts of oak, mines of lead, coal, quarries of marble, and mineral ſprings.

HERAY, a town of Africa, in the country of the Foulahs; 40 miles E. N. E. of Tor.

HERB, in *Botany*. See Herba.

The word is formed of the Latin *herba*, which ſome derive from *arvum*, *field*; others from the Greek φερβεῖν, *paſcere*, *to feed*, of φερβῆν, *pabulum*. Of the Greek *pherbe*, the Latins formed *pherba*; and of *ferba*, *herba*, after the manner of the Spaniards, who always change the *f* at the beginning of a word into *h*.

Herb, in *Gardening*, that ſort of plant which riſes with leaves and ſtalks annually from the root, the ſtalks not becoming woody or durable in their growth.

Many of the kitchen-garden eſculents, and a great variety of ornamental or flowery plants, are of this kind. (See Herbaceous *Plants*.) And, likewiſe, many under-ſhrubby eſculent and other plants are conſidered ſometimes as herbs; ſuch as ſage, thyme, rue, hyſſop, winter-ſavory, lavender, &c.; but theſe having ligneous, durable ſtalks and branches, more properly belong to the ſhrubby tribe of plants.

Herbs are diſtinguiſhed into *kitchen* or *ſallet*-herbs, and *medicinal* herbs.

Herbs, *Sallet*. See Sallet.

Herbs, *Medicinal*. See Simple.

Herb-*bane*, in *Botany*. See Orobanche.

Herb-*bane*, *great purple*. See Lathræa.

Herb, *St. Bartholomew's*. See Ilex.

Herb, *Bennet*, *herb bleſſed*, or *avens*. See Geum.

Herb *Chriſtopher*. See Actæa.

Herb *Gerard*. See Ægopodium.

Herb *of Grace*, a name by which ſome call rue. See Ruta.

Herb *Maſtich*. See Satureia.

Herb *Maſtich*, *Syrian*. See Teucrium and Germander.

Herb *Paris*. See Paris.

Herb *Paris of Canada*. See Trillium.

Herb *Robert*, a name ſometimes uſed for the *geranium*, which ſee.

Herb *Trefoil*. See Trefoil.

Herb *Trinity*, a name ſometimes given to the violet. See Viola.

Herb *True-love*, the name by which the herb paris is ſometimes called.

Herb *Two-pence*. See Lysimachia.

Herb *Willow*, or *Willow-Herb*. See Epilobium, Lythrum, and Lysimachia.

HERBA, the *herb*, in *Botanical* phraſeology, includes every part of a plant, except the root and fructification, whether it be of an herbaceous, ſhrubby, or arboreſcent kind. In this the habit, or general aſpect of a vegetable, is principally diſcerned. Under it the eſſential nature or characters are veiled or maſked, as it were, till they diſplay themſelves naked and explicitly in the flower and fruit. By the latter parts only are plants ſafely to be defined generically, or claſſed ſyſtematically, while the *herb*, for the moſt part, affords ſufficient and very convenient ſpecific diſtinctions. The colour remarkably appropriated to the *herb* is green, inſomuch that it is only when tinged with any other hue, or when white, that it is technically ſaid to be *coloured*. The parts belonging excluſively to the *herb*, are the ſtem, all kinds of general or partial ſtalks, the leaves, ſtipulas, tendrils, and even bracteas; though the latter only attend the inflореſcence, but they make no part of the fructification.

Herba *Roſſa*, a name given by Latin writers to a plant uſed by the dyers in making their yellow colours, and by the women in tinging their hair yellow, which was the favourite colour of ancient times. It is alſo by ſome called *robia herba*. It was from this ſimilitude with the word *rubia*, which ſignifies madder, a vegetable uſed alſo in the dyeing trade, ſuppoſed to be the ſame plant; but all the accounts we have of the robia, or *roſſa herba*, ſhew it to be different in all reſpects from the madder. Paulus

Ægineta, who calls it *robia herba*, takes pains to diſtinguiſh it from the rubia, and ſhews that it was the plant called œcomenium and cymene by the Greeks, and lutum, lutea herba, and corniola by the Latins. It is the geniſta tinctoria, or dyer's weed, at this time common both in England and Greece, and uſed in both places in dyeing yellow. Pliny tells us, that the lutum had the leaves of flax, and the flowers of broom; this ſufficiently ſhews that it was the plant we have mentioned.

Herba *Scythica*, a name by which ſome authors have called the common liquorice, the root and inſpiſſated juice of which are uſed in the ſhops.

Herba *Vulcani*, a name uſed by ſome writers for the ranunculus.

Herba, in *Geography*, a town of Africa, in the deſert of Sahara; 50 miles S. E. of Gurdeia.—Alſo, a town of Algiers; 40 miles S. S. W. of Algiers.

Herba, *El*, a town of the weſtern province of Algiers, or Tlemſan, or Tremecen, ſituated on the river Shelliff, with a narrow ſtrip of fertile ground behind it. Here are ſeveral ruins of pillars, with the capitals, probably of the Corinthian order, defaced, and ſeveral coffins, on ſome of which are inſcriptions, with hollows on the upper ſurface, as if they were intended to receive a libation.

HERBACEOUS Plants, in *Vegetable Phyſiology*, are thoſe whoſe herb (ſee Herba) is but of annual duration, whether the root be annual, biennial, or perennial. The term is erroneouſly reſtricted in Willdenow's Principles of Botany, Engliſh edition, 131, to plants which “bear flowers and ſeeds but once and then die.”

Herbaceous plants are very diſtinguiſhable from the woody kinds, ſuch as trees, ſhrubs, and under-ſhrubs, whoſe ſtems and branches are woody or ligneous, and durable in a greater or leſs degree. Indeed, to this claſs properly belong a great number of the garden eſculent vegetables, a great many of the flowery tribe deſtined for the pleaſure ground, and nearly the whole of the annual and biennial ſorts, as well as the perennial kinds, whether of the fibrous, tuberous, or bulbous-rooted deſcriptions, the ſtalks of which annually decline.

Herbaceous *Plants*, *Foſſil*. Mr. Kirwan remarks, (Geological Eſſays, p. 318) that the foſſil plants found in the carboniferous ſtrata, or coal-meaſures, are thoſe of herbaceous plants, as ferns, &c. which, of all others, contain the leaſt oil in their compoſition; and that the reſiniferous tribe are rarely met with in thoſe ſtrata. M. Blumenbach, as is obſerved, p. 332, conſiders all the herbs met with in the vicinity of coal to be of unknown ſpecies. See our articles Coals and Collieries.

HERBAGE, a collective name, comprehending all kinds of herbs.

What makes the principal difference in the goodneſs of butters and cheeſes, is the difference of herbage.

Herbage, in *Law*, ſignifies the green paſture or fruits of the earth, provided by nature for the food of cattle.

Herbage is alſo uſed for a liberty which a man hath to feed his cattle in another man's ground; as, in the foreſt.

Herbage, in *Rural Economy*, a term very generally applied to ſuch graſs lands as are moſtly kept in the ſtate of paſture. It is alſo occaſionally employed to ſignify the tithe and right of paſture. See Grass.

HERBAIN, Le Chevalier, in *Biography*, capitaine d'infanterie in the ſervice of France, and chevalier de St. Louis, compoſed an opera in Italy, entitled “Æneas and Lavinia,” at Paris, 1756; “Celime,” in one act, for the theatre Ital. in 1763; ‘Les deux Talens,” in 1764; “Nanette and Lucas,” written by M. Framery.

HERBAL, a book which treats of plants, or deſcribes the figure, genus, ſpecies, properties, virtues, &c. of herbs, trees, ſeeds, plants, &c.

Such are Gerard's Herbal, Parkinſon's Herbal, &c.

Herbal is alſo uſed for a ſet or collection of ſpecimens of the ſeveral kinds of plants, dried and preſerved in the leaves of a book, called alſo a Hortus Siccus.

In the Philoſophical Tranſactions, we have a method deſcribed for preſerving ſpecimens for ſuch a herbal. The flowers, leaves, &c. gathered perfectly ripe, and in their true colours, are to be ſpread on whity-brown paper, with the parts all diſplayed as diſtinctly as may be. If the ſtem, or body of the flower, &c. be thick, one-half is to be pared away to make it lie flat. Over theſe is to be ſpread another paper; and the whole is to be put between two iron plates, ſcrewed tight together, and thus baked in an oven for two hours. When taken out, waſh the plants over with a mixture of brandy and aqua fortis, and lay them on freſh paper to dry. Laſtly, lick over the back ſides with a bruſh dipped in a diſſolution of gum tragacanth, to make them ſtick; and lay them in the paper book, where they will lie faſt, and always look freſh.

HERBALIST, or Herborist, a perſon ſkilful in plants; the ſame with *botaniſt*.

To *herbalize*, or *herbarize*, is to go into the fields in ſearch of different or new herbs or plants.

HERBARIUM, in *Botany*, was originally uſed as the title of botanical works, and tranſlated by the Engliſh word *herbal*. It is now more generally applied to deſignate a collection of dried plants, or *hortus ſiccus*, kept for botanical uſe, to ſupply, as far as poſſible, the want of free acceſs at all times to the whole vegetable world in full perfection. The term is, therefore, applicable to any collection of preſerved plants fit for ſuch uſe, whether dried in any form, kept in ſpirits, or otherwiſe. An herbarium is neceſſary, as Linnæus obſerves, to every botaniſt. How finely ſoever a plant may be repreſented in a drawing or plate, we can ſee nothing but what the artiſt ſaw, and with his eyes. We can examine or enquire no further. But when we have the natural object actually before us, we can judge and inveſtigate for ourſelves; we can reſtore the dried plant, by immerſion, in boiling water, ſo that all but its colours becomes preſent before us. Some of the moſt learned botaniſts have been cenſured for truſting to dried ſpecimens; and if they do ſo when they might have acceſs to living ones, they are juſtly cenſurable. But thoſe who are converſant with ſuch objects, acquire a wonderful facility in judging of them, and the mind becomes perfectly able to conceive their living appearance, be their colours more or leſs preſerved.

The general way of making an herbarium is by drying ſpecimens of plants between paper. Theſe ſhould be choſen as perfect as poſſible, ſhowing the ordinary ſtate and aſpect of the ſpecies, and when laid out to dry, ſhould not be formally or artificially expanded, ſo as to deſtroy their characteriſtic habit, but merely ſo as to prevent unnatural folds or confuſion of parts. The flower may conveniently be diſplayed by itſelf, ſo that its internal parts may come under inſpection, and the progreſs of the germen towards maturity, as well as the ripe ſeed or fruit ſhould, if poſſible, be ſeen in the ſpecimen. When dry, plants are either laid looſe between papers, on which their names and the place where each ſpecimen grew ſhould be marked; or they are faſtened to the paper, which we much recommend, with weak carpenters' glue. They are preſerved from the attacks of inſects, and their colours much revived, by being touched with a hair-pencil, dipped in a weak ſolution of corroſive ſublimate of mercury in ſpirits of wine, to which a little camphor may be added.

If plants are very ſucculent, their life muſt be deſtroyed before we attempt to dry them, by immerſion in boiling water, or by heating them thoroughly with a hot iron. The former method is adviſable for ſuch as are prone to throw off their leaves between papers, as Heaths and Firs.

Specimens of plants are commodiouſly preſerved in lockers, or on the ſhelves of a cabinet in a very dry room, but they are beſt without a conſtant fire, the heat of which renders them brittle; and the ſmoke of a coal fire ſoon ſpoils any collection to which it has acceſs. Heat alſo promotes the propagation of inſects, which are very pernicious, unleſs the collection be poiſoned as above recommended.

The herbarium of a working or publiſhing botaniſt acquires peculiar and ineſtimable value, as being the repoſitory of his authorities, the teſt of his accuracy, and the corrector of his overſights and miſtakes. Hence, the uſe of the Linnæan and Dillenian herbariums, the vaſt collections at Oxford, London, Paris, and elſewhere, accumulated by the various contributions of ſpecimens, with the authentic names or remarks of original authors or collectors. Theſe require often to be conſulted, and no garden or library can ſupply their place.

HERBAULT, in *Geography*, a town of France, in the department of the Loir and Cher, and chief place of a canton, in the diſtrict of Blois; 8 miles W. of Blois. The place contains 706, and the canton 10,544 inhabitants, on a territory of 387½ kiliometres, in 21 communes.

HERBE, in the *French Academies*, a reward, or ſome good ſtuff given to a horſe that has worked well in the manege.

Herbe, in *Geography*, a town of Italy, in the Veroneſe; 15 miles S. of Verona.

HERBELOT, Bartholomew *D'*, in *Biography*, celebrated for his Oriental knowledge, was born at Paris in 1625. After paſſing through a courſe of general ſtudy, he made the Hebrew language his great purſuit, in order that he might the better come to the right underſtanding of the Old Teſtament. He went to Italy that he might have an opportunity of converſing with ſome Orientaliſts who frequented the ports of that country in the way of buſineſs. At Rome he contracted an intimacy with Holſtenius and Leo Allatius, two of the moſt learned men of the age. He obtained the poſt of ſecretary, and interpreter of the Oriental languages at Paris. This was after his return from a ſecond journey to Italy; and upon another viſit to that country, his reputation acquired him the notice of many perſons of eminence, particularly of Ferdinand II., grand-duke of Tuſcany, who purchaſed for him a valuable collection of Eaſtern manuſcripts. It was in this country that he made a commencement of his "Bibliothèque Orientale," and upon being recalled to Paris by the celebrated Colbert, a penſion was ſettled on him, to enable him to continue his labours. He originally intended to have printed his work with the Arabic characters, and types were caſt for the purpoſe; but upon the death of his patron, Colbert, the deſign was changed for that of a work in French. He was now nominated to the royal profeſſorſhip of the Syriac language, in which poſt he continued till his death, which took place in 1695, at the age of ſeventy. D'Herbelot was a man of very general erudition, and of high eſtimation as a private character, free from oſtentation and pride; upright, pious, and charitable. His great work, firſt publiſhed in Paris 1697, and ſince re-printed in Holland, is a vaſt collection of every thing relative to the hiſtory, biography, manners, and cuſtoms of the Eaſtern nations. According to Mr. Gibbon, "this work is an agreeable miſcellany, which muſt gratify every taſte;" but he adds, "I can never digeſt the alphabetical order; and I find him more ſatisfactory in the Perſian than the Arabic hiſtory. The recent ſupplement from the papers of M. M. Viſdelore and Galland is of a different caſt, a medley of tales, proverbs, and Chineſe antiquities." Moreri. Gibbon.

HERBEMONT, in *Geography*, a town of France, in the department of the Foreſts, ſituated on a mountain, near the Semoy; 20 miles W. of Arlon.

HERBENGER, or Harbinger. See Harbinger.

HERBER, in the *Manege*, is uſed by farriers to denote an application for ſome diſeaſes in horſes, particularly of the head and the anticor. It conſiſts only of a piece of hellebore-root, which, being put into the middle of the horſe's counter, makes it ſwell and ſuppurate.

HERBERT, Mary, in *Biography*, counteſs of Pembroke, was the ſiſter of ſir Philip Sidney. She tranſlated from the French a tragedy entitled Annius, 1595, and rendered into Engliſh ſome of David's Pſalms. She died in 1621. The following well known epitaph was written for her by the celebrated Ben Jonſon:

> "Underneath this ſable hearſe
> Lies the ſubject of all verſe,
> Sidney's ſiſter, Pembroke's mother:
> Death! ere thou haſt killed another,
> Fair, and good, and learn'd as ſhe,
> Time ſhall throw a dart on thee."

Herbert, William, earl of Pembroke, was born at Wilton in 1580, and educated at New College, Oxford. In 1601 he ſucceeded to the family honours and eſtates; and in 1626 he was elected chancellor of Oxford, and ſteward of the king's houſehold. He died in the year 1630, and his poems were printed in 1660.

Herbert, Thomas, of the ſame family, educated partly at Jeſus College, and partly at Trinity College Cambridge, publiſhed, in 1634, his "Travels into Africa and Aſia." During the rebellion, he at firſt joined the parliament party, and afterwards ſerved with great fidelity in the royal cauſe, and was created a baronet at the reſtoration. He died in 1682. He wrote an hiſtorical account of the two laſt years of the life of Charles I.—Biog. Brit.

Herbert of Cherbury, Edward, *Lord*, was born at the caſtle of Montgomery in 1581, and attained ſo early the rudiments of learning, that at the age of twelve he was ſent to the univerſity of Oxford. In the year 1600 he came to London, and ſhortly after the acceſſion of James I. was created knight of the Bath. He ſerved the office of high ſheriff for the county of Montgomery, and divided his time between the country and the court. In 1608, feeling wearied with the ſameneſs of domeſtic ſcenes, he left England for a viſit to the continent, carrying with him thoſe chivalrous ideas with which his knigthood of the Bath, by its whimſical oath and ceremonial, ſeems to have impreſſed him; and that nicety in the point of honour, which, in ſuch an age, was likely to involve him in perpetual quarrels. His advantageous perſon and manners, and the reputation for courage which he acquired, gained him many friends, among whom was the conſtable Montmorenci. At a ſeat of this nobleman he paſſed ſeveral months practiſing horſemanſhip, and other manly exerciſes, in which he became ſingularly expert. He returned to England in 1609, and in the following year he quitted it again, in order that he might have the opportunity of ſerving with the Engliſh forces, ſent to aſſiſt the prince of Orange at the ſiege of Juliers. Here he ſignaliſed himſelf

ſelf by his valour, which, in ſome inſtances, was carried to the extreme of raſhneſs. After the ſiege he viſited Antwerp and Bruſſels, and returned to London, where he was looked now upon as one of the moſt conſpicuous characters of the time. An attempt was made to aſſaſſinate him in revenge for ſome liberties which he took, or was ſuppoſed to take, with a married lady. In 1614 he went into the Low Countries to ſerve under the prince of Orange; after this he engaged with the duke of Savoy, to conduct from France a body of Proteſtants to Piedmont for his ſervice. In 1616 he was ſent ambaſſador to the court of France, in which office he diſplayed much ſagacity and zeal in all the buſineſs entruſted to him. On one occaſion, however, he had a quarrel with the French miniſter, which cauſed his recal: though the office was devolved on him again at a future period. It was at Paris, in 1624, that he printed his famous book, "De Veritate prout diſtinguitur à Revelatione," which he had planned and begun in England. Previouſly to the publication of this work, he ſays, that he ſought the direction and guidance of heaven, as to the courſe he ſhould take; "I took," ſays he, "my book, De Veritate, in my hands, and kneeling on my knees, devoutly ſaid theſe words, O thou eternal God, Author of the light that now ſhines on me, and giver of all inward illuminations, I do beſeech thee, of thy infinite goodneſs, to pardon a greater requeſt than I a ſinner ought to make: I am not ſatisfied enough, whether I ſhall publiſh this book "De Veritate;" if it be for thy glory, I beſeech thee give me ſome ſign from heaven; if not, I ſhall ſuppreſs it.—I had no ſooner ſpoken theſe words, but a loud, though yet a gentle noiſe came from heaven (for it was like nothing on earth), which did ſo comfort and cheer me, that I took my petition as granted, and that I had the ſign demanded." However he might have been deluded by an enthuſiaſtic imagination, there is no reaſon to think that he did not believe the fact himſelf. In 1625 he was created an Iriſh peer, on account of his ſervices in promoting a match between the prince of Wales and the princeſs Henrietta of France; and ſhortly an Engliſh baron, under the title of lord Herbert of Cherbury in Shropſhire. From this time we hear no more of him in public life, but at the breaking out of the civil wars he adhered to the parliamentary cauſe. He died in London in 1648, and was buried in the church of St. Giles-in-the-fields. His own memoirs exhibit him as vain, boaſtful, fanciful, but open, generous, brave, and diſintereſted. He ſtood in high eſtimation among his contemporaries as a man and an author. The object of his great work "De Veritate," is to aſſert the ſufficiency, univerſality, and abſolute perfection of natural religion, with a view of proving the uſeleſſneſs of revelation. It has been frequently re-printed, and as often anſwered by learned Chriſtians. This piece was followed by a piece, entitled "De Religione Gentilium errorumque apud eos Cauſis." His other principal work was "The Hiſtory of the Life and Reign of Henry VIII.," which, in point of compoſition, was eſteemed one of the beſt hiſtorical works in the language, but it is written with much partiality for the tyrannical king: the Engliſh ſtyle of lord Herbert is ſtrong, manly, and free from the quaintneſs and pedantry of the age. His poems were publiſhed in 1665, by Nicholas Ferrar, and his memoirs of himſelf, in 1764, by Mr. Walpole. Biog. Brit.

Herbert, George, brother of the preceding, was born in 1593. He was educated at Weſtminſter ſchool, from which place he went to Trinity college, Cambridge, where he purſued his ſtudies with great diligence, took his degrees, and in 1619 was choſen orator of the univerſity. In this character he ſeems to have uſed the moſt abſurd flattery towards king James I., whom he made indefinitely greater, as an orator and writer, than the ſages of Greece and Rome. It may be ſaid in his excuſe, that he was looking for court promotion, which could not be expected by any who did not praiſe the monarch for qualities which all the world knew he never poſſeſſed. He was not altogether unſucceſsful, but obtained from James a ſinecure of 120*l. per annum.* On the death of the monarch, Mr. Herbert reſolved to enter upon holy orders, and from this period the ardour of his mind was entirely turned upon an exemplary diſcharge of the miniſterial functions. In 1626 he was preſented to the prebend of Layton Eccleſia, in the dioceſe of Lincoln. His firſt work was to rebuild, partly at his own coſt, and partly by means of contributions, the decayed church of the place. In 1630 he took prieſt's orders, and was inducted to the rectory of Bemerton, near Saliſbury. He now ſeems to have had no other ambition than that of becoming an humble pariſh prieſt, than which a more uſeful and honourable character no man can ſuſtain. For his own uſe, and that of his brethren, he drew up a brief manual, entitled "The Country Parſon," containing rules for the conduct of a perſon in that ſituation, which are much praiſed for their excellent tendency. His own behaviour was a perpetual comment upon theſe rules. He died of a decline in 1633, and after his death a poſthumous work was publiſhed, entitled "The Temple: ſacred Poems and private Ejaculations." Theſe poems were much read and admired by the lovers of ſacred poetry. His character has been given by his brother lord Herbert in the following ſentence: "His life was holy and exemplary, inſomuch that about Saliſbury, where he lived beneficed, he was little leſs than ſainted."

HERBESTIEN, Sigismond, *Baron*, born at Vippach, in Stiria, in 1486, entered into the imperial ſervice in 1506, and diſtinguiſhed himſelf againſt the Turks. In 1509 he was made commandant of all the Stirian cavalry, and was afterwards rewarded with the title of knight, and the dignity of court counſellor. He was employed in various embaſſies, to Denmark, Poland, and Ruſſia, and was created a privy counſellor, and preſident of the Auſtrian chamber. In 1541 he went out as ambaſſador to the grand Seignior, who was at that time with his army near Buda. He had various other honourable employments entruſted to his management, and, after having ſerved four emperors moſt faithfully, retired from public life. He died in 1566. As an author, he is known by a hiſtory of Muſcovy, which appeared at Baſil in 1561, under the title of "Commentarii Rerum Moſcovitarum." He was author alſo of a hiſtory of his own life, and of the origin of his family. Moreri.

HERBIDÆ Vestes, green habits. See Earinæ *veſtes.*

HERBIERS, Les, in *Geography*, a town of France, in the department of the Vendée, and chief place of a canton, in the diſtrict of Montaigu; 13 miles S.E. of Montaigu. The place contains 1910, and the canton 6616 inhabitants, on a territory of 195 kiliometres, in ſeven communes.

HERBIGNAS, a town of France, in the department of the Lower Loire, and chief place of a canton, in the diſtrict of Saveney; 9 miles N.E. of Guerande. The place contains 2016, and the canton 5831 inhabitants, on a territory of 250 kiliometres, in four communes.

HERBINIUS, John, in *Biography*, a native of Bitchen, in Sileſia, who publiſhed ſome treatiſes on Water-Falls; alſo, "De Statu Eccleſiarum Auguſtinæ Confeſſionis in Polonia," 4to. 1670. He died in 1676, aged 44. Moreri.

HERBIVOROUS, an epithet given to thoſe creatures which feed only on vegetables, to diſtinguiſh them from the carnivorous, or ſuch as feed on fleſh.

HERBORN, in *Geography*, a town of Germany, in the principality of Naſſau Dillenburg, with a caſtle, ſituated on the Dille. The chief manufacture is that of iron; 3 miles S.S.E. of Dillenburg. N. lat. 50° 34′. E. long. 26′.

HERBOSUM MARMOR, the name of a ſpecies of marble, much eſteemed and uſed by the ancient architects and ſtatuaries. It was of a beautiful green colour, but had always with it ſome caſt of yellow. It was dug in the quarries of Taigetum, but was eſteemed by the workmen the ſame in all reſpects, except colour, with the black marble dug at Tænarus in Lacedæmonia, and thence called the Tænarian marble.

HERBSLEBEN, in *Geography*, a town of Germany, in the principality of Gotha; 9 miles N.E. of Gotha.

HERBST, JOHN ANDREAS, in *Biography*, an eminent practical and theoretical German muſician, who flouriſhed in the 17th century, was born at Nuremberg. In the year 1628 he was appointed chapel-maſter at Frankfort on the Maine, and continued in that ſtation till 1641, when he was called to the ſame office at Nuremberg. However, in 1650 he thought fit to return to Frankfort, at the ſolicitation of the magiſtrates and others his friends; and, being by them reinſtated in his former dignity, he continued in that ſtation till the time of his death, in the year 1660. He was excellently ſkilled in the theory of muſic, and in the art of practical compoſition had few equals; and was, beſides, like moſt of the Germans, a ſound and judicious organiſt. In the year 1643 he publiſhed, in the German language, a book entitled "Muſica Poetica;" and, ten years after, a tranſlation either from the Latin or the Italian, for it is extant in both languages, of the "Arte prattica e poetica of Giov. Chiodino," in ten books. Herbſt was alſo the author of a tract entitled "Muſica moderna prattica, overo maniere del buon canto," printed at Frankfort in 1658, in which he recommends the Italian manner of ſinging. His other works are, a ſmall tract on Thorough-baſs, and a diſcourſe on counterpoint, containing directions for compoſing "a mente non a penna." Of his muſical compoſitions, all that are extant in print are, "Meletemata ſacra Davidis," and "Suſpiria S. Gregorii ad Chriſtum," for three voices. Theſe were printed in 1619, as was alſo a nameleſs compoſition by him for ſix voices. Draud. Bibl. Claſſ. p. 1649. and Walther.

HERBSTEIN, in *Geography*, a town of Germany, in the biſhopric of Fulda; 13 miles W. of Fulda.

HERCAJADA, a town of Spain, in the province of Leon; 30 miles W. of Avila.

HERCINIAN, or HERCYNIAN *foreſt*, a foreſt which formerly extended over the face of Germany, commencing at the limits of the Helvetii, Nametes, and Rauvaci, and running along the Danube to the borders of the Daci and Anartes. It is now cut down in many places, and parcelled out into woods which go by particular names; as, the Black foreſt, which ſeparates Alſace from Swabia; the Steyger, in Franconia; the Spiſſard, on the Main; the Thuringer, in Thuringia; Heſerwald, in the duchy of Cleves; the Bohemerwald, which encompaſſes Bohemia, and was in the middle ages called Hercinia ſylva; and the Hartz, in Lunenburgh. See FOREST.

HERCK, a town of France, in the department of the Lower Meuſe, and chief place of a canton, in the diſtrict of Haſſalt. The place contains 878, and the canton 8550 inhabitants, on a territory of 142½ kiliometres, in 13 communes.

HERCULANEUM is the name of an ancient city of Campania, in Italy, near the preſent ſeite of a village called *Portici*, which was deſtroyed, by an eruption of Veſuvius, in the firſt year of the empire of Titus, or the 79th of the Chriſtian era, and lately rendered famous on account of the curious monuments of antiquity diſcovered in its ruins; an account of which has been publiſhed by order of the king of Naples, in a work of ſix volumes folio.

The epocha of the foundation of Herculaneum is unknown. Dionyſius Halicarnaſſenſis conjectures, that it may be referred to ſixty years before the war of Troy, or about 1342 years before Chriſt; and, therefore, that it laſted about 1400 years.

Herculaneum and Pompeii, which latter town was deſtroyed at the ſame time with the former (ſee POMPEII), ſtood once above ground; though at this time the former is in no part leſs than 70 feet, and in ſome parts 112 feet below the preſent ſurface of the earth; and the latter is buried 10 or 12 feet deep, more or leſs Whatever matter, therefore, lies between theſe cities and the preſent ſurface of the earth over them, muſt have been produced ſince the year 79 of the Chriſtian era, the date of that formidable eruption by which they were deſtroyed. It appears, by the obſervations of ſir William Hamilton (Phil. Tranſ. vol. lxi.), that the matter which covers the ancient town of Herculaneum is not the produce of one eruption only; for there are evident marks that the matter of ſix eruptions has taken its courſe over that which lies immediately above the town, and which was the cauſe of its deſtruction. Theſe ſtrata are either of lava or burnt matter, with veins of good ſoil between them. The ſtratum, ſays this writer, of erupted matter that immediately covers the town, and with which the theatre and moſt of the houſes was filled, is not of that foul vitrified matter called lava, but of a ſort of ſoft ſtone compoſed of pumice, aſhes, and burnt matter. It is exactly of the ſame nature with what is called the Naples ſtone; the Italians diſtinguiſh it by the name of TUFA, which ſee; and it is in general uſe for building. This matter, when it firſt iſſued from Veſuvius, and covered Herculaneum, was, as our author conceives, in the ſtate of liquid mud. In proof of this opinion he obſerves, that he ſaw the head of an antique ſtatue dug out of this matter within the theatre of Herculaneum: the impreſſion of its face remains, he ſays, to this day in the tufa, and might ſerve as a mould for a caſt in plaiſter of Paris, being as perfect as any mould he ever ſaw. This ſoft matter has been the means of preſerving the pictures, MSS., buſts, utenſils, and other antique remains, which have been recovered out of Herculaneum from utter deſtruction. For if any of the ſix ſucceeding eruptions had happened previous to this, and the red-hot liquid lava, of which they conſiſted, had flowed into the open city, it would have filled every ſtreet, ſcorched up every combuſtible ſubſtance with intenſe heat, involving the houſes and all they contained in one ſolid rock of lava, undiſtinguiſhable, and for ever inſeparable from it. The eruption, which buried the city in cinders, earth, and aſhes, has in ſome meaſure preſerved it from the more deſtructive effects of the fiery torrents which have overwhelmed it ſince. When we conſider that the intervals between thoſe eruptions were ſufficiently long to allow a ſoil to be formed upon the hardened lava of earth; that a new city has been actually built on the lava of the laſt eruption; and that the ancient city is from 70 to 100 feet below the preſent ſurface of the earth, we muſt acknowledge it more ſurpriſing that any, than that ſo few of its ornaments have been preſerved. At the beginning of the laſt century any body would have imagined that the buſts, ſtatues, and pictures of Herculaneum had not a much better chance than the perſons they repreſent of appearing again, within a few years upon the ſurface of this globe.

The preciſe ſituation of this ſubterraneous city was not known till the year 1713, when it was accidentally diſcovered by ſome labourers, who, in digging a well, ſtruck upon a ſtatue on the benches of the theatre. Many were afterwards dug out, and ſent to France, by the prince of Elbœuf; but little progreſs was made in the excavations till Charles, infant of Spain, aſcended the Neapolitan throne. By his unwearied efforts and liberality, a very conſiderable part of Herculaneum has been explored, and ſuch treaſures of antiquity drawn out, as form the moſt curious muſeum in the world. In order to explore theſe hidden treaſures, the king had galleries cut to the principal buildings, and cauſed the extent of one or two of them to be cleared. Of theſe the theatre is the moſt conſiderable. On a baluſtrade, which divided the orcheſtra from the ſtage, was found a row of ſtatues; and, on each ſide of the pulpitum, the equeſtrian figure of a perſon of the Nonia family. Theſe are now placed under the porticos of the palace; and from the great rarity of equeſtrian ſtatues in marble, ſays Swinburne (Travels in the two Sicilies, vol. iii.), would be very valuable objects, were their workmanſhip even leſs excellent than it is; one of them in particular is a very fine piece of ſculpture. By continued labour and expence, ſince the king of Spain left Naples, the collection of curioſities that has been dug out of the ruins of Herculaneum and Pompeii is already very conſiderable. The muſeum, in which many of them are arranged, forms a wing of the palace; and this muſeum poſſeſſes not only ſtatues, buſts, altars, inſcriptions, and other ornamental appendages of opulence and luxury, but alſo an entire apartment of the domeſtic, muſical, and chirurgical inſtruments uſed by the ancients; tripods of elegant form and exquiſite execution, lamps in endleſs variety, vaſes and baſons of noble dimenſions, chandeliers of the moſt beautiful ſhapes, pateras and other appurtenances of ſacrifice, looking-glaſſes of poliſhed metal, coloured glaſs, ſo hard, clear, and well-ſtained as to appear like emeralds, ſapphires, and other precious ſtones; a kitchen completely filled up with copper-pans lined with ſilver, kettles, ciſterns for heating water, and every uſeful neceſſary for culinary purpoſes; ſpecimens of various ſorts of eatables, retaining their form, though burnt to a cinder; corn, bread, fiſh, oil, wine, and flower; a lady's toilet, furniſhed with combs, thimbles, rings, paint, ear-rings, &c. Among the ſtatues, which are numerous, connoiſſeurs allow the greateſt ſhare of merit to Mercury, and a ſleeping Faun. The fine bronze buſts fill ſeveral rooms, but few of the originals for whom they were intended are now known. The intaglios and cameos hitherto diſcovered have not been much commended. The floors are paved with Moſaic; few rare medals have been found in theſe ruins; the moſt curious is a gold medallion of Auguſtus, ſuppoſed to have been ſtruck in Sicily, where he had been ſaluted emperor 15 times: on its reverſe is a female figure with IMI. XV. SICIL. The freſco paintings executed upon the ſtucco which lined the walls, have been taken off with great labour and addreſs, and are now preſerved in glaſs caſes. The colours, it is ſaid, were much brighter before they were drawn out of their ſubterraneous abode, and expoſed to the open air; they are, however, ſtill wonderfully lively; the ſubjects are underſtood at the firſt glance by thoſe who are acquainted with the Grecian hiſtory and mythology. Here are a Chiron teaching Achilles to play upon the lyre, Ariadne deſerted, the judgment of Paris, ſome Bacchantes and Fauns; the largeſt piece repreſents Theſeus's victory over the Minotaur: it conſiſts of ſeven or eight figures very well grouped; but a frieze, with a dancing woman, on a black ground, not above 10 inches long, is thought the beſt. But we ought not to eſtimate the degree of perfection which the ancients had attained in the art of painting by theſe ſpecimens. It is not probable that the beſt paintings of ancient Greece and Italy were depoſited in Herculaneum or Pompeii, which were towns of the ſecond order, and not likely to poſſeſs the maſter-pieces of the chief artiſts, which were uſually deſtined to adorn the more celebrated temples, or the palaces of kings and emperors. Their beſt ſtatues are correct in their proportions, and elegant in their forms; their paintings are not correct in their proportions, and are comparatively inelegant in their forms.

Many of the ancient MSS. found in the ruins of Herculaneum have been carried to Madrid; but a great number were left at Portici. Upon the firſt diſcovery of them, great hopes were entertained that many original works of the claſſics would be reſtored to light. Great pains have been beſtowed, and much ingenuity diſplayed, in ſeparating and unrolling the ſheets without deſtroying the writing. This has ſucceeded in a certain degree; though, in ſpite of all the ſkill and attention of thoſe who have been employed in this delicate work, the copiers are obliged to leave many blanks where the letters are obliterated. The MSS. hitherto unrolled and copied are in the Greek language, and not of a very important nature. Farther efforts are renewed; theſe ſerve to increaſe the probability of recovering thoſe works, the loſs of which has been long lamented by the learned.

HERCULANIA, in *Botany*, a name by which ſome authors have called the *verbena* or *vervain*.

HERCULES, Ενγονασιν, in *Aſtronomy*, one of the conſtellations of the northern hemiſphere. See CONSTELLATION.

The ſtars in the conſtellation Hercules, in Ptolemy's catalogue, are 29; in Tycho's, 28; in the Britannic catalogue, 113.

HERCULES, in *Mythology*, a celebrated hero of antiquity, who, on account of his ſingular exploits, was deified by the Pagans. He is ſaid to have been the ſon of Jupiter and Alcmena, the wife of Amphitrion, king of Thebes. Herodotus fixes his birth a hundred years before the taking of Troy by the Greeks, or about the year 1282 before the commencement of the Chriſtian era. According to Blair's Tables, he died in the year 1222 B. C. The adventures for which he was celebrated may be diſtributed into three claſſes; to the firſt claſs we may refer his ſtrangling the two ſerpents which were ſent to deſtroy him in his cradle, and his killing a large lion near his native city Thebes. The ſecond claſs comprehends thoſe exploits which have been commonly called his twelve labours; theſe he undertook by order of Euryſtheus, in conſequence of the fatality of his birth, and of a decree of the Delphian oracle, as ſome ſay, for expiating his crime of killing the three children which he had by his wife Megara, the daughter of Creon, and in order to acquire immortality; the firſt of theſe was his engagement with the Cleonæan lion, in the foreſt of Nemea; the ſecond his conqueſt of the hydra, by which he is ſaid to have cleared the fens of Lerna, near Argos, of the ſerpents that infeſted them, and that ſeemed to multiply as faſt as they were deſtroyed (ſee HYDRA); the third, his deſtruction of the Erymanthian boar; the fourth, his killing the wild ſtag; the fifth, his ſhooting the flying birds called ſtymphalides; the ſixth, his cleanſing Augæas's ſtables; the ſeventh and eighth, his deſtroying the Cretan bull, and Diomed, the barbarous tyrant of Thrace, with his horſes or mares; the ninth labour is his combat with Geryon, who is generally repreſented with three bodies; the tenth, his conqueſt of the Amazon; the eleventh, his dragging Cerberus up from the infernal regions; and the laſt is his killing the ſerpent, and gaining the golden fruit in the garden of the Heſperides. The third claſs of Hercules's exploits were thoſe which he voluntarily undertook; the chief of which are his combat with the giant Antæus, whereby he freed Africa from this deſtroyer, and his killing Cacus, the notorious robber of Italy. Theſe ſeveral adventures are repreſented and deſcribed both by the ancient ſtatuaries and poets.

It is obſerved, that there are none, even of the twelve great gods of antiquity, that have ſo many ancient monuments relating to them as Hercules. The famous ſtatue of Hercules, in the Farneſe palace at Rome, is well known to the connoiſſeurs; this repreſents him, reſting after the laſt of his twelve labours above recited, leaning on his club, and holding the apples of the Heſperides in his hand. In this ſtatue, as in all the other figures of him, he is formed, by the breadth of his ſhoulders, the ſpaciouſneſs of his cheſt, the largeneſs of his ſize, and the firmneſs of his muſcles, to expreſs ſtrength and a capacity of enduring great fatigue, which conſtituted the chief idea of virtue among the ancient heathens. His other attributes are his lion's ſkin, his club, and his bow.

Hercules is repreſented by the ancients as an exemplar of virtue; however, the *Hercules bibax*, or *Drunken Hercules*, is no uncommon figure, and his amours are deſcribed both by the poets and artiſts. Thus, the Cupids are made to take away his club, and he is exhibited in the poſture of bending under a little boy; by which actions we perceive, that he, who conquered all difficulties, was a ſlave to love. The chief ſcene of his effeminacies was in Aſia, whilſt he lived with Omphale, queen of Lydia; and at length, *viz.* in the forty-ninth year of his life, or, as others ſay, at the age of fifty-two years, about thirty-years before the Trojan war, he fell a ſacrifice to the jealouſy of his wife Dejanire, who, dreading the influence of his paſſion for Iole, the daughter of Eurytus, king of Oechalia, poiſoned his robe, ſo that he died in great agonies on mount Oeta. Ovid repreſents him as preparing his own funeral pile, and laying himſelf upon it with great compoſure. Met. ix. ver. 238.

The apotheoſis of Hercules, which is ſaid to have been performed by his friend Iolaus, or the eſtabliſhment of his altars in the principal cities of Greece, is fixed by Thraſybulus, twenty-nine years before the taking of Troy.

Hercules has been particularly honoured by the Greeks, under the name of *Muſagetes, the conductor of the Muſes*, and at Rome under that of *Hercules Muſarum*. He is repreſented on medals with a lyre in his hand; and the reverſe is marked with the figure of the nine Muſes with their proper ſymbols. Spence's Polymetis, p. 113, &c.

There were ſeveral perſons of celebrity to whom the ancients gave the name of Hercules. Diodorus Siculus reckons three of them; the *firſt* an Egyptian, who traverſed into Africa and raiſed the famous pillars near Cadiz, to give notice to voyagers that they were not to attempt proceeding any further. The *ſecond* was born in Crete, among the Idæi Dactyli, and he, it is ſaid, inſtituted the Olympic games. The *laſt* was the ſon of Jupiter and Alcmena, above-mentioned. Cicero reckons ſix of them. Some Greek authors enumerate forty-three, either becauſe ſeveral perſons thought to do themſelves honour by aſſuming this name, or, perhaps, becauſe Hercules was not a proper name, but an appellative, derived, as Le Clerc conjectures, from the Phœnician word "Harokel," which ſignifies Merchant; and this learned author alleges, that the name was formerly given to the famous traders who migrated for the diſcovery of new countries, and for planting colonies there, and who frequently ſignalized themſelves no leſs by clearing them of the wild beaſts by which they were infeſted, than by the commerce they eſtabliſhed with them; which, without doubt, was the ſource of ancient heroiſm and war. Thus it would appear that Hercules is the ſurname of the ſeveral Herculeſes mentioned by authors; for the Tyrian was called Phaſius; the Phœnician Deſanaus or Agenor: the Grecian Alceus or Alcides; the Egyptian, who was contemporary with Oſiris, and general of his troops, Oſochor or Chon; the Indian, Dorſanes, and the Gaul, Ogmion. But we ſhall obſerve, upon the whole, that the Greeks have filled up the hiſtory of the Theban Hercules with the exploits of all the reſt, with thoſe numerous travels mentioned by the poets who have written his life, and with ſo many adventures, for which the life of one man would not be ſufficient.

HERCULES's *All-heal*, in *Botany*. See GINSENG, HERACLEUM, and PASTINACA.

HERCULES's *Club*. See ZANTHOXYLON.

HERCULES's *Pillars*, in *Geography*. See COLUMNÆ *Herculis*.

HERCULEUS MORBUS, in *Medicine*, the epilepſy; thus called from the terror of its attacks, and the difficulty of cure.

HERCYNIAN FOREST, in *Geography*. See HERCINIAN.

HERD, among *Hunters*, a company or aſſemblage of black or fallow beaſts, in contradiſtinction to *flock*.

In the hunting language, there are various terms uſed for companies of divers kinds of game. We ſay a *herd* of harts and bucks, a *bevy* of roes, a *rout* of wolves, a *richeſs* of martens, &c. See HUNTING.

HERDAL, in *Geography*, a town of Sweden, in the province of Harjedalen; 38 miles S.E. of Langaſchauts.

HERDEWICH, HERDEWIC, or *Herdewych*, in our *Ancient Law-books*, a grange or place for cattle and huſbandry.

"Et unam herdewycham apud Hethcotum in peco, &c." Mon. Angl.

HERDICKE, or MARIEN HERDICKE, in *Geography*, a town of Germany, in the county of Mark, ſituated on the Ruhr, containing three churches for the three religions, a noble ſecular abbey for ladies, both Roman Catholic and Proteſtant; 4 miles S.W. of Schwertz.

HERDING, among *Sportſmen*, is the reverſe of breaking herd.

HERDOLA, in *Geography*, a town of Sweden, in the province of Tavaſtland; 30 miles E.S.E. of Jamſio.

HERDONIÆ, or HERDONIA, in *Ancient Geography*, a town of Italy, in Apulia, S.E. of Luceria, upon the road which leads from Beneventum to Canuſium. It now lies in ruins at a place called "Hordona."

HERDSMAN, a name applied to denote the keeper of a herd; or one who is employed in tending cattle or other animals that herd together.

HEREAN MOUNTAINS, in *Ancient Geography*, mountains of Sicily, deſcribed by Diodorus Siculus as eminently diſtinguiſhed by their ſingular ſituation, the excellent qualities of their ſoil, the abundance of their fountains and ſtreams, and their productiveneſs in fruits of every kind, ſo that they formed the moſt agreeable retreat which the imagination can conceive from the ſummer heats. This part of the country was ſo fertile and rich, that it furniſhed an ample ſupply for the Carthaginian army in the time of its diſtreſs.

HEREBANNUM, in *Antiquity*, a fine of ſixty crowns, which was exacted of a freeman, who, being ſummoned into the field, refuſed to obey, according to the law of the Franks. This expreſſion ſeems to imply, that, according to the ſaid law, both the obligation to ſerve, and the penalty on thoſe who diſregarded it, were coeval with the laws made by the Franks at their firſt ſettlement in Gaul. The fine was levied with ſuch rigour, that if any perſon convicted of this crime was inſolvent, he was reduced to ſervitude, and continued in that ſtate until ſuch time as his labour ſhould amount to the value of the *herebannum*. The emperor Lotharius rendered the penalty ſtill more ſevere; and if any perſon poſſeſſing ſuch an extent of property as made it incumbent on him to take the field in perſon refuſed to obey the ſummons, all his goods were declared to be forfeited, and he himſelf might be puniſhed with baniſhment. Murat. Script. Ital. vol. i. part ii. p. 153.

HEREBODE, the king's edict, anciently iſſued to command his ſubjects into the field.

The word is formed of the Saxon, *here*, *army*, and *bode*, *meſſenger*.

HEREDITAMENTS, in *Law*, are ſuch immoveable things as a man may have to himſelf and his heirs by way of inheritance; or which not being otherwiſe bequeathed, do naturally and of courſe deſcend to him who is next heir of blood, and fall not to the executor or adminiſtrator as chattels do.

Hereditaments is a word of large extent, including not only lands and tenements, but whatſoever may be *inherited*, be it corporeal or incorporeal, real, perſonal, or mixed; it is much uſed in conveyances; for by the grant of hereditaments, iſles, ſeigniories, manors, houſes, and lands of all ſorts, charters, rents, ſervices, advowſons, conveyances, and whatever may be inherited, will paſs.

Hereditaments, in the moſt extenſive ſenſe of the term, are of two kinds, *corporeal* and *incorporeal*. *Corporeal* are ſuch as affect the ſenſes, or ſuch as may be ſeen and handled by the body; *incorporeal* are not the objects of ſenſation, can neither be ſeen nor handled, are creatures of the mind, and exiſt only in contemplation. Thoſe of the former kind conſiſt wholly of ſubſtantial and permanent objects; all which may be comprehended under the general denomination of land only; for land, ſays ſir Edward Coke (1 Inſt. 4.) comprehendeth, in its legal ſignification, any ground, ſoil, or earth whatever; as arable, meadows, paſtures, woods, moors, waters, marſhes, furzes, and heath. It legally includes alſo all caſtles, houſes, and other buildings; for they conſiſt, ſays he, of two things, land, which is the foundation, and ſtructure thereupon; ſo that if I convey the land or ground, the ſtructure or building paſſeth with it. Water is alſo, by a kind of ſoleciſm in the language of law, mentioned as a ſpecies of land; for the land, which the water covers, is permanent, fixed, and immoveable, and therefore, in this I may have a certain, ſubſtantial property, of which the law will take notice, but not of the other.

Land has alſo, in its legal ſignification, an indefinite extent, upwards as well as downwards. “Cujus eſt ſolum, ejus eſt uſque ad cœlum” is the maxim of the law, upwards; therefore no man may erect any building, or the like, to overhang another's land; and, downwards, whatever is in a direct line between the ſurface of any land and the centre of the earth, belongs to the owner of the ſurface; as is every day's experience in the mining countries. So that the word “land” includes not only the face of the earth, but every thing under it or over it. And, therefore, if a man grants all his lands, he grants thereby all his mines of metal and other foſſils, his woods, his waters, and his houſes, as well as his fields and meadows. Not but the particular names of the things are equally ſufficient to paſs them, except in the inſtance of water; by a grant of which nothing paſſes but a right of fiſhing (Co. Litt. 4.); but the capital diſtinction is this, that by the name of a caſtle, meſſuage, toft, croft, or the like, nothing elſe will paſs, except what falls with the utmoſt propriety under the term made uſe of; but, by the name of land, which is *nomen generaliſſimum*, every thing terreſtrial will paſs. (Co. Litt. 4, 5, 6.)

An *incorporeal* hereditament is a right iſſuing out of a thing corporate (whether real or perſonal), or concerning, or annexed to, or exerciſible within, the ſame. (Co. Litt. 19, 20.) It is not the thing corporate itſelf, which may conſiſt in lands, houſes, jewels, or the like, but ſomething collateral thereto, as a rent iſſuing out of thoſe lands or houſes or an office relating to thoſe jewels. Incorporeal hereditaments are principally of ten ſorts: *advowſons*, *tithes*, *commons*, *ways*, *offices*, *dignities*, *franchiſes*, *corodies* or *penſions*, *annuities*, and *rents*. See each article reſpectively.

HEREDITARY, ſomething appropriated to a family, or belonging to it by right of ſucceſſion, from heir to heir.

Of monarchies, ſome are hereditary, others elective: of hereditary monarchies, ſome deſcend only to the heirs-male, as was the caſe in France; others to the next of blood, whether male or female, as in England, Spain, &c.

HEREDITARY is alſo applied to offices and honours annexed to certain families. Thus the office of earl marſhal and lord great chamberlain of England, are hereditary in the families of the duke of Norfolk and the duke of Ancaſter.

It is of no very long date, that the dignities of duke, count, &c. became hereditary.

The canon law has taken all poſſible precautions to prevent benefices from becoming hereditary.

The abolition of hereditary juriſdictions in 1755, forms an epoch in the hiſtory of Scotland, as it laid the firſt foundation of its ſubſequent proſperity.

HEREDITARY is alſo applied figuratively to good or evil qualities, habitudes, &c. capable of being tranſmitted by blood from father to ſon. See HEREDITARY *Diſeaſes*.

HEREDITARY *Right* denotes a right or privilege, in virtue whereof a perſon ſucceeds to the effects of his anceſtors.

The nonjurors, &c. hold hereditary right to be *divine* right, *i. e.* of God's own appointment; and conſequently indiſpenſible, or, as they call it, *indefeaſible*. On this account they contend for the obligation of hereditary right in favour of the deſcendants of king James II. See *Right of* CROWN.

HEREDITARY *Diſeaſes*, are thoſe diſeaſes which affect individuals of the ſame family in ſucceſſive generations. Such are, according to univerſal obſervation, epilepſy, inſanity, pulmonary conſumption, gout, rheumatiſm, ſcrofula, ſtone and gravel, and ſome other maladies.

Strictly ſpeaking, it has been ſaid, the term *hereditary diſeaſe* is not juſtly applicable in theſe inſtances; ſince the maladies in queſtion are not actually born with a perſon, but commonly occur, in conſequence of the operation of ſome occaſional cauſe, at an after period of life. Upon ſuch a quibbling conſideration of the ſubject, ſome authors have denied the exiſtence of hereditary *diſeaſes* altogether, and maintained that an hereditary *prediſpoſition* to certain diſeaſes, is alone brought into the world with us. The diſpute is merely verbal; if we uſe the word *connate*, inſtead of hereditary, it is obvious that it is applicable only to the prediſpoſition. (See CAUSE in *Medicine*.) As the diſeaſes in queſtion are connected with certain peculiarities of conſtitution, many of which are characterized by peculiarities of form and ſtructure, (ſuch as the texture and ſtrength of the limbs, muſcles, ſkin, hair, the complexion, &c.) and as theſe characteriſtics of various conſtitutions are conſtantly tranſmitted from the parent to the offſpring; ſo a diſpoſition to have the ſame diſeaſes brought on, when certain exciting cauſes are applied, is as neceſſarily conveyed from our progenitors, as the family likeneſs; and the fact is to be explained upon the ſame principle. By an hereditary diſeaſe, therefore, is not meant the tranſmiſſion of any morbid juices, or peccant humours, or any *materies morbi*, from the parent to the child; but merely that the child, partaking of the conſtitution of his parent, will be liable to ſimilar diſeaſes. See Temperament.

HEREFORD, in *Geography*, a city and principal town of Herefordſhire, England, ſtands on the banks of the river Wye. At an early period this place is noted in the Anglo-Saxon annals. In the year 676 and 680, ſynods were held here, after Peada, king of Mercia, had embraced the Chriſtian religion: and it was then decreed that a new ſee ſhould be formed in this kingdom. Putta was choſen the firſt biſhop. It is hence inferred, that Hereford had then become populous, and was a place of the firſt conſequence in that part of the country; and it is fairly conjectured, that it owes its origin and early eſtabliſhment to deſertion from, and depopulation of Magna Caſtra, or Kencheſter, a Roman ſtation in the vicinity. On the ſubdiviſion of the iſland by the Anglo-Saxon monarchs, Hereford became the capital of the Mercian kingdom, and had a large church conſtructed in it as early as the reign of Offa. Indeed this monarch founded a cathedral here, in expiation of the murder of Ethelbert, king of the Eaſt-Angles. This church, and the holy tomb within it, attracted numerous pilgrims and Catholic devotees, many of whom beſtowed handſome gifts and bequeſts on the foundation. In the time of king Athelſtan the city was fortified by walls, remnants of which ſtill remain. The extent of the city may be aſcertained by the circumference of this fortified encloſure, which meaſured 1800 yards. Beſides this there was an extent of 550 yards guarded by the river, which ſerved as a natural barrier. In the walls were ſix gates; and 15 embattled towers were attached to, and ſerved to guard the walls. Theſe were 34 feet in height, and the walls were 16 feet high. Leland deſcribes the fortifications as tolerably perfect when he viſited Hereford.

Seated near the borders of England and Wales, this place has been repeatedly ſubject to ſieges and war-like operations, in many of the conteſts between thoſe nations. Here Athelſtan bound the Britons, in the year 939, to pay a tribute of 20*l.* in gold, 300 in ſilver, and 200 head of cattle, beſides hawks and hounds, as a tribute of allegiance and ſubjection. The Welſh, in the 11th century, made an irruption into the marches, but were repulſed by the garriſon of Hereford: again, in 1055, they came in a more formidable body, headed by Gryffyth, a ſovereign of Wales, and Algar, earl of Cheſter. The forces of Hereford gave them battle near the city, but were defeated, and on retreating to their fortifications, were cloſely purſued by the Welſh. Both armies entered the city, and the place became a ſcene of plunder, ſlaughter, and havoc. The cathedral and ſeveral houſes were conſumed by fire. This ſavage occurrence is particularly deſcribed in Powell's Chronicle of Wales. Harold, ſon of earl Godwin, collected an army and marched againſt the Welſh, whom he compelled to ſue for peace. Returning to Hereford, he rebuilt or repaired the fortifications, and erected a caſtle, on the eaſt ſide of the cathedral, cloſe to the banks of the river .

The Domeſday book contains many intereſting particulars relative to the cuſtoms and tenures of this city and its ſuburbs; whence may be deduced the conſequence which Hereford had then attained: though its inhabitants, both within and without the walls, are, in the ſame record, ſtated to have been only 103 in the time of Edward the Confeſſor. The whole town paid to the Conqueror 60*l.* in ſilver coin, which, together with the emoluments ariſing from eighteen manors, accounted for in Hereford, amounted to 335*l.* 18*s.* beſides the mulcts, and other profits, ariſing from the hundred and county courts. After the Norman ſubjugation, the caſtle, &c. were granted to and governed by the earls of Hereford. At the time of the barons' confederacy againſt Henry III., one of the firſt acts of hoſtility was committed at Hereford in 1262, where the biſhop, Peter de Aqua-Blanca, was arreſted and expelled the kingdom: in the following year the king, in a letter dated Hereford June 5, commanded him to repair forthwith to his church, on pain of confiſcation of his temporalities: he obeyed, but was ſeized in his cathedral by the barons, and his wealth was diſtributed to the ſoldiers. Hereford, from its vicinity to the Welſh frontiers, was ſubjected to continual alarm from the contending parties: and when the caſtle was beſieged and taken by the earl of Leiceſter, the city was partly deſtroyed by fire. In the reign of Edward III., when an unſucceſsful attempt was made by ſome of the chieftains of Wales to regain independence, Mael Gwyn Vychan and two of his aſſociates were impriſoned, and afterwards hanged in this city. The great council of the realm, which depoſed Edward II. was aſſembled in Hereford; and here his favourite, the younger Spencer, was executed on a gallows 50 feet high, by the queen's order. The earl of Arundel, and three others of Spencer's friends, were alſo put to death in this city. Nothing of hiſtorical importance is recorded in the annals of Hereford afterwards, till the commencement of hoſtilities betweeen Charles I. and his parliament, when this city is deſcribed by lord Clarendon, as "a town very well affected, and reaſonably well fortified, having a ſtrong ſtone wall about it, and ſome cannon; and there being in it ſome ſoldiers of good reputation, many gentlemen of honour and quality, and three or four hundred ſoldiers, beſides the inhabitants well armed." Yet with all theſe advantages, it was ſurrendered to ſir William Waller without the loſs of a man on either ſide. It was ſoon afterwards re-occupied by the royaliſts; and in 1645, ſuſtained a cloſe but ineffectual ſiege for a month from the Scotch auxiliaries under the earl of Leven. The entrenchments thrown up by the Scots are ſtill viſible on different ſides of the city.

Among the public buildings of Hereford, the cathedral, though deprived of much of its venerable appearance by the fall of the weſtern front in 1786, ſtill ſtands pre-eminently conſpicuous. This ſtructure, as already mentioned, owes its origin to the murder of Ethelbert, king of the Eaſt Angles, by the Mercian king, Offa, whoſe many valuable donations to the church which previouſly occupied the ſame ſcite, and had been dedicated to St. Mary, have occaſioned him to be ſometimes conſidered as the founder of the new cathedral (in the conſtruction of which thoſe gifts were applied) erected by Milfrid, a viceroy or provincial governor under Egbert, about the year 825. In leſs than 200 years this fabric appears to have fallen in ruins, and biſhop Athelſtan, or Ethelſtan, rebuilt it during his prelacy, which continued from 1012 to 1055. This building was again deſtroyed by fire, and continued in ruins till the year 1079, when Robert de Lozinga, who was appointed biſhop by king William I., commenced a new edifice. This was completed by the biſhop Raynelm, who was inducted to the ſee in 1107. In the calendar of obits this biſhop is recorded to be founder of the church. About a century after the deceaſe of Raynelm, the great central tower was built by biſhop Bruce, who ſat here from 1200 to 1216.

Further additions and alterations were progreſſively made by different prelates: among which the fine northern porch was built by biſhop Booth between the years 1516 and 1535, and the choir was fitted up and decorated by dean Tyler, about the year 1720. A very memorable epoch in the hiſtory, and architectural character of this grand eccleſiaſtical ſtructure, may be referred to the year 1786, when the great weſtern tower fell, and buried beneath its ruins part of the nave, and nearly the whole of the weſt front. The latter has been rebuilt, in an incongruous ſtyle of architecture, by James Wyatt, eſq., architect: the expences attending which amounted to nearly 18,000*l.* At the ſame time 2000*l.* more were expended in repairing the central tower and other parts of the building. The plan of this cathedral is that of a croſs, with a ſmall tranſept towards the eaſt, and a St. Mary chapel. At the interſection of the chief tranſept with the nave and choir, riſes a large ſquare tower. The exterior diſplays ſeveral diſſimilar parts, of various dates, and various ſtyles: but the interior is more in uniſon, and preſents ſome intereſting features. The nave is divided from the aiſles by two rows of maſſive columns, ſuſtaining ſemicircular arches. Over theſe is a row of arcades on each ſide, having pointed arches. At the north end of the great tranſept, is a part divided from the aiſle, and appropriated as the pariſh church of St. John the Baptiſt. The choir is lofty, and contains 50 ſtalls with fine ornamented canopies. Eaſt of this is the Lady chapel, now uſed as a library-room, and ſtored with a valuable collection of books. Beneath this is a crypt, which, from containing a maſs of human bones, is called Golgotha. The dimenſions of the cathedral are as follows: extreme length 325 feet; 130 of which are occupied by the nave; 96 by the choir, and the library, &c. the remainder. Great tranſept 100 feet from north to ſouth. Breadth of the nave and ſide aiſles 74 feet: height from pavement to the vaulting 70 feet. This edifice contains ſeveral intereſting monuments; though many were deſpoiled and pilfered at the reformation, and during the civil wars. Among the remaining the following are entitled to particular notice: one to Thomas Cantilupe, biſhop, who died in 1282, and was canonized in 1310; an altar tomb to biſhop Aqua-Blanca, who died in 1268; in the north wall of the library are two ancient monuments, ſaid to commemorate Humphry de Bohun, earl of Hereford, and his counteſs: ſeveral other biſhops, deans, &c. were interred within the walls of this cathedral, among whom the following names and dates of their reſpective deaths occur: biſhop Biſſe, 1721; biſhop Braoſe, 1215; ſir Richard Pembruge, or Brydges, 1375; biſhop Booth, 1535; Robert de Lozinga, 1095; Raynelm, 1115; Galfrid de Clive, 1119; Robert de Betun, 1148; Robert de Melun, 1167; John Phillips, poet, 1708.

Connected with the cathedral are ſeveral buildings: ſome of which are entitled to the notice of the antiquary; particularly the biſhop's palace, the biſhop's cloiſters, the deanery and prebendal houſes, the college, &c.

Previous to the civil war Hereford contained five pariſh churches, beſides the cathedral, reſpectively dedicated to St. Peter, All-Saints, St. Nicholas, St Martin, and St. Owen. Of theſe only the three former remain. In the city are chapels for each of the following ſects: Methodiſts, Diſſenters, Roman Catholics, and Quakers. Previous to the reformation Hereford abounded with monaſtic eſtabliſhments, but moſt of the buildings belonging to them have fallen to ruin, or been taken down. On the north ſide of the city are ſome remains of a monaſtery of Black-friars, and near them is the greater part of a *preaching-croſs*, or ſtone pulpit. Beſides ancient alms-houſes, hoſpitals, &c. here is a modern building, called a General Infirmary, for the reception and accommodation of 70 patients, a lunatic aſylum, a county-gaol, a ſhire hall, &c. Since the year 1774 very conſiderable improvements have been made in this city. An act of parliament having been then obtained for the purpoſe of regulating the "lighting, paving, pitching, and repairing the ſtreets, lanes, and paſſages," of Hereford and its ſuburbs. This city was firſt incorporated by Henry III., and has received ſeveral renewed and enlarged charters by other ſucceeding monarchs. It returned members to parliament in the 23d year of Edward I. The right of election is wholly veſted in the freemen, amounting to about 1200. The chief manufacture of the place is gloves; ſome flannel and hat manufactories have been alſo eſtabliſhed here. The theatre of Hereford claims ſome notice from having been the nurſery of a Clive, a Siddons, and a Kemble. In the year 1800 the city was officially declared to contain 1460 houſes and 6828 inhabitants. Many perſons of eminence have been born here, as is evinced by a liſt of the following names: Roger of Hereford, biſhop Miles Smith, John Gwillim, John Davies, Richard Gerthinge, Eleanor, or Nell Gwynn, general Stringer Lawrence, Capt. James Cornwall, and David Garrick. The charitable eſtabliſhments of this city are numerous, and of conſiderable utility: they are known under the names of hoſpitals, alms-houſes, charity-ſchools, &c. St. Ethelbert's hoſpital, or alms-houſe, was originally built and endowed in the reign of Henry III., for the maintenance, &c. of ten poor perſons, who were to be nominated and governed by a maſter. The latter is uſually united with the office of treaſurer of the cathedral. St. Giles' hoſpital was founded in the year 1290: but the preſent building was erected in 1720; and is appropriated to the uſe of five poor men. Williams' hoſpital was erected in 1601, and endowed by Richard Williams, to accommodate ſix poor men. The two latter hoſpitals are governed by the mayor and corporation. Trinity hoſpital was eſtabliſhed in the year 1601, by Thomas Kerry, for the ſupport and reſidence of a corporal, two other unmarried men, and 12 poor widows. Coningſby's hoſpital is a large building, of rather unuſual appropriation. It was erected, and a revenue provided for its ſupport, by ſir Thomas Coningſby, knight, in the year 1614. The building is quadrangular, and compriſes twelve ſuits of apartments, a chapel, a hall, and ſuitable appurtenances. The eſtabliſhment conſiſts, according to the articles of the founder, of eleven military men in neceſſitous circumſtances, and a chaplain. The maſter is ſtyled corporal Coningſby, and the other members are called ſervitors. This eſtabliſhment is chiefly ſupported from the Hampton court eſtate in this county. Weaver's hoſpital was founded in the year 1641, by Richard Weaver, for the reception of five poor perſons. Three other hoſpitals in the city are known by the names of Lazarus's, or the Sick-man's, for ſix widows. Shellay, for the ſame number and claſs of perſons: and Price's, for 12 poor men, and a chaplain. The Hereford charity-ſchools provide for the cloathing, education, &c. of 50 boys and 30 girls. In the vicinity of this city are ſeveral ſeats, and objects of antiquity, &c. worthy the examination of a traveller. About one mile to the weſt is the baſe and ſeven ſteps of a ſtone ſtructure called the White-Croſs, of a ſimilar deſign to the beautiful ſtone croſſes erected by king Edward I. in memory of his queen. (A view and particular deſcription of it is given in Britton's Architectural Antiquities.) The Wear, a ſeat of William Parry, eſq. is pleaſantly ſituated on the bank of the Wye, five miles W. of Hereford. Garnon's, about ſeven miles from the city, is the ſeat of ſir John Geers Cotterell, bart. At the diſtance of two miles N.E. of the latter is Foxley, the ſeat of Uvedale Price, eſq. the learned and eloquent author of "Eſſays on the Pictureſque." The houſe, a plain brick building, contains ſeveral fine and intereſting pictures by Claude, Pouſſin, Salvator Roſa, Rembrandt, Vandervelde, &c. from a contemplation of which, and the highly pictureſque ſcenery in the vicinity of the houſe, Mr. Price appears to have derived many of the maxims and opinions which are contained in his volumes. Two miles from the houſe is a lofty knoll, or mountain, called Lady-lift, which commands proſpects of an extenſive, diverſified, and highly intereſting tract of ſcenery. On another eminence, called Credenhill, three and a half miles S.E. of Foxley, are the traces of an encampment, which comprehended an area of nearly 40 acres. The view from this hill is ſaid to be the moſt extenſive of any in the county. A mile and a half S.W. of this, and five miles W. from Hereford, is Kencheſter, where the Romans had a grand military ſtation. Traces of walls and embankments are ſtill remaining, and various relics of the arts and cuſtoms of the Romans have been found here. At Sutton's Walls, five miles N. of Hereford, is an encampment, which is traditionally ſaid to have been the ſcite of Offa's palace. Seven miles from Hereford is Burghope houſe, an ancient manſion, which formerly belonged to the families of Goodyere and Dineley, and is now the property of lord Selſey. Longworth, the ſeat of Robert Phillipps, eſq. about four miles E. of Hereford, is a handſome modern building, ſurrounded by pleaſure-grounds and fine plantations. At Stoke, or Stoke-Edith, is a modern church, built at the ſole expence of Thomas Foley, eſq. in 1740; and a large, handſome manſion belonging to Edward Thomas Foley, eſq. Sufton, a modern houſe built of Bath-ſtone, is the ſeat of James Hereford, eſq. This place has belonged to his anceſtors from the reign of Henry III. At Rotherwas, about three miles S.E. of Hereford, is a ſpacious and reſpectable houſe, the ſeat of Charles Bodenham, eſq. On Dynedor-hill, near Rotherwas, are veſtiges of an ancient encampment, traditionally ſaid to have been occupied by Oſtorius Scapula. Aconbury-hill, five miles S. of Hereford, is a bold, commanding eminence, and has the traces of a large ſquare encampment on its ſummit. Eaton camp, about five miles W. of this city, is deſcribed as a Britiſh fortification, comprehending an area of nearly 40 acres of land. About two miles W. of Hereford is Belmont, the delightful ſeat of J. Matthews, eſq. late M.P. for this county. Duncomb's "Collection towards the Hiſtory and Antiquities of the County of Hereford," 4to. 1804.—"The Hereford Guide," &c. 12mo. 1806; a very uſeful and judicious topographical vade mecum.

HEREFORD *and Glouceſter Canal*, is an inland navigation in theſe counties, made in purſuance of acts of parliament paſſed in the years 1791 and and 1793, of which an account is given in our article CANAL; to which it may be proper to add, that the S.E. end of this canal, acroſs Alney iſle, is now abandoned, on account of the damage to which it is liable from the floods of the Severn.

HEREFORDSHIRE, one of the inland counties of England, is bounded on the W. by part of Wales, and from being a border county, was, previous to the final annexation of Wales to England, the ſcene of almoſt perpetual warfare. Hence we find that moſt of its eminences have been fortified, and many of its chief towns and manors have veſtiges of caſtellated ſtructures. At the period of the Roman invaſion this diſtrict was inhabited by the Silures, who alſo occupied the adjacent counties of Radnor, Monmouth, and Glamorgan, together with that part of Glouceſterſhire which lies weſtward of the Severn. The Silures were a brave and hardy people, and for a conſiderable period retarded the progreſs of the Roman arms: but being overpowered by the military talents of Julius Frontinus, they retired into the faſtneſſes of Wales, offering no farther reſiſtance to Roman domination; and the complete and undiſturbed poſſeſſion of South Britain was by this ſucceſs inſured to the conquerors, who included Herefordſhire in the diſtrict named Britannia Secunda. Two of the principal ſtations of the Itinerary of Antoninus, namely, Magna, now Kencheſter, and Ariconium, near Roſs, together with the ſmaller port of Bravinium, or Brandon, are ſituated within the limits of this county. The Watling Street enters it on the north from Shropſhire, near Leintwardine, where it paſſes the river Teme, and conducts to the camp of Brandon. A ſecond Roman road, ultimately joining with the former at Uſk, enters Herefordſhire on the ſouth-eaſt, from Glouceſterſhire; and appears to have connected the ſtations of Glevum or Glouceſter, Ariconium, Bleſtium or Monmouth, and Burium or Uſk. A third Roman road enters this county from Worceſterſhire, and paſſing Frome Hill, Stretton Granſham or Grandiſon, Lugg-bridge, Holmer, and Stretton-Sugwas, extends to Kencheſter. A fourth ancient road, called the Ridge-way, is met with to the ſouth of the Herefordſhire beacon, extending ſeveral miles towards Eaſtnor, in a circular direction.

On the decline of the Roman power, the Silures were the foremoſt in endeavouring to regain their independence, and to ſtem the torrent of Saxon uſurpation: but reſiſtance being unavailing, the Britons were driven back to Wales, and Offa incorporated Herefordſhire with the Saxon kingdom of Mercia. The original line of demarcation, which had been the river Severn, was now violated, and the famous dyke, called Clawdd Offa, or Offa's Dyke, was made by that prince to ſecure his conqueſts, which comprehended nearly the whole of this county, together with conſiderable portions of Radnorſhire, Monmouthſhire, and Shropſhire. Still further to repreſs the repeated incurſions of the Britons, Offa removed his court to South-town, now Sutton, about three miles north-weſt from Hereford, where he erected a palace, on an eminence, defended by ſtrong entrenchments. About the end of the eighth century the Danes obtained a temporary poſſeſſion of Mercia, but were expelled by Burthred the lawful heir, who, after a reign of twenty years, was defeated by theſe invaders and deprived of his kingdom; which was ſoon afterwards ſubdued by Alured, king of the Weſt Saxons, who united it to his own.

Herefordſhire is bounded on the north by Shropſhire; on the north-eaſt, and eaſt, by Worceſterſhire; on the ſouth-eaſt, by Glouceſterſhire; on the ſouth-weſt, by Monmouthſhire; on the weſt, by Brecknockſhire; and on the north-weſt, by Radnorſhire. Its form is nearly an ellipſis; but ſome detached pariſhes are ſituated beyond the general outline: of theſe, Farlow is ſurrounded by Shropſhire; Rochford is included in the county of Worceſter; and Lyttonhill in that of Radnor: a conſiderable tract of land, called the Futhog, with a few acres on the Devaudin-hill, is inſulated by Monmouthſhire. Its greateſt extent, from Ludford on the north, to the oppoſite border, near Monmouth on the ſouth, is thirty-eight miles: its greateſt width, from Clifford on the weſt, to Cradley on the eaſt, is thirty-five miles. It includes about 800,000 acres; and is divided into eleven hundreds, containing 221 pariſhes, one city, and ſix market towns: the number of houſes, as enumerated under the act of 1801, was 19,763; that of inhabitants 89,191: its boundaries are moſtly artificial.

The general aſpect of the county is extremely pictureſque and intereſting to the traveller: its ſurface is finely diverſified, and broken by ſwelling heights, ſo as greatly to reſemble the more central parts of Kent. The ſoil is chiefly a mixture of marle and clay, containing a large proportion of calcareous earth. The ſubſtrata are moſtly lime-ſtone of different qualities; in ſome parts, particularly near Snodhill-caſtle, it aſſumes the properties of marble, and becomes beautifully variegated with red and white veins. Towards the weſtern borders the ſoil is cold and retentive of moiſture; but ſtill argillaceous, with a baſe of ſoft crumbling ſtone, which decompoſes on expoſure to the atmoſphere; or of nodules of impure lime-ſtone. The eaſtern ſide of the county is principally a ſtiff clay, of great tenacity and ſtrength, and in many places of a red colour: a great proportion of the hundred of Wormelow, on the ſouth, is a light ſand. Deep beds of gravel are occaſionally found in the vicinity of Hereford; and the ſub-ſoil of ſeveral of the hills are of ſiliceous grit. Fuller's earth is ſometimes dug near Stoke; and in different parts of the county are ſmall quantities of red and yellow ochres, with tobacco-pipe clay. Iron ore has been met with in the parts bordering on Glouceſterſhire, but none has been dug lately; though, from the conſiderable quantities that have been diſcovered, imperfectly ſmelted, and from the remains of hand-blomaries that have alſo been found, it has been thought that ſome iron-works were eſtabliſhed here as early as the time of the Romans.

Herefordſhire is particularly famous as a cyder country; yet this, though a favourite object of its huſbandry and commerce, is by no means the only one: cattle, ſheep, ſwine, corn, hops, &c. have equally ſtrong claims on the attention of the farmer. Plantations of fruit-trees are found in every aſpect, and on ſoils of every quality, and under every ſpecies of culture. The moſt approved ſcite is that which is opened to the ſouth-eaſt, and ſheltered in other points, but particularly in the oppoſite direction; for though Virgil and other Roman poets celebrate the weſt wind as the moſt genial in Italy; and Philips, in his poem on cyder, recommends the ſame aſpect; yet it is an unqueſtionable fact, that the weſterly winds, and therefore a weſterly expoſure, are particularly unfavourable to the fruit-trees of Herefordſhire: theſe winds are more cold, as blowing over a conſiderable tract of the Welſh mountains, which are often covered with ſnow even late in the ſpring; and they are more unkind, becauſe from that point proceeds a much more than equal proportion of thoſe fogs and blue miſts, which Dr. Beale calls "the diſguſts of the Black Mountain." The period at which the cultivation of orchards became a pre-eminent branch of the rural economy of England, appears to have been early in the reign of Henry VIII., when the example of a perſon named Harris, the king's fruiterer, who had occaſioned the fields and environs of about thirty towns and villages, in Kent, to be planted with fruit-trees, extended this ſpecies of culture to ſeveral parts of the kingdom. The particular era, however, when the plantations of Herefordſhire acquired the peculiar eminence which they yet retain, was the reign of Charles I., when, by the ſpirited exertions of lord Scudamore, of Holm-Lacy, and other gentlemen of the county, Herefordſhire became, in a manner, one entire orchard. For a particular deſcription of the various kinds of apples cultivated in this county, ſee Marſhall's Obſervations on the Management of Orchards and Fruit Liquor in Herefordſhire, annexed to his ſecond volume of "The Rural Economy of Glouceſterſhire."

The Herefordſhire cattle are regarded, by the beſt informed judges, as the moſt ſuperior breed in the kingdom. The other breeds, which nearly reſemble them, are thoſe of Devonſhire and Suſſex, and of the Vale of Pickering in Yorkſhire. They are of the middle-horned kind; of a large and athletic form; and unuſually ſleek in appearance, from the bright and ſilky nature of the coating. The prevailing colour is a reddiſh-brown, with white and bald faces. The rearing of oxen for agricultural purpoſes is a very general practice; nearly half the ploughing of the whole county is performed by them, and they are equally employed in the labours of the harveſt. The breed of ſheep in this county is almoſt equally as celebrated as that of its cattle: the name by which they are diſtinguiſhed is the Ryeland, from a diſtrict in the ſouthern part of the county, where the moſt ſuperior varieties are fed.

The cultivation of hops forms a very conſiderable branch of the rural economy of Herefordſhire, and is ſtill increaſing, particularly in the parts bordering on Worceſterſhire. They appear to have been introduced into this county ſoon after they were imported into England about the commencement of the ſixteenth century; and by the middle of the following century, the cultivators had greatly extended their plantations, and become conſiderably more numerous. The hops of this county are of two kinds, white and red; but each of theſe has ſeveral varieties: the white hops are the moſt delicate, and have the preference with the buyers; though the red kinds are more hardy, and impart a ſtronger quality in brewing.

Herefordſhire may, with propriety, be termed a woodland county; many ſpecies of trees growing up ſpontaneouſly, and becoming ſtrong and vigorous in a very ſhort period. The oak, elm, poplar, and willow are particularly flouriſhing; but are ſeldom ſuffered to attain full maturity, unleſs on the eſtates of the nobility, and moſt wealthy landed proprietors. Coppice-wood is extremely abundant; the ſides and ſummits of many of the hills and upland grounds being covered with extenſive plantations. The aſh coppices are very valuable and numerous; thoſe of alder are alſo plentiful in low and marſhy ſituations: the former are regulated under a general ſyſtem, and are cut about once in eight, ten, or twelve years, according to the uſes for which the wood is deſigned. The principal part of the county is incloſed; and as moſt of the incloſures are bounded by hedge-rows, it has a very woody appearance.

The principal rivers and ſtreams of Herefordſhire are the Wye, the Lugg, the Munnow, the Arrow, the Frome, the Team or Teme, and the Leddon. The Wye has been often celebrated for the extremely pictureſque and diverſified ſcenery which adorns its meandering channel. This river is navigable to Hereford for barges of from eighteen to forty tons; but either a large or a ſmall ſupply of water is equally fatal to the navigation. The Lugg has its ſource in Radnorſhire, but enters Herefordſhire on the north-weſt ſide, near Stapelton-caſtle: thence flowing in a ſouth-eaſt direction, it receives the Pinſley near Leominſter; and afterwards inclining to the ſouth, is increaſed by the waters of the Arrow and the Frome. Soon after its junction with the latter, it falls into the Wye, near Mordiſford. The Munnow riſes on the Herefordſhire ſide of the Hatterell mountains, and in its courſe through the county is increaſed by the ſtreams called Eſcle, Olchron, Hothny, Dore, and Werme; it forms the boundary between Herefordſhire and Monmouthſhire, till it quits the former at Llanrothal, and flowing towards Monmouth, is received by the Wye immediately below that town. The Team enters this county from the confines of Radnorſhire and Shropſhire, a ſhort diſtance north-weſt from Brampton Bryan, and flowing eaſtward runs into Shropſhire near Ludlow. In the muſcle-ſhells of the river, pearls have occaſionally been found. The Leddon riſes above Boſbury on the eaſt ſide of the county, and running ſouthward gives name to the town of Ledbury; thence flowing into Glouceſterſhire, it unites with the Severn. The inland navigation of Herefordſhire is very imperfect; though ſcarcely any county, poſſeſſing neither iron-works, nor any principal manufacture, can have greater occaſion for its aids.

Herefordſhire returns eight members to parliament: *viz.* two for the county, two for the city, two for Leominſter, and two for Weobly. Ledbury, Roſs, and Bromyard, were formerly privileged to ſend repreſentatives, but were excuſed on a petition of inability to ſupport them. This county is included in the dioceſe of Hereford. Duncumb's "Collections towards the Hiſtory and Antiquities of the County of Hereford," 4to. 1804. "General View of the Agriculture of Herefordſhire," by John Duncumbe, M. A. 8vo.

HEREGELD, in our *Old Writers*, a tribute or tax levied for the maintenance of an army. See Subsidy.

HEREN. See Haran.

HERENTHALS, in *Geography*, a town of France, in the department of the Two Nethes, and chief place of a canton, in the diſtrict of Tarnhout; 16 miles E. of Antwerp. The place contains 2541, and the canton 13,305 inhabitants, on a territory of 267½ kiliometres, in 13 communes.

HERESIARCH, *Arch-heretic*, the founder or inventor of a hereſy, or a chief and ring-leader of a ſect of heretics. The word is Greek, αἱρεσιαρχης, compounded of αἱρεσις, *hereſis, hereſy*, and αρχος, *princeps, prince, chief.*

Thus Arius and Socinus are called hereſiarchs, as being the founders and patriarchs of the Arians and Socinians. Simon Magus is recorded as the firſt hereſiarch under the new law.

HERESY, an error in ſome eſſential point of Chriſtian faith, maintained with obſtinacy, and diſingenuity.

It is properly the obſtinacy that conſtitutes the character of hereſy, not the error. When a man is humble and ingenuous, ready and deſirous to receive farther light and inſtruction, and when he gives every thing urged againſt him its due weight, he is not guilty of hereſy. "Errare poſſum, hæreticus eſſe nolo," is a celebrated maxim of St. Auguſtine.

Tertullian, in his treatiſe Of Preſcriptions, defines hereſy by *choice*, agreeably to the etymology of the word. A heretic, in this ſenſe, is one who, knowingly and of his own choice, propoſes, or even embraces, any new dogma or article of faith.

The word is formed of the Greek αἱρεσις, from αἱρεω, *I chuſe*, which, among the ancients, had nothing of that odious ſignification attached to it by eccleſiaſtical writers of later times. It only ſignified a peculiar opinion, dogma, or ſect, without conveying any reproach; ſince it was indifferently uſed, either of a party approved or of one diſapproved, by the writer.

In this ſenſe they ſaid, the hereſy of the Stoics, of the Peripatetics, &c. meaning their ſect, their ſyſtem, &c.

Thus alſo in the New Teſtament, we read of the ſect or hereſy of the Sadducees, of the Phariſees, of the Nazarenes, &c. See Acts, v. 17. ch. xv. 5. ch. xxiv. 5. ch. xxvi. 5. ch. xxviii. 22.

In the two former of the paſſages above cited, the term is adopted by the hiſtorian, merely for diſtinction's ſake, without the leaſt appearance of intention to convey either praiſe or blame. In Acts, xxvi. 4, 5, Paul, in his ſelf-defence before king Agrippa, uſes the term, when it was manifeſtly his deſign to exalt the party to which he had belonged, and to give their ſyſtem the preference to every other ſyſtem of Judaiſm, both in ſoundneſs of doctrine, and purity of morals. In Acts, xxiv. 5, there is an appearance that ſomething reproachful is meant to be conveyed under the term αἵρεσις. But we ſhould have had no reaſon for imagining, that any part of the obloquy lay in the application of the word laſt mentioned, if it had not been for the notice which the apoſtle takes of it in his anſwer; Acts, xxiv. 14. In the Engliſh tranſlation, however, which follows the Vulgate, there is an obvious impropriety; becauſe the ſame word is rendered one way in the charge brought againſt the priſoner, and another way in his anſwer for himſelf. The conſequence is, that though nothing can be more appoſite than his reply, in this inſtance, as it ſtands in the original, yet nothing can appear more foreign than this paſſage, in the two verſions above-mentioned. The apoſtle ſeems to defend himſelf againſt crimes, of which he is not accuſed. In both places, therefore, the word ought to have been tranſlated in the ſame manner, whether "hereſy" or "ſect." The laſt term ſeems to be the only proper one; for the word "hereſy," in the modern acceptation, never ſuits the import of the original word, as uſed in ſcripture. But, if we attend to the peculiar circumſtances of the apoſtle at this time, the difficulty in his having conſidered it as a reproach to be denominated of a "ſect," diſclaimed by the whole nation, inſtantly vaniſhes. Let it be remembered, firſt, that ſince the Jews had fallen under the power of the Romans, their ancient national religion had not only received the ſanction of the civil powers for the continuance of its eſtabliſhment in Judea, but had obtained a toleration in other parts of the empire; ſecondly, that Paul is now pleading before a Roman governor, a Pagan, who could not well be ſuppoſed to know much of the Jewiſh doctrine, worſhip, or controverſies; and that he had been arraigned by the rulers of his own nation, as belonging to a turbulent and upſtart ſect; for in this way they conſidered the Chriſtians, whom they reproachfully named Nazarenes. The natural conſequence of this charge, with one who underſtood ſo little of their affairs as Felix, was, to make him look upon the priſoner as an apoſtate from Judaiſm, and, therefore, as not entitled to be protected, or even tolerated, on the ſcore of religion. Againſt a danger of this kind, it was of the utmoſt importance to our apoſtle to defend himſelf. Accordingly, the apoſtle, with great addreſs, refutes the charge of having revolted from the religious inſtitutions of Moſes, and, at the ſame time, is ſo far from diſclaiming, that he glories in the name of a follower of Chriſt.

Upon the whole, in the hiſtorical part of the New Teſtament, we find the word αἵρεσις employed to denote "ſect" or "party," indiſcriminately, whether good or bad. The word "ſect," however, among the Jews, was not, in its application, entirely coincident with the ſame term as applied by Chriſtians to the ſub-diviſions ſubſiſting among themſelves. We ſeem invariably to uſe it of thoſe who form ſeparate communions, and who do not aſſociate with one another in religious worſhip and ceremonies. Thus we call Papiſts, Lutherans, Calviniſts, different ſects, not ſo much on account of their difference in opinion, as becauſe they have eſtabliſhed for themſelves different fraternities, to which, in what regards public worſhip, they confine themſelves; the ſeveral denominations above-mentioned having no intercommunity with one another in ſacred matters. High church and low church we call only parties, becauſe they have not formed ſeparate communions.

In the Jewiſh ſects (if we except the Samaritans) there were no ſeparate communities erected. The ſame temple, and the ſame ſynagogues, were attended alike by Phariſees and by Sadducees. Nay, there were often of both denominations in the Sanhedrim, and even in the prieſthood.

Another difference was, that the name of the ſect was not applied to all the people who adopted the ſame opinions, but ſolely to the men of eminence among them, who were conſidered as the leaders and inſtructors of the party. This is exemplified in the uſe of the appellation Phariſees, which was uſed in ſcripture and alſo by Joſephus, to denote, not the followers, but the leaders of the Phariſees. The caſe was ſomewhat otherwiſe with regard to the Eſſenes; for they entered into a ſolemn engagement, by which they confined themſelves to a peculiar mode of life, that ſecluded them from the reſt of mankind; and they may therefore be conſidered almoſt in the ſame manner as we do the Benedictines or Dominicans, or any order of monks or friars among the Romaniſts.

It has been ſuggeſted, that the acceptation of the word αἵρεσις in the Epiſtles, is different from what it has been obſerved to be in the hiſtorical books of the New Teſtament. In order to account for this difference, we may obſerve, that the word "ſect" has always ſomething relative in it; and therefore, in different applications, though the general import of the term be the ſame, it will convey a favourable or an unfavourable idea, according to the particular relation it bears. When the word "ſect" is uſed along with the proper name, by way of diſtinguiſhing one party from another, it conveys neither praiſe nor blame. Thus we read of the ſect of the Phariſees, the ſect of the Sadducees, the ſect of the Nazarenes; and thus we may ſpeak of a ſtrict ſect, or a lax ſect, or even of a good ſect, or a bad ſect. If any thing reprehenſible or commendable be ſuggeſted, it is ſuggeſted, not by the word αἵρεσιν, but by the words conſtrued with it. Again, it may be applied to a formed party in a community, conſidered in reference to the whole. If the community, of which the ſect is a party, be of ſuch a nature as not to admit this ſub-diviſion, without impairing and corrupting its conſtitution, to charge them with ſplitting into ſects or forming parties, is to charge them with corruption, in what is moſt eſſential to them as a ſociety. Hence ariſes the whole difference in the word, as it is uſed in the hiſtory, and as it is uſed in the epiſtles of Peter and Paul; for theſe are the only apoſtles who employ it. In the hiſtory, the reference is always of the firſt kind; in the epiſtles, always of the ſecond. In theſe the apoſtles addreſs themſelves only to Chriſtians, and are not ſpeaking of ſects without the church, but either reprehending men for, or warning them againſt, forming ſects among themſelves, to the prejudice of charity, to the production of much miſchief within their community, and of great ſcandal to the unconverted world without. So St. Paul's words to the Corinthians (1 Cor. xi. 19.) were underſtood by Chryſoſtom, and other ancient expoſitors. In both applications, however, the radical import of the word is the ſame; but even here, it has no neceſſary reference to doctrine, true or falſe. Campbell's Preliminary Diſſertations to the "Four Goſpels, &c." Suicer's Theſ. vol. i. p. 120. 124. Lardner's Works, vol. ix. p. 223, &c. For the difference between *hereſy* and *ſchiſm*, ſee the latter article. See alſo Heretic.

It ſeems difficult in the law of England, preciſely to determine what errors amount to hereſy, and what not. Sir Matthew Hale, (1 Hal. P. C. 384) defines it to be "Sententia rerum divinarum humano ſenſu excogitata, palam docta et pertinaciter defenſa." But, ſays judge Blackſtone, here it muſt be acknowledged, that particular modes of belief or unbelief, not tending to overturn Chriſtianity itſelf, or to ſap the foundations of morality, are by no means the object of coercion by the civil magiſtrate. Others, however, contend for a greater latitude on this ſubject than the learned judge allows; and they conceive, that opinions relating to religion, and more particularly the tendency of ſuch opinions, do not lie within the province of the civil magiſtrate, whoſe buſineſs it is to guard againſt the pernicious influence of overt acts, that diſturb the peace and undermine the ſecurity and exiſtence of the ſtate over which he preſides. Indeed, what doctrines ſhould be adjudged hereſy, was left, by our old conſtitution, to the determination of the eccleſiaſtical judge, who had, in this reſpect, a moſt arbitrary latitude allowed him. For the general definition of an heretic given by Lyndewode (cap. de hæreticis) extends to the ſmalleſt deviations from the doctrines of holy church: "hæreticus eſt qui dubitat de fide Catholica, et qui negligit ſervare ea, quæ Romana eccleſia ſtatuit, ſeu ſervare decreverat." Or, as the ſtatute 2 Hen. IV. c. 15. expreſſes it in Engliſh, "teachers of erroneous opinions, contrary to the faith and bleſſed determinations of the holy church." Very contrary this, to the uſage of the firſt general councils, which defined all heretical doctrines with the utmoſt preciſion and exactneſs. And what ought to have alleviated the puniſhment, the uncertainty of the crime, ſeems to have enhanced it in thoſe days of blind zeal and pious cruelty. The ſanctimonious hypocriſy of the canoniſts at firſt, indeed, went no farther than enjoining penance, excommunication, and eccleſiaſtical deprivation for hereſy; though afterwards they proceeded boldly to impriſonment by the ordinary, and confiſcation of goods in *pios uſus.* But in the mean time they had prevailed upon the weakneſs of bigotted princes to make the civil power ſubſervient to their purpoſes, by making hereſy not only a temporal, but even a capital, offence; the Romiſh eccleſiaſtics determining, without appeal, whatever they pleaſed to be hereſy, and ſhifting off to the ſecular arm the odium and drudgery of executions; with which they themſelves were too tender and delicate to intermeddle. Nay, they pretended to intercede and pray on behalf of the convicted heretic, "ut citra mortis periculum ſententia circa eam moderatur;" well knowing, at the ſame time, that they were delivering the unhappy victim to certain death. Hence the capital puniſhments on the ancient Donatiſts and Manichæans by the emperors Theodoſius and Juſtinian (Cod. l. i. tit. 5.); hence alſo the conſtitution of the emperor Frederic, mentioned by Lyndewode, adjudging all perſons, without diſtinction, to be burnt with fire, who were convicted of hereſy by the eccleſiaſtical judge. The ſame emperor, in another conſtitution, ordained, that if any temporal lord, when admoniſhed by the church, ſhould neglect to clear his territories of heretics, within a year, it ſhould be lawful for good Catholics to ſeize and occupy the lands, and utterly to exterminate the heretical poſſeſſors. And upon this foundation was built that arbitrary power, ſo long claimed and ſo fatally exerted by the pope, of diſpoſing even of the kingdoms of refractory princes to more dutiful ſons of the church. Whilſt Chriſtianity was thus deformed by the dæmon of perſecution on the continent, it was not likely that our own iſland ſhould altogether eſcape the ſame ſcourge. We therefore find among our ancient precedents (F. N. B. 269.) a writ "de hæretico comburendo," which is thought by ſome to be as ancient as the common law itſelf. The conviction of hereſy, however, by the common law, was not in any petty eccleſiaſtical court, but before the archbiſhop himſelf in a provincial ſynod, and the delinquent was delivered over to the king to do as he ſhould pleaſe with him; ſo that the crown had a controul over the ſpiritual power, and might pardon the convict by iſſuing no proceſs againſt him; the writ "de hæretico comburendo" being not a writ of courſe, but iſſuing only by the ſpecial direction of the king in council. (1 Hal. P. C. 395.) But in the reign of Henry IV., the clergy, availing themſelves of the king's dubious title for an increaſe of their own power, obtained an act of parliament, 2 Hen. IV. c. 15. by virtue of which the dioceſan alone, without the intervention of a ſynod, might convict of heretical tenets; and unleſs the convict abjured his opinions, or if, after abjuration, he relapſed, the ſheriff was bound, "ex officio," if required by the biſhop, to commit the unhappy victim to the flames, without waiting for the conſent of the crown. Afterwards, when the final reformation of religion began to advance, the power of the eccleſiaſtics was ſomewhat moderated; for though what hereſy *is*, was not then preciſely defined, yet we are told in ſome points what it is *not*; thus the ſtatute 25 Hen. VIII. cap. 14. declared, that offences againſt the ſee of Rome are not hereſy, and the ordinary is reſtrained from proceeding upon mere ſuſpicion, *i. e.* unleſs the party be accuſed by two credible witneſſes, or an indictment of hereſy be firſt previouſly found in the king's courts of common law; yet in ſix years afterwards, the ſtat. 31 Hen. VIII. cap. 14. eſtabliſhed the ſix moſt conteſted points of popery, *viz.* tranſubſtantiation, communion in one kind, the celibacy of the clergy, monaſtic vows, the ſacrifice of the maſs, and auricular confeſſion; and farther enacted and declared all oppugners of the firſt to be heretics, and to be burnt with fire; and of the five laſt to be felons, and to ſuffer death. By ſtat. 1 Eliz. cap. 1. all former ſtatutes relating to hereſy are repealed, which leaves the juriſdiction of hereſy as it ſtood at common law, *viz.* as to the infliction of common cenſures in the eccleſiaſtical courts; and, in caſe of burning the heretic, in the provincial ſynod only (5 Rep. 23. 12 Rep. 56. 92.); or, according to ſir Matthew Hale, in the dioceſan alſo; but in either caſe the writ is not demandable of common right, but grantable or otherwiſe, merely at the king's diſcretion. 1 Hal. P. C. 405. (See *De* HÆRETICO *Comburendo*.) By this ſtatute the term hereſy is reſtrained to ſuch tenets as are either determinable by the words of the canonical ſcripture, or by one of the four firſt general councils, or by ſome other council which has only uſed the expreſs words of ſcripture, or by parliament, with the aſſent of the convocation.

It is agreed that the convocation may, and always might, declare what opinions are heretical, and that a conviction before them was anciently a good foundation for the writ *De Hæretico Comburendo*; but it is doubted whether they can, at this day, convene and convict a heretic. A biſhop, but no other ſpiritual judge, may puniſh a heretic by church cenſures; and a conviction before him was, as ſome ſay, anciently a good foundation for the writ *De Hæretico Comburendo*. But the temporal courts cannot puniſh a heretic, as ſuch, but only as a diſturber of the public peace; yet ſuch courts may incidentally take knowledge whether a tenet be heretical or not; as anciently, where biſhops grounded their commitment of a man as an heretic on 2 Hen. IV. which empowered them to impriſon for hereſy; or even at this day, where a biſhop pleads to a *quare impedit*, that he refuſed the clerk for hereſy; in both which caſes the temporal courts will relieve the party, unleſs the particular point charged againſt him be ſet forth, and ſuch point appear to be heretical. But regularly, the temporal courts cannot determine what is hereſy; and therefore if a man thinks himſelf aggrieved by a ſuit in the ſpiritual court *pro ſalute animæ*, for hereſy, his moſt proper remedy is by appeal, not prohibition. Anciently, an heretic convict, refuſing to abjure, or relapſing after abjuration, might be burnt by force of the writ *De Hæretico Comburendo*; but he forfeited neither lands nor goods: but though this writ is now aboliſhed, and all the old ſtatutes which gave a power to arreſt or impriſon perſons for hereſy, or introduced any forfeiture on that account, are repealed; yet by the common law, ſtill in force, an obſtinate heretic may be impriſoned by force of the writ *De Excommunicato Capiendo*, till he make ſatisfaction to the church. The civil magiſtrate has ſtill a power of interpoſing with regard to one ſpecies of hereſy; for, by ſtat. 9 and 10 Will. III. cap. 32. if any perſon, educated in the Chriſtian religion, and having made profeſſion of the ſame, ſhall by writing, printing, teaching, or adviſed ſpeaking, deny the Chriſtian religion to be true, or the holy ſcriptures to be of divine authority, or deny any one of the perſons in the holy Trinity to be God, or maintain that there are more Gods than one, he ſhall for the firſt offence be rendered incapable of holding any office or place of truſt; and for the ſecond, be rendered incapable of bringing any action, being guardian, executor, legatee, or purchaſer of lands, and ſhall ſuffer three years impriſonment without bail. But if, within four months after the firſt conviction, the delinquent will, in open court, publicly renounce his error, he is diſcharged at once from all diſabilities. It is the wiſh of many, however, that in an age of unreſtricted inquiry, and in a country that may juſtly boaſt of the prevalence of knowledge, and liberality of ſentiment, our ſtatute books may be reſcued from the opprobrium of penal laws in the province of religion.

Hereſy is ſometimes alſo uſed, by extenſion, for a propoſition that is notoriouſly falſe in ſome other ſcience.

Thus it is a hereſy in morals to ſay, that a man muſt be ungrateful. It is a hereſy in geometry to ſay, that two triangles, whoſe angles are equal, are not ſimilar.

HERETIC, in a general ſenſe, is one that ſets up to be the head, or chuſes to join himſelf to a particular religious ſect.

Heretic, in a bad ſenſe, according to the opinion of Whitby, Foſter, and many others, is one who knowingly eſpouſes a falſe doctrine, is inſincere in his profeſſion, and aſſerts and defends what he is convinced is contrary to Chriſtianity, and conſequently ſupports the intereſt of a faction, in order to ſerve ſome bad deſigns. According to this opinion, a heretic not only entertains wrong ſentiments of Chriſtianity, but doth this wilfully, and with an ill intention; ſo that no mere error of the judgment can be hereſy, and no honeſt man, who is not condemned of himſelf, can poſſibly be a heretic. Thoſe who are of this opinion, and particularly Dr. Foſter, in his controverſy with Dr. Stebbing, infers from the above ſtatement of the apoſtle's ſenſe of the term heretic (Tit. iii. 10, 11.), who is ſaid to be *ſelf-condemned* (αυτοκατακριτος), that as none can ordinarily tell who is *ſelf-condemned* without the gift of diſcerning ſpirits, the uſe of this rule was peculiar to the apoſtle's time. The chief argument in ſupport of this interpretation is, not ſo much that ſuch a perſon is ſaid to *ſin*, but that he is ſaid to be αυτοκατακριτος, which is ſuppoſed to ſignify *condemned by his own conſcience*. But Dr. Stebbing thinks the meaning is, that ſuch a perſon does not, like many other offenders, ſtudy to conceal his crime, and thereby oblige others to prove it, but that, openly declaring and maintaining his ſentiments, he is accuſed and condemned out of his own mouth: compare Heb. xi. 7. Matt. xii. 41, 42. Acts, xiii. 46. where perſons are ſaid to be condemned by thoſe who furniſh out matter for their condemnation: compare Job, xv. 6. Luke, xix. 22.

Againſt Dr. Foſter's explanation of the term heretic, Dr. Campbell has urged ſeveral objections, which he conceives to be inſuperable. It is not, he ſays, agreeable to the rules of criticiſm to aſſign, without any evidence from uſe, a meaning to a concrete term which does not ſuit the ſenſe of the abſtract. Αἵρεσις is the abſtract, αἱρετικὸς the concrete. If αἵρεσις could be ſhewn, in any inſtance, to mean the profeſſion and propagation of opinions not believed by him who profeſſes and propagates them, it might be admitted that αἱρετικὸς might denote the profeſſor or propagator of ſuch opinions. But it is not pretended that αἵρεσις, in any caſe, ſcriptural, claſſical, or eccleſiaſtical, ever bore that meaning; there is, therefore, a very ſtrong probability againſt the ſenſe given by Foſter, &c. to the word αἱρετικὸς. Beſides, this word, though it occurs but once in ſcripture, is very common in ancient Chriſtian writers, but has never been ſaid, in any one of them, to bear the meaning which Dr. Foſter has affixed to it. Moreover, the apoſtolical precept explained in this way is of little or no uſe. Who can know whether a man's belief in the opinions which he profeſſes be ſincere or hypocritical? Titus, it may be ſaid, had the gift of diſcerning ſpirits, and, therefore, might know. Was the precept, after his life-time, to be of no ſervice in the church? This ſeems to be incredible, eſpecially as there is no other direction in the chapter, or even in the Epiſtle, which requires a ſupernatural gift to enable men to follow it. To what purpoſe enjoin us to "avoid a heretic," if it be impoſſible without a miracle to know him? Although we cannot affirm, that ſuch a ſpecies of hypocriſy as Foſter makes eſſential to the character has never appeared, it may be preſumed, that it very rarely appears. It is the natural tendency of vanity and ambition to make a man exert himſelf in gaining proſelytes to his own notions, however trifling, and however raſhly adopted. But it is not a natural effect of this paſſion to be zealous in promoting opinions which the promoter does not believe, and to the propagation of which he has no previous inducement from intereſt. It is ſufficient to vindicate the application of the term αὐτοκατάκριτος, or *ſelf-condemned*, that a factious or turbulent temper, like any other vicious diſpoſition, can never be attended with peace of mind, but, in ſpite of all the influence of ſelf-deceit, which is not greater in regard to this than in regard to other vices, muſt, on account of the mortal wounds it gives to peace and love, often be diſquieted by the ſtings of conſcience. In ſhort, the αἱρετικὸς, when that term is applied to a perſon profeſſing Chriſtianity, is the man who, either from pride, or from motives of ambition or intereſt, is led to violate the important precepts of our Lord, recorded Matt. xxiii. 8. 10. We may here obſerve further, that, in the early ages of the church, after the completion of the canon, the word αἱρετικὸς was not always limited (as the word *heretic* is in modern uſe) to thoſe who, under ſome form or other, profeſs Chriſtianity. At preſent, we invariably diſtinguiſh the *heretic* from the *infidel*. The firſt is a corruptor of the Chriſtian doctrine, of which he profeſſes to be a believer and a friend; the ſecond, a declared unbeliever of that doctrine, and, conſequently, an enemy; whereas, in the times above referred to, the head of a faction in religion, or in ethics (for the term ſeems not to have been applied at firſt to the inferior members), the founder, or at leaſt a principal promoter of a ſect or party, whether within or without the church; that is, whether of thoſe who called themſelves the diſciples of Chriſt, or of thoſe who openly denied him, was indiſcriminately termed αἱρετικὸς. For want of duly attending to this difference in the ancient application of the word, it has been confuſedly and inconſiſtently uſed by eccleſiaſtical hiſtorians. Thus Doſitheus, Simon Magus, Menander, and ſome others, are commonly ranked among the ancient hereties; whereas, they were deniers of Jeſus Chriſt in every ſenſe, and avowed oppoſers of the goſpel. Nevertheleſs, the primitive writers called them *heretics*; and, therefore, their ſenſe of the word αἱρετικὸς did not coincide with ours. Upon the whole, we obſerve, that the heretics, whom, in the New Teſtament, we are directed to avoid, were not the humble, modeſt, and peaceable, though erroneous Chriſtians, who adhered to the authority of Chriſt, and deſired to know and do his will; but the proud, pragmatical, turbulent party-men, who diſturbed and divided the church by their impoſitions and innovations, on the terms of brotherly affection and Chriſtian communion, and by aſſuming an authority over their fellow Chriſtians. Hereſy, in the ſenſe of ſcripture, doth not conſiſt in ſimple errors; nor were thoſe heretics who were anathematized and perſecuted; but only thoſe who anathematized and perſecuted others, refuſing to acknowledge them for true Chriſtians, on account of their ſuppoſed or real miſtakes; agreeably to this ſenſe of the appellation, it is obſerved by Mr. Hallet, that all heretics are ſectaries; that no doctrine alone can conſtitute a perſon a heretic; and that the pope is the greateſt heretic in the world. See Hallet's Notes, &c. vol. iii. diſc. ix. p. 390. Furneaux's Letters to Judge Blackſtone, p. 30.

A real heretic is properly he who maintains a falſe opinion, out of a ſpirit of obſtinacy, faction, or hypocriſy. A heretic makes profeſſion of Chriſtianity, by which he is diſtinguiſhed from an Infidel, Jew, and Idolater.

A man does not become an heretic by doing a thing condemned or forbidden by the Goſpel, and of conſequence repugnant to the Chriſtian faith; but by a ſtiff, diſingenuous, wilful, turbulent adherence to an opinion oppoſite to ſome article of the Chriſtian faith, whether it regard ſpeculation or practice.

Others, however, both in the early ages of the church and in modern times, have extended the odious appellation of heretics to thoſe that have been miſtaken in judgment, who have erred in fundamentals, or doctrines reckoned of the greateſt importance. See Heresy.

The ſects of heretics, who have, at different times, diſturbed the church, are innumerable.

The emperor Maximus, who uſurped the throne from Gratian, was the firſt that decreed the pains of death to heretics.

By our own law, heretics were anciently to be burnt; and there was a writ, *De Hæretico Comburendo*, which lay for that purpoſe.

HERETOCHS, among our *Saxon Anceſtors*, ſignified the ſame with dukes or *duces*, denoting the commanders or leaders of their armies. See Duke.

It appears, from Edward the Confeſſor's laws, that the military force of this kingdom was in the hands of the dukes or heretochs, who were conſtituted through every province and county in the kingdom, being ſelected out of the principal nobility, and ſuch as were moſt remarkable for being *ſapientes*, *fideles*, *&* *animoſi*. Their duty was to lead and regulate the Engliſh armies, with a very unlimited power; and becauſe of their great power they were elected by the people in their full aſſembly, or folkmote, in the ſame manner as ſheriffs were elected.

HERICOURT, Louis de, in *Biography*, a lawyer and man of learning, was born at Soiſſons in 1687. He applied himſelf moſt diligently to the ſtudy of the civil law, and in 1712 was appointed advocate in the parliament of Paris. In 1713 he was aſſociated with the writers in the "Journal des Savans," in which his labours were much approved. In 1719 he publiſhed a very valuable, and as it proved, a popular work, entitled “ Les Loix Eccleſiaſtiques de France, miſes dans leur Ordre Naturel.” He was author, likewiſe, of a “ Treatiſe on the Sale of Immoveables by decree,” an “ Abridgment of the Diſcipline of the Church, by P. Thomaſſin,” and other pieces. He died in 1753, leaving behind him a high character of the moſt unblemiſhed integrity. His poſthumous works were publiſhed in four volumes, 4to. Moreri.

HERISSON, in *Fortification*, a beam armed with iron ſpikes, the points whereof are turned outward, ſupported in the middle by a ſtake, wherein is a pivot on which it turns; it ſerves as a barrier to block up a paſſage.

Heriſſons are frequently placed before gates, eſpecially the poſterns of a town or fortreſs, to ſecure thoſe paſſages which muſt of neceſſity be frequently opened and ſhut.

HERITAGE. See INHERITANCE.

HERITIER, CHARLES LOUIS L', DE BRUTELLE, in *Biography*, an eminent French botaniſt, one of the moſt diſtinguiſhed ſtudents and promoters of the Linnæan principles and accuracy in his own country, was born, of an opulent mercantile family, at Paris in 1746. In 1772 he was appointed ſuperintendant of the waters and foreſts of the *Generalité* of Paris, and his active mind being turned to fulfil the duties of his office, he began to apply to botany, with a particular view to the knowledge of foreſt-trees. He ſoon extended his enquiries; ſtudied the works of Linnæus; and became one of the moſt zealous diſciples of the illuſtrious Swede, among people who, prepoſſeſſed with French ſyſtems and French importance, could ſcarcely conceive that botany could make any progreſs but at the beck of a Tournefort or a Juſſieu; great names, worthy of better diſciples! No wonder if l'Heritier yielded to a contrary bias. A new path lay open before him, and he purſued it with the ardour natural to his character. His countrymen had ſat down under the fading laurels of Tournefort, and the ſcarcely expanding ones of Bernard de Juſſieu. He directed their attention, if not their homage, to another quarter. If they could not adopt his prejudices, they were aſhamed not to defend their own. The ſtimulus of ambition, the calls of filial piety and patriotiſm, raiſed up another Juſſieu, and the world ſaw, in 1789, the *Genera Plantarum ſecundum Ordines Naturales diſpoſita*; a work whoſe publication marks an epocha in philoſophical and ſyſtematic botany, and whoſe merits are the more wonderful, when we conſider that the author had but for a few years paid any deep or conſiderable attention to the ſcience, and, but for the above-mentioned cauſes, might never have cultivated it at all.

When the writer of the preſent article knew theſe able men at Paris in 1786 and 1787, each formed, as it were, the head of a ſchool. Brouſſonet, who had ſtudied with ſir Joſeph Banks, and was an ardent Linnæan, was the intimate friend of l'Heritier, and contributed in no ſmall degree to urge him forward in his career. The firſt fruit of his labours was a ſplendid book, with finely engraved plates, entitled *Stirpes Novæ*, of which the firſt faſciculus, containing eleven plates with their deſcriptions, appeared in 1784. Some copies were coloured for thoſe who choſe to have them, but the author himſelf had a prepoſſeſſion in favour of uncoloured botanical works, from an opinion that painted ones were ſeldom ſufficiently correct to anſwer any good purpoſe. In this we can trace the influence of his friend Brouſſonet, and of the Bankſian ſchool. Contrary ſentiments have ſince prevailed, and it is curious to obſerve how the popular taſte for coloured books in natural hiſtory, has extended the ſame faſhion to the baby library; though, from a compariſon of merits in the execution, ſome future antiquarian critic may be not a little puzzled to decide which were the prototypes, and which the copies. (See *Figures of* PLANTS.) Five more faſciculi of the *Stirpes Novæ* followed, amounting to eighty-four plates and their deſcriptions all together. They were all dated either 1784 or 1785, though many of them not actually publiſhed till ſeveral years afterwards. By this the author gave great offence to the abbé Cavanilles at Madrid, who was at the ſame period publiſhing upon the Monadelphous or Mallow tribe, which fills one of l'Heritier's laſt faſciculi. Some of the labours of the worthy Spaniard ſeemed foreſtalled, and the priority of his names infringed upon. A paper war enſued, in which we cannot but think juſtice was on his ſide, though we are equally certain l'Heritier never borrowed, nor could want to borrow, any thing from him, whoſe knowledge and whoſe performances could, at that period, bear no compariſon with his own, however eſtimable the character and the ſubſequent labours of the indefatigable Cavanilles.

To ſecure to himſelf ſome of his own diſcoveries, and eſpecially the eſtabliſhment of certain new genera and their names, l'Heritier contrived a method of publiſhing ſuch in the form of monographs, with one or two plates; but the purpoſe ſeems imperfectly anſwered, theſe publications not being dated at all. The ſubjects were *Louichea*, *Buchozia*, *Michauxia*, *Hymenopappus*, and *Virgilia*. We have always underſtood that twelve of each were printed. His biographer, the celebrated Cuvier, ſays, there were only five, and that, “ in order to give them the value of rarity,” by which only ſome collectors judge of books, “ he diſtributed the copies gratuitouſly to different people, ſo that no individual might be poſſeſſed of the entire collection.” We are however indebted to his favour for the whole ſet complete, which may alſo be ſeen in the rich library of ſir Joſeph Banks. A ſixth diſſertation of the ſame kind on *Kakile* was preparing, but never finiſhed, ſo that one proof copy only was in exiſtence, which was ſold with his library in 1802. The catalogue of this library amounts to 2957 articles. Its poſſeſſor ſpared no pains nor expence to enrich it, and he allowed his friends, and all who had a taſte for the ſame ſtudy, to conſult his collection without reſerve. He even propoſed at one time to dedicate it freely to public uſe, in order to ſhame the government of the day, who were about to render venal all acceſs to the public libraries and collections; and his example had in ſome meaſure the effect of defeating ſo ſcandalous a project.

The neighbourhood and the gardens of Paris were, in his time at leaſt, by far too confined a field for the aſpiring genius of l'Heritier. Prevented by inſurmountable obſtacles from botanizing in remote regions himſelf, he expreſſed, in the preface to his *Stirpes*, a wiſh that ſome traveller might entruſt him with the publication of his diſcoveries. His deſire was not entirely fruitleſs. Dombey returned to Paris in 1786 with the wreck of his vaſt collections made in Chili and Peru, and in vain ſolicited from M. de Calonne the requiſite aſſiſtance to render his diſcoveries of uſe to the public. The miniſter and the government had other things to think of. The horrors of impending bankruptcy, the juſt fear of reformation and revolution, all alike inevitable, left them neither attention nor money to beſtow on ſcience. They allowed their amiable king to fancy he was doing good by patronizing agriculture, and a medal was ſtruck on his giving away milch cows in the neighbourhood of Paris, whilſt a blood-ſucking hydra was draining the vitals of his people, under the maſk of his authority and even of his virtues. We have already related (ſee DOMBEY) how l'Heritier obtained the herbarium of this unfortunate botaniſt, and how his aim was diſappointed. Cuvier ſays, he brought back from England the manuſcript of his Peruvian Flora complete, and that ſixty drawings were finiſhed, and many engraved. On this ſubject the writer of the preſent article can give no information, having returned from the continent but a ſhort time before the departure of l'Heritier. He knows, however, that the latter had laboured very aſſiduouſly, and very ſecretly, always in dread of ſome interruption from his government; and that the few ſpecimens he ventured to give his friends here, out of Dombey's collection, were all marked as given by M. de Buffon. He found leiſure, during his ſtay, to collect from the Engliſh gardens the materials of his *Sertum Anglicum*, a work conſiſting of ſeveral faſciculi, on a ſimilar plan to his *Stirpes Novæ*, but it remains unfiniſhed. He alſo publiſhed a monograph on the genus *Cornus*, and the plates of another on the natural family of *Gerania*; ſee that article and ERODIUM. The letter preſs of the latter, though reported to be printed, never appeared. He augmented his library greatly during his viſit to England, and after his return, and for a while lived happy in the boſom of his family, dividing his attention between his ſcientific purſuits, and thoſe public duties of which we are now to ſpeak.

The ſubject of our narrative became a *Conſeiller a la Cour des Aides*, in 1775, and was for a long time the dean of that court, being perſonally attached by various ties to its chief, M. de Maleſherbes, the illuſtrious victim to its duty in the cloſing ſcene of Louis XVI. L'Heritier loved and emulated the auſtere public virtue, the private amiableneſs, and the univerſal benevolence of this great man, while they agreed even in their taſte for botanical amuſements. No wonder that ſuch characters anticipated good from the promiſing dawn of the French revolution! L'Heritier accepted the office of a judge in the civil tribunals of the department of the Seine, and is recorded to have fulfilled its duties with the moſt exemplary rectitude and incorruptibility. He alſo ſat from time to time as a member of the repreſentative body. His views were always thoſe of a true patriot, the correction of abuſes, the maintenance of the laws in their genuine force and purity; and the darling object of his emulation was the uncorrupted Britiſh conſtitution. "In a ſhort time," ſaid he, in 1787 to the writer of this, "we may poſſibly hope to be governed as you are." A few years afterwards he wrote "our elections are now formed on the Engliſh mode; happy if in practice they do not hereafter become too much ſo!"

It is with pain that we advance towards the dreadful cataſtrophe of his life. He had married, in 1775, an eſtimable woman of the name of Doré, with whom he paſſed 19 years in domeſtic happineſs. She died in 1794, leaving him five children. He devoted himſelf to their education, but with reſpect to one of them, a ſon, his parental ſolicitude was attended with little ſucceſs, and his hopes were blaſted in a cruel manner, by the moſt refractory and unprincipled conduct. The parent returning very late one evening in Auguſt, we believe of the year 1800, from a meeting of the National Inſtitute, never again reached his own domeſtic circle. His children expected him all night long in the greateſt anxiety and uncertainty. Some ſavage cries of inſult or exultation were overheard in the ſilence of the night, but their object was not diſcovered till the dawn of morning, when the murdered body of the father of the family was found near his own threſhold, with the money and other valuables which he carried about him untouched. Nothing certain was ever diſcovered, or at leaſt publiſhed, by the police or government, though the moſt horrible ſuſpicions aroſe, which even in thoſe days of murder and atrocity excited curioſity, if not feeling, in the mind of the Pariſians. "Vague and contradictory conjectures," ſays Cuvier, "aroſe." He declined to repeat them, nor can we throw any freſh light on this diſaſtrous hiſtory. The wretched ſon is now no more. S.

HERITIERA, in *Botany*, ſo named by the late Mr. Dryander, in honour of the able French botaniſt, Charles Louis l'Heritier de Brutelle, whoſe hiſtory is given in the preceding article. As he was, to our knowledge, conſulted about the orthography of the name, and directed that the l' ſhould be dropped, we have thought it beſt to arrange his own biographical article in the ſame part of the alphabet.—Ait. Hort. Kew. v. 3. 546. Schreb. 812. Mart. Mill. Dict. v. 2. (Samadera; Gærtn. t. 156.)—Claſs and order, *Monoecia Monadelphia*. Nat. Ord. *Malvaceæ*, Juſſ.

Gen. Ch. Male flowers ſmaller than the female.—*Cal.* Perianth of one leaf, bell-ſhaped, five-toothed. *Cor.* none. *Stam.* Filament in the centre of the calyx, columnar, conic-awl-ſhaped, encircled below the ſummit with from five to ten minute anthers, united into a cylinder.

Female flowers in the ſame plant, larger.

Cal. as in the male. *Cor.* none. *Stam.* Filament none; anthers ten, ſeated on the receptacle at the baſe of the germens, two between each, didymous, minute, probably barren. *Piſt.* Germens five, half-ovate, compreſſed, ſmooth; ſtyles conical, ſhort, cohering during impregnation; ſtigmas club-ſhaped. *Peric.* Drupas five, widely ſpreading, oval, of one cell; flattiſh above; convex beneath; their keel extended into a wing. *Seeds* ſolitary, large, nearly globular.

Eſſ. Ch. Male, Calyx five-toothed. Corolla none. Filament columnar. Anthers from five to ten, below the top.

Female, Calyx five-toothed. Corolla none. Germens five, ſeſſile, with five pair of barren anthers between them. Drupas five, dry, of one cell. Seeds ſolitary.

1. H. *littoralis*. (Samandara; Herm. Muſ. Zeyl. 5. Linn. Zeyl. 202. Nagám; Rheede Hort. Mal. v. 6. 37. t. 21.)—Native of Ceylon and other iſlands of the Eaſt Indies, in a wet ſandy ſoil, flowering from Auguſt to November, and bearing fruit in March and April. Sir Joſeph Banks procured it for the Kew garden in 1780, where it became known by the name of the Looking-glaſs plant, on account of the ſilvery under ſide of its leaves, ſuggeſting ſome idea of the back of a looking-glaſs. Rheede deſcribes it as a *tree*, of the thickneſs of a man's body, and four times the human height, with a grey bark, and white wood, with reddiſh pith. The *leaves* are evergreen, coriaceous, alternate, ſtalked, a ſpan long, ſomewhat ovate, bluntiſh, and entire; ſmooth and green on the upper ſide; of a ſilvery grey, ſomething like *Hippophäe*, or *Eleagnus*, beneath. *Flowers* ſmall, reddiſh, numerous, in axillary panicles, reſembling thoſe of a *Sterculia*, nor are the fruits of theſe genera diſſimilar in appearance, but the preſent conſiſts, not of burſting follicles, but of a dry cloſe drupa, with one ſeed. The cavity, however, is rather larger than the ſeed, which raiſes a doubt reſpecting the propriety of its denomination.

HERMÆA, Ἑρμαια, in *Antiquity*, a feſtival obſerved in honour of Mercury: yet there were ſeveral ſolemnities of this kind, ſome celebrated in Peloponneſus, others in Bœotia, Crete, &c. See Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 896.

In Crete, during the celebration of the hermæa, the maſters ſerved their ſlaves at table. This cuſtom obtained likewiſe among the Athenians and Babylonians, as alſo among the Romans: witneſs the *Saturnalia*, which ſee.

HERMANN, JAMES, in *Biography*, a Swiſs profeſſor of moral and natural law, who flouriſhed in the 17th and 18th centuries, was born at Baſil in 1678, at the univerſity of which place he ſtudied, and took his degrees. He went through a courſe of divinity, and was admitted into the Chriſtian miniſtry in 1701. He was chiefly attached to mathematical ſtudies, and was one of the moſt diſtinguiſhed pupils of James Bernouilli. He publiſhed, in 1700, a defence of the principles of the "Differential Calculus," againſt the objections of the famous Nieuwentyt. After he had been admitted to the miniſtry he travelled for improvement through Germany, Holland, France, and England: and on his return to Baſil devoted himſelf with renewed ardour to the mathematical ſciences. In 1707, by the recommendation of Leibnitz, he was appointed profeſſor of mathematics at the univerſity of Padua, the duties of which office he diſcharged, with great reputation, for about ſix years. He next obtained from the king of Pruſſia the mathematical profeſſorſhip at Frankfort on the Oder. In 1724, Peter the Great appointed him mathematical profeſſor at St. Peterſburg, and, in conjunction with M. De Liſle, he was commiſſioned to draw up "An Abridgment of the Mathematics," which was publiſhed in the French language. The departments executed by M. Hermann were thoſe on arithmetic, geometry, trigonometry, and fortification. In 1731 he returned to Baſil, where he was choſen profeſſor of natural and moral law. Upon his quitting St. Peterſburg, the empreſs Anne ſettled on him a conſiderable penſion, upon the condition of his tranſmitting, from time to time, mathematical diſſertations to Peterſburg, for inſertion in the "Memoirs of the Imperial Academy." He lived but a ſhort time to enjoy the favours and honours liberally beſtowed on him, being carried off by a fever in 1733, at the age of fifty-five. His works are very numerous, chiefly on ſubjects connected with mathematics and natural philoſophy. He was elected a foreign member of the Royal Academy of Sciences at Paris. Moreri.

Hermann, Paul, a celebrated botaniſt, was born at Halle, in Saxony, towards the middle of the 17th century. Having reſided ſome time in the Eaſt Indies, and eſpecially at Ceylon, where he practiſed as a phyſician, he was induced to re-viſit Europe in 1679, when an opportunity occurred for him to fill the botanical profeſſorſhip at Leyden, and at the ſame time to undertake the care of the botanical garden eſtabliſhed in that univerſity. Having entered upon his charge, he proſecuted the duties of it with ſo much zeal, that he ſoon more than doubled the number of plants which had been introduced by his predeceſſors during 150 years. Hermann had the honour of being the firſt in Holland who adopted a ſyſtem of botany founded on the fructification, partly following the arrangement of Moriſon, and partly that of Ray. His works are remarkable for the excellence and neatneſs of his figures, containing deſcriptions of many new plants found in various parts of the world. He died on the 29th of January, 1695.—Linnæus, in his *Claſſes Plantarum*, has given a ſketch of the Hermannian ſyſtem, which is founded upon the *Fruit*.—He divided plants, in the firſt place, either from their having naked ſeeds, or ſeeds incloſed in a capſule; he ſub-divided the former according to the number of ſeeds, and the latter according to the number of cells. Having thus begun upon the principle of arranging plants by their fruit, he adhered to the ſyſtem with more pertinacity than either Ray or Moriſon themſelves.—The firſt work he publiſhed was a "Catalogue of the Leyden Garden," in the year 1687, from which it appears, that during the ſeven years of his curatorſhip, he had ſo improved the garden by treaſures, brought both from the Eaſt and Weſt Indies, as well as by the conſtructing of ſtoves, greenhouſes, &c., that it was regarded as the firſt in Holland. Many of theſe new plants were deſcribed and figured by him, particularly ſeveral new and rare Geraniums. This work was reprinted at Leyden in 8vo. in 1720, under the title of "Index Plantarum quæ in horto Leidenſi aluntur," to which Boerhaave added a hiſtory of the garden. To Hermann may be aſcribed, on the authority of Sherard, the following work, *Floræ Lugdunobatavæ flores*, though publiſhed under the name of Zumbach. In this was developed his whole method of claſſification, which Boerhaave nearly followed.—In the year 1695, a work, entitled *Flora Lugdunobatava*, was begun to be printed, but after a few ſheets were taken off, its author's death put a ſtop to any further continuation of it.—At this time the *Paradiſus Batavus* was in a ſtate of forwardneſs, and it was publiſhed in 8vo., as a poſthumous work, about three years afterwards.—It was, however, reprinted in quarto in the year 1705, having been edited by William Sherard, at the expence of Hermann's widow, who is nevertheleſs deſcribed by ſome as an unprincipled woman, unworthy of ſo celebrated a huſband.—Many of the plants are ſcarce ones, or altogether new; ſome are merely named, others beautifully delineated and engraved. A catalogue is ſubjoined, ſhewing what plants the author intended to have given in the following volumes, had he lived to go on with the work.—This indefatigable man left a conſiderable number of papers and dried plants, the latter of which came into the poſſeſſion of J. Burmann, (ſee the article Burmann, J.) and formed the corner-ſtone of his *Theſaurus Zeylanicus*, publiſhed at Amſterdam in 1737. Theſe ſame plants came afterwards into the hands of Linnæus for a time, and from them his *Flora Zeylanica* was compoſed. They are now finally the property of ſir Joſeph Banks.—The ſubject of our memoir paid much attention to the medical qualities of plants, as many of his tracts indicate. Beſides the books above alluded to, he was the author of the following works.

Muſæi Indici catalogus, continens varia exotica animalia, inſecta, vegetabilia, mineralia, quæ collegerat, 1711, 8vo.

Lapis Lydius Materiæ Medicæ, 1704, 8vo.

Muſæum Zeylanicum (unfiniſhed).

Catalogus Plantarum Capitis Bonæ Spei (unedited).

Beſides this liſt, he wrote various botanical and medical tracts which are of leſs moment, and ſome of which are ſuperſeded by the former. Haller's Bibl. Bot. Linnæi Claſſes Plantarum. Moreri Dict.

HERMANNIA, in *Botany*, ſo named by Tournefort, in honour of his learned contemporary and correſpondent, Paul Hermann, M D. who ſent him the original ſpecies, Linnæus's *H. hyſſopifolia*.—Tourn. Inſt. 656. t. 432. Linn. Gen. 348. Schreb. 453. Willd. Sp. Pl. v. 3. 589. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 411. Thunb. Prodr. 110. Juſſ. 289. Lamarck. Illuſtr. t. 570. Cavan. Diſſ. 327. Gærtn. t. 112.—Claſs and order, *Monadelphia Pentandria*. Nat. Ord. *Columniferæ*, Linn. *Tiliaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, permanent, roundiſh, inflated, five-cleft, its ſegments inflexed. *Cor.* of five petals, rolled ſpirally contrary to the ſun; their claws the length of the calyx, bordered at each ſide with a little membrane, whoſe edge meets with the oppoſite one of the ſame claw, ſo as to form a nectariferous tube; limb ſpreading, broadiſh, obtuſe. *Stam.* Filaments five, broadiſh, very ſlightly united together in their lower part; anthers erect, pointed, cohering. *Piſt.* Germen ſuperior, roundiſh, with five ſides and five angles; ſtyles five, thread-ſhaped, cloſe together, tapering, longer than the ſtamens; ſtigmas ſimple. *Peric.* Capſule roundiſh, five-ſided, of five cells, opening at the top. *Seeds* numerous, ſmall.

Eſſ. Ch. Calyx ſimple, five-cleft. Petals five, oblique, partly tubular at their baſe. Filaments lanceolate. Styles five. Capſule of five cells, with many ſeeds.

Linnæus, who, to the original one, adds five ſpecies, in his *Hortus Cliffortianus*, the laſt of which indeed is now *Mahernia pinnata*, juſtly notices the great propriety of dedicating a genus, peculiar to the Cape of Good Hope, to a man, who, by the fine African plants with which he enriched the gardens of Holland, revived a taſte for botany in that country, that has ever ſince been continued. Numerous ſpecies of *Hermannia* have ſubſequently been diſcovered, all from the ſame prolific region. The laſt edition of the Linnæan Syſtemata, by Murray, comprehends 17; Willdenow has 30. There is a perpetual ambiguity betwixt this genus and *Mahernia*, of which latter Willdenow reckons up eight ſpecies.—Thunberg, who unites the two genera, has but 27 in all.

We ſhall ſubjoin a few examples of *Hermanniæ*.

H. *althæifolia*. Linn. Sp. Pl. 941. Curt. Mag. t. 307. Cavan. Diſſ t. 179. f. 2. (H. aurea; Jacq. Hort. Schonbr. v. 2. 46. t. 214. Ketmia africana fruteſcens, foliis mollibus et incanis, flore ſpirali ſulphureo; Commel. Hort. v. 2. 157. t. 79)—Leaves ovate, crenate, plaited, downy. Lower ſtipulas ovate; upper elongated. Calyx bell-ſhaped, angular. —This, like all the reſt, as we have ſaid, is a native of the Cape, and is very common in green-houſes, where it is remarkable for the velvet ſoftneſs of its *leaves*, like that of the Marſh-mallow, and its numerous drooping *flowers*, whoſe orange petals are contraſted with their rough yellowiſh calyx.

H. *plicata*. Ait. Hort. Kew. n. 2. (H. althæifolia; Jacq. Hort. Schonbr. v. 2. 46. t. 213.)—Leaves ovate, ſomewhat heart-ſhaped, toothed, plaited, rugged, rough. Stipulas ovate, acute, three-ribbed.—Often confounded with the firſt, but its *leaves* are larger, greener, and rather hairy than downy. The *ſtipulas* are broad, often three-cleft. Mr. Maſſon ſent it to Kew, among other things collected by him at the Cape, in 1774.

H. *alnifolia*. Linn. Sp. Pl. 942. Curt. Mag. t. 299. Jacq. Hort. Schonbr. v. 3. 22. t. 291. Mill. Illuſtr. t. 56. —Leaves obovate, ſomewhat wedge-ſhaped, abrupt, emarginate, toothed. Cluſters terminal, compound; their ſtalks about three-flowered.—One of the moſt common and oldeſt of our cultivated ſpecies, often miſtaken, as Mr. Curtis juſtly remarked, for the *groſſularifolia* of Linnæus. It differs from the two former in its ſmaller, paler, and more cluſtered *flowers*. The *leaves* are nearly naked above; white and downy beneath.

H. *flammea*. Jacq. Hort. Schonbr. v. 1. 69. t. 129. Willd. n. 17.—Leaves wedge-ſhaped, abrupt, ſmooth; toothed at the extremity. Cluſters terminal; their ſtalks two-flowered. Calyx widely-ſpreading.—This is happily named from the flame-coloured *flowers*, whoſe petals are ſtriped with deep orange and yellow. We have not ſeen it in England.

H. *lavandulifolia*. Linn. Sp. Pl. 942. Curt. Mag. t. 304. Cavan. Diſſ. t. 180. f. 1. Jacq. Hort. Schonbr. v. 2. 46. t. 215—Leaves elliptic-lanceolate, obtuſe, entire, downy. Stipulas linear. Calyx angular.—This was in the Eltham garden before 1732, and is now very common. The *leaves* are pale and very ſoft. *Flowers* pendulous, orange-coloured, produced frequently, and in conſiderable plenty.

H. *argentea*.—Leaves doubly pinnatifid, clothed with ſilvery ſtarry ſcales; their ſegments decurrent. Flower-ſtalks ſomewhat racemoſe, elongated, ſingle-flowered.—We know this merely by an indifferent ſpecimen, given us, from the Leyden garden in 17°6, by profeſſor David Van Royen, nor can we meet with any account of it. The *leaves* convey ſome idea of *Lavandula multifida*, but are ſmaller, clothed with moſt beautiful ſilvery ſtarry hairs or ſcales. The *flowers* are large, and variegated with orange and yellow. Their *calyx* is ſhort and bell-ſhaped.

HERMANNUS CONTRACTUS, in *Biography*, a learned and pious count and monk of Suabia, to whom are aſcribed the two celebrated hymns in the Romiſh church, "Salve Regina," and "Alma Redemptoris." He had the reputation of great learning, and knowledge of hiſtory, and of the arts and ſciences. He left behind him a Chronicle, a treatiſe on Muſic, in two parts, and a tract on the Monochord. He died at Aleſhuſen in 1054. He was a monk of St. Gal, and had the cognomen of *Contractus*, from a general contraction in all his limbs.

HERMAPHRODITE, Ἑρμαφρόδιτος, a perſon who has both the ſexes, or the genital parts both of male and female.

The word is formed of the Greek Ἑρμαφρόδιτος, a compound of Ἑρμης, *Mercury*, and Αφροδιτη, *Venus*; *q. d.* a mixture of Mercury and Venus, *i. e.* of male and female. For it is to be obſerved, Hermaphroditus was originally a proper name, applied by the heathen mythologiſts to a fabulous deity, whom ſome repreſent as a ſon of *Hermes*, *Mercury*, and *Aphrodite*, *Venus*; and who, being deſperately in love with the nymph Salmacis, obtained of the gods to have his body and her's united into one. Others ſuggeſt, that the god Hermaphroditus was a compoſition of Mercury and Venus, thus exhibiting the union of eloquence or of commerce, repreſented by Mercury, with Pleaſure or Venus. Others think this junction intended to ſhew, that Venus, Pleaſure, was of both ſexes; as, in effect, the poet Calvus calls Venus a god.

M. Spon obſerves, Heſychius calls Venus *Aphroditos*: and Theophraſtus affirms, that Aphroditos, or Venus, is Hermaphroditus; and that, in the iſland of Cyprus, ſhe has a ſtatue, which repreſents her with a beard like a man. The Greeks alſo call *hermaphrodites* ανδρογυνοι, *androgyni*, *q. d.* *men-women*.

Mr. Hunter, in his account of the free martin, has lately obſerved, that, in many of the inferior tribes of animals, the male and female parts of generation are found to be united in the ſame animal, which, from poſſeſſing both parts, are called hermaphrodite. Theſe hermaphrodites he divides into the natural and unnatural, or monſtrous. The natural kind belongs to the inferior and more ſimple order of animals; but as animals become more complicated, and each part is more confined to its particular uſe, a ſeparation of the two neceſſary powers for generation takes place in them: and he apprehends that the unnatural kind may be occaſionally found among every tribe of animals having diſtinct ſexes, but that it is more common in ſome than in others. The human ſpecies has the feweſt; but in the horſe, aſs, ſheep, and cattle, they are very frequent. Phil. Tranſ. vol. lxix. part i. p. 279, &c. See *Free* MARTIN. On the ſubject of hermaphrodites, ſee *Hermaphrodiſm* under the article GENERATION.

Divers of the inſect and reptile kind are truly hermaphrodites; particularly worms, ſnails, &c.

In the Memoirs of the French Academy, we have an account of this very extraordinary kind of hermaphrodites, which not only have both ſexes, but do the office of both at the ſame time. Such are earth-worms, round-tailed worms found in the inteſtines of men and horſes, land-ſnails, and thoſe of freſh waters, and all the ſorts of leeches. And as all theſe are reptiles, and without bones, M. Poupart concludes it probable, that all other inſects, which have theſe two characters, are alſo hermaphrodites.

The method of coupling, practiſed in this claſs of hermaphrodites, may be illuſtrated in the inſtance of earth-worms. (Ray's Hiſt. Inſect. p. 2.) Theſe little creatures creep, two by two, out of holes proper to receive them, where they diſpoſe their bodies in ſuch a manner, as that the head of the one is turned to the tail of the other. Being thus ſtretched lengthwiſe, a little conical button or papilla is thruſt forth by each, and received into an aperture of the other.

Theſe animals, being male in one part of the body and female in another, and the body flexible withal, M. Homberg does not think it impoſſible but that an earth-worm may couple with itſelf, and be both father and mother of its young; an obſervation which, to ſome, appears highly extravagant!

Among the inſects of the ſoft or boneleſs kind, there are great numbers indeed which are ſo far from being hermaphrodites, that they are of no ſex at all. Of this kind are all the caterpillars, maggots, and worms, produced of the eggs of flies of all kinds; but the reaſon of this is plain; theſe are not animals in a perfect ſtate, but diſguiſes under which animals lurk. They have no buſineſs with the propagating of their ſpecies, but are to be transformed into animals of another kind, by the putting off their ſeveral coverings, and then only they are in their perfect ſtate, and therefore then only ſhew the differences of ſex, which are always in the diſtinct animals, each being only male or female. Theſe copulate, and their eggs produce theſe creatures, which ſhew no ſex till they arrive at that perfect ſtate again. Mem. Acad. Par. 1707.

HERMAPHRODITE, a term frequently applied to a large ſort of waggon in ſome diſtricts, which is capable of being divided, ſo as to conſtitute two carts. See WAGGON.

HERMAPOLLON, in *Antiquity*, a ſtatue or figure compoſed of Mercury and Apollo, repreſenting a young man with the ſymbols of both divinities, *viz.* the petaſus and caduceus, with the bow and lyre.

HERMAS, in *Biography*, the author of an ancient book, called the "Shepherd or Paſtor," quoted by Irenæus, Clement of Alexandria, Origen, Tertullian, and others. It was written in Greek at or near Rome, probably about the year 92, a little before Domitian's perſecution. We have only a Latin verſion in three books; containing four viſions, twelve commands, and ten ſimilitudes. In this book, which was held in high eſtimation by the ancient fathers, there are many alluſions to our genuine books of the New Teſtament, though they are not expreſsly cited; but there are none to any apocryphal goſpels or other apocryphal books of the New Teſtament. The beſt edition of the Latin verſion is that of 1698, among the apoſtolical fathers, illuſtrated with the notes and corrections of Cotelerius and Le Clerc, tranſlated by archbiſhop Wake. The beſt edition is that of 1710. Lardner's Works, vol. ii.

HERMAS, in *Botany*, a name of whoſe meaning its author Linnæus has left no account. The plant can have nothing to do with Ἑρμῆς, *Mercury*. Profeſſor Martyn ſuggeſts that the word may be derived from ἕρμα, *a prop*, or *foundation;* but its application here is not evident.—Linn. Mant. 163. Schreb. 734. Mart. Mill. Dict. v. 2. Juſſ. 225. Lamarck. Illuſtr. t. 851. Gærtn. t. 85. Claſs and order, *Polygamia Monoecia*, Linn. (rather *Pentandria Digynia.*) Nat. Ord. *Umbelliferæ.*

Gen. Ch. *General umbel* of numerous rays, hemiſpherical; partial of numerous rays, the central one only bearing a flower, the reſt nearly or entirely ſterile. *General involucrum* of numerous, lanceolate, ſhort, permanent leaves; *partial* of about two lanceolate ones, as long as the umbel. *Perianth* obſolete, of five teeth. *Cor. Univerſal* uniform; *partial* of five oblong-ovate, erect, flat, undivided, equal petals. *Stam.* Filaments five, thread-ſhaped, ſhorter than the petals; anthers oblong, ſaid by Linnæus to be empty and ineffectual. *Piſt.* Germen inferior, compreſſed, larger than the corolla; ſtyles two, thread-ſhaped, erect, longer than the corolla; ſtigmas obtuſe. *Peric.* Fruit orbicular, emarginate at the baſe, ſeparating at the angles. *Seeds* two, orbicular, ſomewhat heart-ſhaped, compreſſed, nearly flat, bordered, marked with one longitudinal elevated line.

Such are the terminal umbels. The lateral ones are ſmaller and later, entirely male; their partial rays all bearing flowers, whoſe involucrum, perianth, and corolla are like the former. *Stam.* Filaments five, thread-ſhaped, the length of the petals; anthers oval, ſomewhat didymous, perfect. The umbelliferous tribe being, in various inſtances, liable to partial imperfection of the ſexual organs, we conceive there is no more propriety in removing this genus from the bulk of that order in the *Pentandria Digynia*, than there would be in taking away ſome other genera or ſpecies. We ſhall therefore give its eſſential character with a view to its place there, near *Aſtrantia*. The younger Linnæus thought it ſcarcely diſtinct from *Bupleurum*, and Thunberg has united the two.

Eſſ. Ch. Partial involucrum of about two narrow leaves. Terminal umbels fertile; lateral ones male only.

1. H. *depauperata*. Linn. Mant. 299. (Bupleurum villoſum; Linn. Sp. Pl. 343. Thunb. Prodr. 50. Perfoliata foliis oblongis ſinuoſis ſubtùs incanis; Burm. Afric. 196. t. 71. f. 2.)—Leaves nearly ſeſſile, heart-ſhaped-oblong, toothed; ſmooth and ſhining above; downy beneath.—Native of the Cape of Good Hope, as are all the following ſpecies. The *ſtem* is thick and ſomewhat woody, though, as far as we can judge, ſhort and not much elevated. *Leaves* crowded, rigid, two or three inches long and one broad, ovate or oblong, heart-ſhaped at the baſe, with very ſhort broad footſtalks; their margin ſharply toothed, reflexed between the teeth; their upper ſurface ſmooth and ſhining, reticulated with depreſſed veins; the under white and denſely cottony, with prominent veins and rib. Flowering *branches* central, ſolitary, a foot or more in length, round, furrowed, bearing a few ſcattered, ſometimes leafy, ſmall *bracteas*, and one large terminal *umbel*, with two or three alternate, ſmaller, ſtalked lateral ones. The *flowers* are white or yellowiſh. The habit is ſufficiently peculiar, added to the ſhape of the petals, fruit, and other characters recorded in the above generic deſcription, to keep this ſpecies, and ſtill more the ſubſequent ones, diſtinct from *Bupleurum.*

2. H. *gigantea*. Linn. Suppl. 435.—Leaves ſtalked, elliptic-oblong, woolly on both ſides, nearly entire.—Native of the higheſt mountains at the Cape. Much larger than the firſt ſpecies, the *leaves* being above a foot long, not unlike thoſe of the Norfolk Mullein, *Verbaſcum pulverulentum;* their wool when ſcraped off ſerving for tinder. Their edges are ſlightly crenate or wavy. Flowering *branch* two or three feet high, ſmooth, with a large terminal *umbel*, and four or five lateral ones.

3. H. *capitata*. Linn. Suppl. 435.—Leaves radical, ovate, deeply crenate, woolly beneath, longer than their footſtalks. Stalk woolly, leafleſs.—A ſmall herbaceous ſpecies, with the habit of an *Aſtrantia*. *Leaves* all radical, ſcarcely an inch long, not very unlike thoſe of *Dryas octopetala*, their upper ſurface green and quite naked, except a woollineſs at the bottom part of the mid-rib; the under is clothed with denſe white down; the edge deeply and acutely crenate. *Footſtalks* woolly, longer than the leaves. *Flowerſtalk* about a foot high, ſolitary, ſlender, woolly; its terminal fertile *umbel* ſcarcely an inch broad; the one or two lateral ones not much ſmaller. The *leaves* of the general involucrum are elliptical, purpliſh, ribbed, with a very blunt point.

4. H. *quinquedentata*. Linn. Suppl. 436.—Stalk ſmooth. Leaves ovate, five-toothed, downy beneath.—Said in the *Supplementum* to be very diſtinct, on account of its ſmall *leaves*, which have exactly five deep ſerratures each. The *umbel* is there ſaid to be ſolitary, but this muſt be preſumed a miſtake, eſpecially as Thunberg does not repeat the circumſtance in his *Prodromus.*

5. H. *ciliata*. Linn. Suppl. 436.—Stalk ſmooth. Leaves ovate, ciliated, downy beneath.—The *umbels* of this are ſaid to be ſeveral, but it is manifeſt that this is only the common character of the genus. We know neither of theſe two laſt, but by the above characters, communicated to the younger Linnæus by their finder Thunberg.

HERMATHENA, 'Ερμαθηνη, in *Antiquity*, a ſtatue repreſenting Mercury and Minerva both in one.

The word is compound of *Hermes*, *Mercury*, and *Athena*, a Greek name for *Minerva*.

M. Spon gives divers figures of Hermathenæ, in his Rech. Cur. de l'Antiquité, p. 98. They are a ſort of ſtatues raiſed on ſquare pedeſtals, after the manner of Hermæ, only that the attributes of Minerva are added thereto. See Hermes below.

HERMATHIAS, a dactylic air. (See Harmatian Air.) Dactylic is a name given, in *Ancient Muſic*, to that kind of air or nome of which the rhythm or meaſure conſiſts of two equal notes. See Rhythm.

They alſo called a nome dactylic in which this rhythm was frequently uſed, as the Harmathian, and the Orthian nome.

Julius Pollux doubts whether dactylic implied the ſort of inſtrument, or the form of melody; a doubt which is ſolved by what Ariſtides Quintilianus ſays in his ſecond book, and which can only be underſtood, by ſuppoſing that the term *dactylic* ſignifies at once the inſtrument and the air; as with us, ſays Rouſſeau, the words *muſette* and *tambourine*.

HERMAUT, in *Geography*, a town of France, in the department of the Puy-de-Dôme, and chief place of a canton, in the diſtrict of Riom; 8 miles W. S.W. of Riom. The place contains 542, and the canton 3825 inhabitants, on a territory of 147½ kiliometres, in ſix communes.

HERMENSDORF, a town of Pruſſia, in the province of Oberland; 10 miles E. of Holland.

HERMENSTADT, or Szebeny, the capital of Tranſylvania, fortified with a double wall and deep moat, and ſituated on the ſide of the Szeben, which ſoon after runs into the Aluta; 147 miles N. E. of Belgrade. N. lat. 46°. E. long. 23° 50′.

HERMERACLES, in *Antiquity*, a ſtatue compounded of the figures of Mercury and Hercules.

M. Spon gives us a type of an Hermeracles, Rech. Cur. de l'Antiq. p. 96. fig. 13. The name, he obſerves, was given to a divinity repreſented after the manner of Hermes, with the additional attributes of Hercules, *viz.* a lion's ſkin and a club. This he aſcribes to the cuſtom among the Greeks of placing the ſtatues of Mercury and Hercules in the academy and gymnaſia, as both one and the other preſided over the exerciſes of the youth.

HERMEROS, compoſed of 'Ερμης, *Mercury*, and "Ερως, *Cupid*, a ſtatue formed of Mercury and Cupid.

HERMES, or Herma, among *Antiquaries*, a ſort of ſquare or cubical figure of the god Mercury, uſually made of marble, though ſometimes of braſs or other materials, without arms or legs, and planted by the Greeks and Romans in their croſs-ways.

Servius gives us the original thereof, in his Comment on the eighth book of the Æneid. Some ſhepherds, ſays he, having one day caught Mercury, called by the Greeks Hermes, (ſee Interpreter,) aſleep on a mountain, cut off his hands; from which he, as well as the mountain where the action was done, became denominated Cyllenius, from κυλλος, *maimed:* and thence, adds Servius, it is, that certain ſtatues without arms are denominated Hermeſes or Hermæ. But this etymology of the epithet of Cyllenius contradicts moſt of the other ancient authors; who derive it hence, that Mercury was born at Cyllene, a city of Elis, or even on the mountain Cyllene itſelf, which had been thus called before him.

Suidas gives a moral explication of this cuſtom of making ſtatues of Mercury without arms. The Hermeſes, ſays he, were ſtatues of ſtone placed at the veſtibules or porches of the doors and temples at Athens; for this reaſon, that, as Mercury was held the god of ſpeech and of truth, ſquare and cubical ſtatues were particularly proper; having this in common with truth, that, on what ſide ſoever they are viewed, they always appear the ſame.

It muſt be obſerved, that Athens abounded more than any other place in Hermeſes; there were abundance of very ſignal ones in divers parts of the city, and they were indeed one of the principal ornaments of the place. They were alſo placed in the high-roads and croſs-ways, becauſe Mercury, who was the courier of the gods, preſided over the highways; whence he had his ſurname of Trivius, from *trivium;* and that of Viacus, from *via*.

From Suidas's account, above cited, it appears that the terms, *termini*, uſed among us in the door-caſes, balconies, &c. of our buildings, take their origin from theſe Athenian Hermeſes; and that it was more proper to call them *hermetes* than *termini*, becauſe, though the Roman termini were ſquare ſtones, on which a head was frequently placed, yet they were rather uſed as land-marks and mere-ſtones than as ornaments of building.

Hermes, in the Egyptian mythology, like Mercury in the Grecian, was the inventor of the lyre, to which he gave three ſtrings, producing three different ſounds, the grave, the mean, and the acute: the grave anſwered to winter, the mean to ſpring, and the acute to ſummer.

Among the various opinions of the ſeveral ancient writers who have mentioned the invention of the lyre, and confined it to the Egyptian Mercury, that of Apollodorus is the moſt intelligible and probable. "The Nile," ſays this writer, "after having overflowed the whole country of Egypt, when it returned within its natural bounds, left on the ſhore a great number of dead animals of various kinds, and, among the reſt, a tortoiſe, the fleſh of which being dried and waſted by the ſun, nothing was left within the ſhell but nerves and cartilages, and theſe being braced and contracted by deſiccation, were rendered ſonorous; Mercury, in walking along the banks of the Nile, happening to ſtrike his foot againſt the ſhell of this tortoiſe, was ſo pleaſed with the ſound it produced, that it ſuggeſted to him the firſt idea of a lyre, which he afterwards conſtructed in the form of a tortoiſe, and ſtrung it with the dried ſinews of dead animals."

HERMESIA, a name given by ſome authors to hermetic chemiſtry.

HERMESIAS, in *Botany*, a name given by Lœfling to the genus called *Brownæa* by Jacquin and Linnæus. See Brownæa.

HERMESKEIL, in *Geography*, a town of France, in the department of the Sarre, and chief place of a canton, in the diſtrict of Birkenfeld. The place contains 1061, and the canton 15,892 inhabitants, in 38 communes.

HERMETIC, or Hermetical *Art*, a name given to chemiſtry, on a ſuppoſition that Hermes Triſmegiſtus was the inventor of it, or that he excelled in it. See Alchymy and Chemistry.

We know but little of this Hermes; only that he was an ancient king of Egypt, a thouſand years prior to Æſculapius. Zozimus Panopolity mentions him as having wrote of natural things; and there are ſeveral pieces ſtill extant under his name, but they are all ſuppoſititious.

The numerous books upon theology, aſtronomy, and medicine, are aſcribed by Marſham (in Chron. ſæc. 1.) to the ſecond Mercury, the ſon of Vulcan, who, according to Euſebius,

bius, (in Chron.) lived a little after Moſes, that is, about 50 years after the Exodus of the Iſraelites; and this learned author, relying upon the authority of Manetho, cited by Syncellus, reckons that this ſecond Mercury is he who was ſurnamed "Triſmegiſtus," or thrice-great. According to Manetho, this ſecond Hermes or Mercury tranſlated from engraved tables of ſtone, that had been hidden in the earth, the ſacred characters written by the firſt Hermes or Mercury, called Thaut or Thoth, and wrote the explanation in books which were depoſited in the Egyptian temples; and thus eſtabliſhed his authority, obtained a high degree of reſpect among the people, and was long revered as the reſtorer of learning. From the tables of the firſt Hermes he is ſaid to have written, as commentaries and explanations, an incredible number of books. Theſe books, according to Clemens Alexandrinus (Strom. l. 6.) amounted in number to 42; and it was impoſſible for the Egyptians to carry their veneration for them higher than they did. They were borne in their proceſſions with great ceremony and reſpect. Firſt of all appeared the "Chanter," who had two of them in his hands, one containing the hymns in honour of the gods, and the other rules according to which the kings were to govern. Next came the "Horoſcopus," or that miniſter, as Clemens informs us, who carried the four books of aſtronomy, one treating of the fixed ſtars, another of the eclipſes of the ſun and moon, and the two laſt of the riſing of theſe two luminaries. Then appeared the ſacred "Scribe," with 10 books that treated of coſmography, geography, the deſcription of the Nile, &c.: then followed the "Stoliſt" with other 10 books on the ſubject of religion, *viz.* ſacrifices, prayers, feſtival days, &c. The "Prophet" came next, with 10 books, which were named ſacerdotal, and treated of the laws of the gods, and of eccleſiaſtical diſcipline. Thus, ſays the author now cited, there were 42 books in all, of which 36 comprehended all that belonged to the Egyptian philoſophy; and the other ſix regarded medicine, and treated of anatomy, medicaments, diſeaſes of the eyes, of women, &c. Theſe books, long ago loſt, if any ſuch ever exiſted, furniſhed Sanchoniathon with his theogony. (See Mercury.) Many ſubjects, on which theſe writings are ſaid to have treated, were unknown in the early period of the Egyptian philoſophy. There can be little doubt, therefore, that they were the forgeries of a later age, when it became one of the common artifices of impoſture to give the ſanction of antiquity to fiction.

HERMETICAL Philoſophy, is that which undertakes to ſolve and explain all the phenomena of nature from the three chemical principles, ſalt, ſulphur, and mercury.

A conſiderable augmentation was made to the ancient hermetical philoſophy, by the modern doctrine of alkali and acid.

Hermetical *Phyſic* or *Medicine*, is that ſyſtem or hypotheſis in the art of healing, which explains the cauſes of diſeaſes, and the operations of medicine, on the principles of the hermetical philoſophy, and particularly on the ſyſtem of alkali and acid.

Hermetical *Seal*, a method of ſtopping or cloſing glaſs tubes or veſſels, for chemical or other operations, ſo very accurately, that nothing can exhale or eſcape, not even the moſt ſubtle ſpirits.

It is performed by heating the neck of the tube or veſſel in the flame of a lamp till it be ready to melt, and then with a pair of pincers twiſting it cloſe together. This they call putting on *Hermes's ſeal.*

There are alſo other ways of ſealing veſſels hermetically; *viz.* by ſtopping them with a plug or ſtopple of glaſs, well luted into the neck of the veſſel; or, by turning another ovum philoſophicum upon that wherein the matter is contained.

For ſealing a ſmall tube hermetically, it is ſufficient to hold it in the flame of the lamp for a little time, ſlowly turning it round, when the end will melt, and falling in, will cloſe the cavity with a neat button. This operation may be aided by puſhing the ſoftened ends in towards the common centre with an iron needle. But if the tube be large, the quantity of glaſs forming the button at the end muſt be diminiſhed, by ſoftening the end of the tube in the flame, and applying to it a piece of another tube nearly of the ſame ſize, which will firmly adhere to it. Then let the tube which is to be ſealed be ſoftened a little higher up than the point of juncture, and pull the two ſlowly in contrary directions, till they ſeparate. The tube will then draw out at the heated part into two ſhort thin funnels, and a little turning and management of the flame will readily ſeal that which is wanted, leaving the joined ends, and about an inch of the lower part of the tube, on the waſte-piece. See Lamp *Blowing.*

HERMETRA, in *Geography*, one of the ſmaller weſtern iſlands of Scotland, N.E. of North Uiſt. N. lat. 57° 38'. W. long. 7° 3'.

HERMHARPOCRATES, or Hermarpocrates, in *Antiquity*, a deity, or figure of a deity, compoſed of Mercury and Harpocrates, the god of ſilence.

M. Spon gives us a Hermharpocrates in his Rech. Cur. de l'Antiquité, p. 98. fig. 15. having wings on his feet like Mercury, and laying his finger on his mouth like Harpocrates. It is probable they might mean, by this combination, that ſilence is ſometimes eloquent.

HERMIANI, or Hermiatitæ, in *Eccleſiaſtical Hiſtory*, a ſect of heretics in the ſecond century, thus called from their leader Hermias. They are alſo denominated Seleuciani.

One of their diſtinguiſhing tenets was, that God is corporeal: another, that Jeſus Chriſt did not aſcend into heaven with his body, but left it in the ſun.

HERMIAS, in *Biography*, a writer towards the cloſe of the ſecond century, according to Cave and Lardner, who has left us a ſhort but elegant diſcourſe, entitled "A Deriſion, or Banter, of the Gentile Philoſophers." The work ſhews that, in the time of the writer, Gentiliſm prevailed, and that it muſt have been written before the fall of Paganiſm. The author quotes 1 Cor. iii. 19.

HERMINE, in *Ancient Geography*, a town ſituated on the northern part of the Elide, near Cyllene, and ſaid by Pauſanias to have been founded by Actor, ſon of Phorbas and Herminia, who gave it his mother's name. A promontory preſerved its name.

Hermine, L', in *Geography*, a town of France, in the department of Vendée, and chief place of a canton, in the diſtrict of Fontenay-le-Comte. The place contains 406, and the canton 10,594 inhabitants, on a territory of 327½ kiliometres, in 19 communes.

HERMINIUS Mons, in *Ancient Geography*, a chain of mountains of Spain, in Luſitania, towards the ſouth of Maidobriga.

HERMIONE, Caſtri, a town of the Argolide, at the extremity of the peninſula, which is extended to the ſouth-eaſt. According to Pauſanias the ancient town was in ruins in his time, but the new one appeared to be in a very flouriſhing ſtate. It belonged to the Dryopes, and was founded by Hermion, the ſon of Europus. In proceſs of time the Dorians of Argos eſtabliſhed themſelves in this place. It was particularly conſecrated to Ceres and Proſerpine, and the temples of theſe deities ſerved as an aſylum. From Plutarch we learn that it was burnt by pirates, who deſolated the Roman empire in the time of Pompey, and who were deſtroyed by him in the year 67 B. C. This town had ſeveral ancient monuments; *e. g.* a temple of Venus, ſurnamed Pontia and Limenia, *i. e.* the protectreſs of ſeas and ports; a temple of Bacchus Menalegis, in which were celebrated every year muſical combats, and here alſo were diſtributed prizes to the beſt navigators and ſwimmers; and a temple of Diana Iphigenia, in which was a bronze figure of Neptune ſeated on a dolphin. Near this town was a gulf of Peloponneſus, named "Hermionicus Sinus."

HERMISIUM, a town of the Tauric Cherſoneſus, ſituated near the Cimmerian Boſphorus, N. of Boſphorus.

HERMIT, Eremit, or Eremita, a devout perſon retired into ſolitude, to be more at leiſure for prayer and contemplation, and to diſencumber himſelf from the affairs of the world.

The word is formed from the Greek ἔρημος, *eremus, wilderneſs;* and according to the etymology ſhould rather be written *eremit,* the ſpirit being ſoft.

An hermit is not reputed a religious, unleſs he have made the vows.

Paul, ſurnamed the *Hermit, Paulus Eremitanus,* towards the cloſe of the ſecond century, is uſually reckoned the firſt hermit; though St. Jerom, at the beginning of the life of that ſaint, ſays, it is not known who was the firſt. Some go back to John the Baptiſt, and others to Elias.

Others make St. Anthony the founder of the hermitical life; but others take him to have only rekindled and heightened the fervour of it; and hold, that the diſciples of the ſaint owned Paul for the firſt perſon that practiſed it, who fled into the moſt ſolitary deſerts of Thebais, where he led, during the ſpace of ninety years, a life more worthy of a ſavage animal, than of a rational being. Nevertheleſs this unſociable manner of life was very common in Egypt, Syria, India, and Meſopotamia, not only long before his time, but even before the coming of Chriſt; and it is ſtill practiſed among the Mahometans as well as Chriſtians, in thoſe dry and burning climates: for the glowing atmoſphere that ſurrounds theſe countries is a natural cauſe of that love of ſolitude and repoſe, of that indolent and melancholy diſpoſition, that are very common among their languid inhabitants. The perſecutions of Decius and Valerian are ſuppoſed to have been the occaſion; though the fanatical ſyſtem of theology, derived from the Platonic ſchool, and adopted by Origen and his diſciples, that prevailed at this period, contributed to form the taſte and temper of the firſt hermits.

Several of the ancient hermits, as St. Anthony, &c. though they lived in deſerts, had yet numbers of religious accompanying them.

There are alſo divers orders and congregations of religious, diſtinguiſhed by the title of hermits; as, hermits of St. Auguſtine, of St. John Baptiſt, of St. Jerom, of St. Paul, &c.

Hermits *of St. Auguſtine,* is a religious order, more frequently called Auguſtins, or Auſtin-friars. See Auguſtins.

Hermits *of Brittini,* was a congregation formed under pope Gregory IX. who gave them the rule of St. Auguſtine.

Their firſt hermitage or abode was in a ſolitary place, called Brittini, in the marquiſate of Ancona: whence the name. They led a very auſtere life: they never eat any meat, and faſted much.

Hermits *of Camaldulia.* See Camaldulians.

Hermits *of St. Jerom.* See Jeronymites.

Hermits *of St. John Baptiſt,* was a religious order in Navarre, whoſe principal convent, or hermitage, was ſeven leagues from Pampelona.

Till the time of Gregory XIII. they lived under the obedience of the biſhop of that city; but the pope confirmed them a religious order, approved their conſtitutions, and admitted them to make the vows. Their way of living was exceeding auſtere; they went bare-footed, wore no linen, lay on boards, with a large ſtone for their pillow, and bore a large wooden croſs on their breaſts.

Their houſe was a kind of laura, rather than a convent, cantoned out into cells, in which they lived ſolitary in the middle of a wood.

Hermits *of St. Paul,* the firſt hermit, is an order formed in the 13th century, by the union of two bodies of hermits in Hungary, *viz.* thoſe of St. James de Patach, and thoſe of Piſilia near Zante.

Upon being incorporated, they choſe St. Paul, the firſt hermit, for the common patron and protector of their order, and aſſumed his name. They multiplied very conſiderably in Hungary, Germany, Poland, and other provinces; and, at length, came to have ſeventy monaſteries in Hungary alone; but the revolutions and wars in that kingdom reduced them again.

HERMITAGE properly ſignifies a little hut, or habitation, in ſome deſart place, where a hermit dwells.

Hermitage is alſo popularly attributed to any religious cell, built and endowed in a private and recluſe place, and thus annexed to ſome large abbey, of which the ſuperior was called *hermita.*

Hermitage, in *Geography,* a town of Weſt Florida, on the S.W. ſide of the river Miſſiſſippi; 7 miles S.W. of New Orleans.

HERMIT's Bay, a bay on the iſland of St. Chriſtopher, on the N. coaſt, a little S. of Madan's point.

HERMITE's Islands, a group of iſlands of unequal extent, ſituated before Naſſau bay, at the ſouthern extremity of Terra del Fuego. This name is derived from Mynheer Hermite, admiral of the Dutch fleet, in the year 1624. See *Cape* Horn.

HERMO, or Beram, a town of Iſtria; 28 miles S. of Trieſte.

HERMODACTYL, or *Snake-headed Iris,* in *Botany.* See Iris.

Hermodactyls, in the *Materia Medica,* a drug uſed as a gentle purgative, &c.

The hermodactyl is a root about the ſize of a little cheſnut, in figure reſembling a heart; ruddy without, very white within; of a light fungous ſubſtance, without fibres; eaſily broken, and reducible into a powder like flower; of a ſweetiſh taſte, but ſomewhat viſcid. It is brought to us dried, from Egypt, Syria, and Turkey.

Theſe have been too generally ſuppoſed a fruit, but they are unqueſtionably a root, and ſeem to be the roots of that ſpecies of meadow-ſaffron, called by authors *colchicum Chinenſe floribus fritillariæ inſtar variegatis, foliis undulatis,* or the Chineſe meadow-ſaffron, with undulated leaves, and with flowers chequered like thoſe of the fritillary. They were in great uſe among the ancients as a purge; but their operation is very ſlow, tedious, and fatiguing, and therefore they have been commonly quickened with aloes and other cathartics. They are beſt corrected by being joined with aromatics, and are now ſometimes uſed, mixed with jalap, in rheumatiſms. The women of Egypt eat the freſh roots roaſted, to make them grow fat.

Hermodactyls were chiefly uſed to purge pituitous humours of the brain and joints. They were deemed ſo efficacious in ſcouring the mucilaginous glands, and preſerving them from the lodgments of gritty matters, which occaſion the gout and arthritic complaints, that they were denominated, by ſome writers, *anima articulorum.* They alſo promote ſweat. They are now expunged by the colleges both of London and Edinburgh from their catalogues of officinals.

HERMODE, in *Mythology*, the name of a divinity worſhipped by the ancient inhabitants of the North, or Goths; he was reputed to be the ſon of Odin, the firſt of their gods.

HERMOGENEAN Code, in *Law*. See Code.

HERMOGENES, Tigellius, in *Biography*, cited by Horace, ſat. iii. l. 1.

“Ut, quamvis tacet Hermogenes, cantor tamen, atque
Optimus ut modulator.”

“Though Hermogenes ſings no more, he is nevertheleſs an excellent muſician.”

He was probably the ſon or brother of Tigellius, a famous muſician in the time of Cæſar and Auguſtus; who muſt have been an exquiſite ſinger; for Horace makes his obtruſive companion ſay:

“Invideat quod et Hermogenes, ego canto.”
“I ſing till I throw Hermogenes into deſpair.”

St. Hermogenes's *Iſland*, in *Geography*, an iſland on the N.W. coaſt of America, about ſix leagues in circuit, ſeparated from the adjacent coaſt by a channel one league broad. This was thought by the famous navigator Beering to be a cape, ſituated in N. lat. 58° 15′. E. long. 207° 45′. In a later account of his voyage publiſhed by Mr. Stæhlin, cape St. Hermogenes, and all the land diſcovered by Beering to the S.W. of it, are made to be a cluſter of iſlands; and St. Hermogenes is placed among thoſe which are deſtitute of wood. This account was fully confirmed in Cook's Third Voyage, ſee vol. ii. p. 384.

HERMOGENIANS, a ſect of ancient heretics, denominated from their leader Hermogenes, who lived towards the cloſe of the eleventh century.

Tillemont, with whom Dr. Lardner agrees, places him before the end of the reign of Marcus Antoninus, who died in the year 180. He is ſuppoſed to have been a native of Africa; and from Tertullian we learn, that he was ſkilled in the art of painting; and he ſeems to have been originally a Chriſtian, and not only learned and ingenious, but likewiſe virtuous; for though Tertullian, who wrote againſt him, intimates that of a Chriſtian he became a philoſopher and ſtoic, he does not charge him with any vice. Hermogenes, though denominated a heretic, does not ſeem to have formed a party, or ſet up a ſeparate communion. He was willing to communicate with Catholic Chriſtians, if they would admit him; though he indulged himſelf in ſpeculations that deviated from the ſentiments that were generally adopted. It is undeniable that he received and reſpected the ſcriptures of the Old and New Teſtament, as other Chriſtians of his time did. If he was an author, which is not improbable, we have no account of any of his writings; and that none of them remain, if any ever exiſted, furniſhes occaſion of indecent and illiberal triumph to Cave.

Hermogenes eſtabliſhed matter as his firſt principle, and co-eternal with the Deity; and regarding matter as the fountain of all evil, he maintained that the world, and every thing contained in it, as alſo the ſouls of men and other ſpirits, were formed by the Deity from an uncreated and eternal maſs of corrupt matter.

If the world had been made out of nothing, he feared that the evil ſubſiſting in it muſt have been aſcribed to the will of God, which, in his opinion, would have been a reflection on his goodneſs. But matter, out of which the world was made, being inherently evil, he ſuppoſed that he thus vindicated the Supreme Being. Hermogenes aſſerted one God ſupreme over all, maker of the world, unchangeably good, with whom no other being could be compared. He admitted no Æons, nor any creator different from the one God the father; but he ſaid that matter was eternal, and God made the world out of it. To this matter he aſcribed all the evil and all the defects which exiſt in any creatures. Matter had always a confuſed and irregular turbulent motion, but God wrought order and beauty, and proportion, out of that confuſed and indigeſted matter. It does not appear what were his conceptions concerning the perſon of Jeſus Chriſt. Theodoret ſays, he thought the body of Jeſus was lodged in the ſun. Although he taught that God made the ſoul out of matter, he does not ſeem to have denied human liberty. Theodoret informs us, that Hermogenes believed that the devil and dæmons would be again reſolved into matter; from which they had ariſen; nor is it improbable that he might conceive the confluence of matter, or ſome part of it, to be the abyſs and place of torment aſſigned to the devil and his angels at their final condemnation. Hence he appears to have believed a future judgment, and probably all the other great articles of religion.

The opinions of Hermogenes, with regard to the origin of the world and the nature of the ſoul, were warmly oppoſed by Tertullian.

The Hermogenians were divided into ſeveral branches, under their reſpective chieftains, *viz.* Hermiani, Seleucians, Materiari, &c.

Some will have the Manichees alſo to have ſprung from the Hermogenians. Lardner's Works, vol. ix.

HERMOGENIANUS, in *Biography*, an eminent juriſt, flouriſhed in the fourth century, publiſhed an “Abridgment of Law,” in ſix books, in Latin, in which he follows the order of the Perpetual edict. It commences with the reign of Adrian, and is highly ſpoken of by writers on the Roman law. Moreri.

HERMON, in *Ancient Geography*, a mountain, or rather chain of mountains, of Paleſtine, in the tribe of Iſſachar, on this ſide of Jordan, S. of mount Tabor. It was noted for its height, and for being, like Lebanon, capped with ſnow. It was once famous for an ancient temple held in great veneration, and much reſorted to by the ſuperſtitious heathens from all the neighbouring countries, and in the book of Pſalms (Pſ. cxxxiii. 3.) for its refreſhing dews, which deſcended on the adjoining mount of Sion. St. Jerom tells us, that it was above the Paneas; that its ſnow was carried to Tyre and Sidon, to be uſed in cooling liquors; and the Chaldees and Samaritans ſtyle it the “Mount of Snow.”

HERMONASSA, a town of the Cimmerian Boſphorus, and one of the four which Pomponius Mela places in this peninſula.—Alſo, a town of Aſia, in the Pontus Polemoniacus, and on the ſame gulf with Ceraſonte.

HERMONAX, a town which belonged to the Tyrians, ſituated on the ſea-coaſt, and at the mouth of the river Tyras.

HERMONIUS Sinus, a gulf of Aſia Minor, in the Boſphorus of Thrace, N.E. of the promontory of Boſphorus.

HERMONTHIS, a town of Egypt, and capital of the “Nomos Hermonthites,” bounded by the nome of

Memnon to the N., that of Thebes and the Nile to the E., the Dodæcaſchœnes to the S., and the mountains of Libya to the W. Ptolemy places Hermonthis, which he writes Hermunthis, between Thebes and the town of the Crocodiles. This city had two temples, conſecrated to the honour and worſhip of Apollo and Jupiter. They may be ſtill ſeen in ſome degree of preſervation at the village called *Armant*, built near the ſcite of Hermonthis. The temple of Apollo is ſmall; its walls are formed of granite, and round it runs a freeze covered with ſparrow-hawks, conſecrated to the god. All its aſpects are decorated with hieroglyphics; four rows of human figures are carved without, and three within. The building is divided into ſeveral halls: five falcons, with their wings ſpread, adorn the cieling of the firſt; golden ſtars ſhine upon the roof of the ſecond. Here are two rams which look at each other, with hieroglyphics; and two marble oxen occupy the extremity of this apartment. Around it are ſeen women ſuckling their children. Before this temple was a large building, of which the foundations only remain. Beyond is a large baſon, deſtined to receive the waters of the Nile. At a farther diſtance, on the bank of the river, is another edifice, probably the temple of Jupiter, which the Chriſtians have converted into a church, and over the Egyptian hieroglyphics and inſcriptions they have painted croſſes.

HERMOPAN, in *Ancient Mythology*, a figure compoſed of Mercury and Pan.

HERMOPOLIS, in *Ancient Geography*, or the town of Hermes, the name of three towns in Egypt; the *firſt* was in the Delta, below Sebennytus, and nearer the ſea, E. of Buto; the *ſecond* in the nome of Alexandria, without the Delta, W. of the weſtern branch of the Nile; and the *third*, or "Hermopolis Magna," in the Heptanomis or Hermopolite nome, W. of the Nile and at ſome diſtance from it, and 59 miles from Lycopolis. Pliny calls it, by a tranſlation of the Greek name into Latin, "Mercurii Oppidum." According to Ammianus Marcellinus, this was a celebrated city.

HERMOPOLIS, an epiſcopal city of Aſia, in Iſauria.—Alſo, a town of Aſia, in Carmania.

HERMOPOLITUS NOMOS, a country of Egypt, in Heptanomis, bounded N. by the Cynopolite nome, E. by the Nile; S. by the Nycopolite nome; and W. by the mountains of Libya. Its metropolis was Hermopolis Magna.

HERMOSELLO, in *Geography*, a town of Spain, in the province of Leon, at the conflux of the Duero and the Tormes; 9 miles below Miranda de Duero.

HERMOSIRIS, is a ſtatue of Mercury and Oſiris, with the diſtinct attributes of thoſe divinities united; *viz.* the caduceus for Mercury, and the head of an hawk with an eagle for Oſiris.

HERMOSMENON, in the *Greek Muſic*, a term which implied morals, propriety, and fitneſs. It conſiſted in knowing how to chuſe, upon all occaſions, what belonged to the mode or key, to the ſubject, the rhythm, the melody, the voice of the ſinger; and promiſcuouſly to uſe every thing belonging to a key or movement alike on all occaſions. The *moral* part of compoſition is ſelection and rejection, that all may naturally ariſe out of the ſubject, and ſeem to belong to no other theme or occaſion.

HERMULES were two ſmall ſtatues of Mercury placed in the Circus at Rome.

HERMUNDURI, in *Ancient Geography*, a people who inhabited the eaſtern extremity of Germany, and who worſhipped Mars and Mercury. In a war with the Catti for the poſſeſſion of a ſalt-pit, they devoted the hoſtile army to theſe deities. Tacitus ſays, that in proceſs of time they became allies to the Romans, who diſtinguiſhed them above other Germans by peculiar privileges.

HERMUPOA, in *Botany*, the name of an hexandrous plant in Lœfling's *Iter Hiſpanicum*, which he deſcribes as naturally akin to *Breynia*, (meaning that of Plumier, which Linnæus makes a *Capparis*,) but with a double perianth. The flowers are ſcarlet. We do not find his deſcription or name cited by Linnæus.

HERMUS, in *Geography*, a conſiderable river of Aſia Minor, which flowed from a mountain ſacred to Cybele, and diſcharged itſelf in the ſea near Phocea. It received, beſides other rivers, the Pactolus and Hyllus. This river watered plains, which were on this account called "Hermi Campi." Theſe plains were thoſe of Sardis and Smyrna. The gulf into which it diſcharged itſelf was anciently called the "Hermæan Gulf;" but when Theſeus, a perſon of diſtinction in Theſſaly, founded on this gulf a town, which he called Smyrna, after the name of his wife, the gulf was denominated "Smyrnæus Sinus," or the gulf of Smyrna, a name which it ſtill retains. The river, as D'Anville ſays, is called "Saravat," but according to M. Peyſſonnel, "Bouroun."

HERN, in *Ornithology*. See HERON.

HERN *Iſland*, in *Geography*, a ſmall iſland on the W. coaſt of Africa, at the mouth of the Rio del Oro. N. lat. 23° 35.

HERNANDEZ, FRANCIS, in *Biography*, a naturaliſt and phyſician, who was ſent out by Philip II. king of Spain, to make obſervations on, and to deſcribe, the natural productions of Spaniſh America. His pecuniary allowance for this purpoſe appears to have been ample, and he ſpared no expence to make himſelf acquainted with ſuch objects as he was in ſearch of. He wrote an account of their nature and properties, but it does not appear that he lived to ſuperintend the publication of his labours, for in 1651 the reſult of his enquiries was edited at Rome under the care of the Lyncæan academy, eſtabliſhed in that city; the papers of Hernandez having been purchaſed by Frederic Ceſi, a young nobleman who founded, and was perpetual preſident of the Lyncæi. This work had originally been publiſhed in the Spaniſh language at Mexico, under the name and care of Francis Ximenes, but the Roman edition, in ſmall folio, came out in Latin, having the following title, "Nova Plantarum, Animalium et Mineralium Mexicanorum Hiſtoria, a Franciſco Hernandez, Medico, in Indiis præſtantiſſimo primum compilata. Dein a Nardo Antonio Reccho in volumen digeſta, a Johanno Terentio, Johanno Fabro, et Fabio Columna, Lyncæis, notis et additionibus longe doctiſſimis illuſtrata." The original drawings of this work were procured by Hernandez, who paid the immenſe ſum of ſixty thouſand ducats for them; they had been drawn at the time when Joſeph a Coſta was in America, but the numerous wooden cuts which accompany this volume are by no means equal to what might have been expected from the account we have of the drawings, and this called forth an obſervation of regret from Linnæus, that the work did not anſwer the trouble and expence which had been beſtowed upon it. It muſt, however, be remarked, that no blame ſhould attach to the memory of Hernandez, but to his editors on this account. What became of him is not recorded, but his drawings were conſumed by a fire in the Eſcurial. Among the figures are ſome curious animals, but the plants compoſe the chief bulk of the work. Some of his repreſentations are ſo extraordinary, that their truth has been doubted

doubted, for inſtance his *Macpalxochiquahuitl*, the form of which is ſo ſtrange, that ſome error was reaſonably expected. His accuracy, however, has lately been verified, even in this inſtance. The plant, whoſe large united ſtamens exactly reſemble a bird's foot, is of the malvaceous order, and is recently figured in a ſplendid French work. We have ſeen a ſpecimen preſerved in ſpirits at ſir Joſeph Banks's. No doubt his *Lyncea*, 266, which ſeems to be a moſt magnificent ſpecies of *Dendrobium*, is equally faithful. This plant occurs perpetually as an embelliſhment in various parts of his book. His *Flos Tigridis*, 276, for a long time no leſs a problem to botaniſts, is now well known in our gardens, and one of their moſt ſplendid ornaments; ſee Curt. Mag. t. 532. Some intereſting matter, furniſhed by Fabius Columna, occurs at the end of the volume, where the gum Arabic, *Mimoſa*, the *Lobelia Cardinalis*, and the Paſſion-flower, *Paſſiflora incarnata*, are well repreſented. A curious phytoſcopic table, by Frederic Ceſi, by far too profound to be epitomized or explained, is ſubjoined. Hernandez does not appear to have publiſhed any other works on natural hiſtory, but this will entitle him to our gratitude for having firſt unfolded to European botaniſts, the treaſures of that then little known quarter of the world. The Mexican names are always given, and his medical obſervations are general and good. A hiſtory of the church at Mexico has been aſcribed to our author, but without certainty. Hall. Bibl. Bot. Moreri. Linn. Crit. Bot. Hernand. Hiſt.

HERNANDIA, in *Botany*, a genus named by Plumier in honour of Francis Hernandez, phyſician to Philip II. who firſt explored the natural productions of the new world. See HERNANDEZ. Linn. Gen. 484. Schreb. 627. Willd. Sp. Pl. v. 4. 327. Plum. Gen. 6. t. 40. Jacq. Amer. 245. Mart. Mill Dict. v. 2. Ait. Hort. Kew. v. 3. 333. Juſſ. 81. Lamarck. Dict. v. 3. 122. Illuſtr. t. 755. Gærtn. t. 40. Claſs and order, *Monœcia Triandria*. Nat. Ord. *Tricoccæ*, Linn. *Lauri*, Juſſ.

Gen. Ch. Male, *Cal.* a partial involucrum, three-flowered, with four, ovate, obtuſe, much ſpreading leaflets; perianth none. *Cor.* Petals ſix, ſomewhat ovate, ſpreading; the three interior ones narrower; nectary of ſix round, capitate glands, ſituated about the filaments. *Stam.* Filaments three, ſhorter than the petals, inſerted into the receptacle; anthers erect, oblong, large.

Female, *Cal.* an involucrum common with the males; perianth inferior, of one campanulate, entire, perſiſtent leaf. *Cor.* Petals eight, the four interior ones narrower, all placed upon the germen; nectary of four obovate glands. *Piſt.* Germen roundiſh; ſtyle thread-ſhaped; ſtigma oblique, ſomewhat funnel-ſhaped, large. *Peric.* a dry, ovate, eight-furrowed, ſingle-celled drupa, incloſed in the greatly enlarged, inflated, roundiſh perianth. *Seed* a globoſe, lightly depreſſed nut.

Eſſ. Ch. Male, Calyx deeply three-cleft. Corolla of three petals.

Female, Calyx truncated, entire. Corolla of ſix petals. Drupa hollow, open at the mouth, its coat unconnected with the nut.

1. *H. ſonora.* Jack-in-a-Box. Linn. Sp. Pl. 1391. Hort. Cliff. 485. t. 33.—"Leaves peltate."—A native of the Weſt Indies, and firſt cultivated in the ſtoves of our own country by the ducheſs of Beaufort, in the year 1714. It is very curious that the plant in queſtion ſhould be found in Ceylon, as well as in the Weſt India iſlands. This lofty *tree* has a very rugged *trunk*, but the ſmaller branches are ſmooth and green. *Leaves* ovate, pointed, ſmooth, and ſhining; their footſtalk inſerted into the back an inch or more above the baſe, ſo that they are, as it were, pendent; red, radiating veſſels mark the place of inſertion on the upper ſide. Linnæus juſtly extols the beauty of the foliage of this tree. The *flowers* are ſmall and yellowiſh, in panicled cluſters. The *fruit* when ripe rattles in the permanent calyx, whoſe orifice is too ſmall to admit of its falling out.

2. *H. ovigera.* Linn. Sp. Pl. 1392; (Arbor ovigera; Rumph. Amboin. v. 3. 193. t. 123.)—"Leaves heart-ſhaped, ovate, pointed, flat."—A native of the Eaſt Indies, growing in woods by the ſhore of large rivers.

A *tree* with *leaves* ſix inches long, diſtinguiſhed from the former by having their footſtalks inſerted as uſual, and not in a peltate manner. This ſpecies is taken up from Rumphius, whoſe figure is leſs than the natural ſize, the *fruit* of the plant being as large as an egg, and ſimilar in ſtructure to the nut of *H. ſonora.*

3. *H. guianenſis.* Willd. Sp. Pl. v. 4. 328. Aubl. Guian. v. 2. 849. t. 329.—"Leaves heart-ſhaped, oblong, pointed, folded, bracteas whorled."—Native of woods in Guiana. This tree riſes to the height of 60 feet, and has a light aromatic *wood*. *Leaves* longer in proportion than the laſt. The *panicle* is accompanied by ſeveral whorls of ovate acute bracteas. The *calyx* of the fruit is elliptical, obtuſe, ſpotted with red, ſcarcely a fifth part the ſize of the laſt. The *flowers* appear in February, and being very numerous, of a greyiſh colour, render the tree very conſpicuous in that ſtate. The inhabitants of Cayenne uſe the kernel as a purgative medicine.

HERNANDIA, in *Gardening*, compriſes plants of the exotic evergreen kind, of which the ſpecies principally cultivated is the whiſtling hernandia (H. ſonora), which in the Weſt Indies is frequently denominated the Jack-in-a-box tree.

Method of Culture.—The plants in this caſe are to be raiſed by ſowing the well ripened ſeeds upon a hot-bed in the ſpring ſeaſon. As ſoon as the young plants are about two inches in height, they ſhould be tranſplanted ſeparately into pots filled with freſh rich earth, and replunged into the hot-bed, care being taken to water and ſhade them until they have taken new root, after which air ſhould be admitted by elevating the glaſs-frames, in proportion to the ſtate of the atmoſphere, in reſpect to warmth, and the degree of heat thrown up by the bed; the plants being frequently watered. As the plants advance in growth they muſt be removed into larger pots, great care being taken not to break or injure the root, but to preſerve a good ball of earth about them. If their leaves ſhould droop, they ſhould be well protected from the heat of the ſun, until they have ſtricken new root. The beſt period of ſhifting them is about July, as by that means there will be good time for their becoming firmly rooted before the approach of the cold ſeaſon. It is neceſſary to preſerve them conſtantly in the bark ſtove, affording them during the winter a moderate ſhare of heat, and in the ſummer, when the weather is hot, letting them have a full ſupply of air.

Theſe plants have a fine and curious effect among others of the ſame nature.

HERNGRUND, in *Geography*, a town of Hungary, ſituated among the mountains, in the midſt of extenſive mines of copper, which furniſh the chief employment of the inhabitants; four miles N.N.W. of Neuſol.

HERNIA, in the language of *Surgery*, commonly implies a protruſion of ſome of the viſcera, out of the cavity of the belly, into a preternatural bag, conſiſting of the portion of peritoneum which is puſhed before them. The diſeaſe is better known, among perſons who are not of the medical profeſſion, by the name of a *rupture.*

Although ſuch is the ordinary meaning of the term *hernia*, it ought to be underſtood, that the occaſional ſignifications of the word is much more extenſive, comprehending indeed ſeveral diſeaſes, which bear no ſimilitude or analogy whatſoever to one another. Thus, a collection of water in the tunica vaginalis teſtis is ſometimes named *hernia aquoſa;* an inflammation of the teſticle is diſtinguiſhed by the appellation of *hernia humoralis;* and a certain tumour of the brain is frequently denominated *hernia cerebri.* (See FUNGUS *Cerebri.*) But not to digreſs from the ſubject which we now propoſe to treat of, it will be ſeen in the courſe of the following pages, that the definition with which we have ſet out, cannot be applied to ſome forms of diſeaſe, always ranking as herniæ of the abdomen, either becauſe the diſplaced parts undergo no protruſion at all, or are not contained in any bag or pouch, formed by the peritoneum.

As the common expreſſion, *rupture*, tends to convey an erroneous notion, that the diſorder is eſſentially connected with a ſudden burſting, or laceration of ſome part of the ſides of the abdomen, it is undoubtedly objectionable. But ſince long cuſtom ſanctions its employment, while the term hernia is little underſtood out of the profeſſion, and has had aſſigned it no etymological ſenſe, in the leaſt expreſſive of any character of the diſeaſe, which it uſually denotes, we merely prefer it inaſmuch as it cannot communicate any falſe idea reſpecting the nature of the complaint.

The manner in which, of late years, our knowledge of herniæ has been amplified by the diligent inveſtigations of ſeveral able and diſtinguiſhed ſurgeons, is ſuch as cannot fail to raiſe the admiration of every one, at all converſant with the ſubject. At the ſame time, it is ſuch as ought to awaken the ſpirit of emulation and induſtry throughout all the departments of ſurgery, by making us diſtruſt the preſent attainment of any thing like perfection in a ſingle branch of it. When we conſider the vaſt number of heads and pens which have been engaged, at different periods, upon the ſubject before us; when we reflect that there is ſcarcely a great ſurgeon of any age, who has not devoted ſome of his time and attention to the ſtudy of hernia, and a part of his writings to the explanation of it; and finally, when we call to mind the great frequency of the diſeaſe, which muſt have afforded at all times every opportunity of examination; we have ſome reaſon for ſurprize at finding errors of conſiderable conſequence prevailing, even up to the commencement of the preſent century. Our aſtoniſhment, however, muſt immediately ceaſe, when we find that the cauſe of theſe errors has proceeded from a groſs neglect of morbid anatomy, and conſequent ignorance of the real condition of the parts relating to the formation of herniæ in general. With this kind of inattention, it was in vain for ſurgeons to attempt clear and accurate deſcriptions of a diſeaſe, the internal circumſtances of which they did not take the trouble of properly examining by diſſection. The great Percival Pott, ſo renowned for talents and accuracy of obſervation, fell into ſome material miſtakes in his anatomical conception of this diſeaſe, and of courſe his treatiſe on ruptures is, in this reſpect, faulty and imperfect. Camper, a Spaniſh ſurgeon of the name of Gimbernat, and particularly our countrymen Mr. Aſtley Cooper, Mr. William Lawrence, and Mr. Hey, ſeem entitled to the chief ſhare of honour for having introduced more correct opinions concerning many particulars of the diſeaſe.

The importance of ſtudying the ſubject of hernia ſhould be deeply impreſſed upon the mind of every man who is deſirous of practiſing ſurgery, with reputation to himſelf, and benefit to the afflicted. The great frequency of the diſeaſe, the various ſituations and forms in which it preſents itſelf; the different ſtates in which the contents of herniæ are in different caſes; the variety of treatment depending upon this circumſtance; the knowledge of anatomy required in operating; and the danger of miſtaking hernial tumours for others of a totally different kind; are circumſtances which ought to infuſe fear into the heart, and agitation into the conſciences of all, who preſume to call themſelves qualified ſurgeons, without having firſt duly conſidered every thing relating to ſo important a branch of their profeſſion.

The calculations which have been made, of the proportion which men and women afflicted with ruptures, bear to the reſt of the human race, comprehend a very high number. Some ſurgeons, as Arnaud, Gimbernat, and Turnbull, have eſtimated that one-eighth or one-ſixteenth of mankind have ruptures. Knowing, however, that theſe ſtatements are vaſt exaggerations, we only mention them to ſhew that the diſeaſe is one of a moſt common kind. From an inſtructive note, inſerted in Mr. Lawrence's treatiſe on ruptures, edition ii. page 2, it appears that the preceding eſtimate is conſiderably over-rated. Among other things, it is obſerved that "M. Louis aſcertained the number of patients with herniæ in the different hoſpitals of Paris. We ſhould expect to find a greater proportion here, than in mankind at large, ſince theſe very diſorders compel many to ſeek relief at ſuch inſtitutions; yet it will be ſeen that the proportion is not ſo high, &c. Of 7027 perſons in the Salpêtriere, 220 were ruptured; at the Bicêtre, 212 out of 3800; at the Invalides, 142 out of 2500 or 2600; and of the children at the Hôpital de la Pitié, 21 in 1037." Mémoires de l'Acad. de Chir. tom. v. ſupplement, p. 885.

Hernia is a diſeaſe from which no age, ſex, nor condition, is exempt; the youngeſt children, the moſt aged perſons, the rich man, and the poor one, the induſtrious and the indolent, being all liable to be afflicted with it.

Many reaſons, ſays Mr. Aſtley Cooper, may be aſſigned for the very frequent occurrence of protruſions from the abdomen.

Firſt, the viſcera of this cavity are numerous, many of them very moveable, and only looſely connected by peritoneal attachments, with the ſurrounding parts; and they are habitually expoſed to changes of ſize and relative ſituation, from ſudden or gradual diſtention.

Secondly, the parietes of the abdomen are compoſed of muſcles, the action of which is to contract the dimenſions of this cavity, to compreſs the bowels, and thus to force them from their natural ſituation.

Thirdly, for the paſſage of veſſels and nerves, theſe muſcles and their tendons have various apertures, which, though naturally only wide enough for this purpoſe, often become ſo much relaxed as to allow the viſcera themſelves to protrude.

Laſtly, the muſcles are ſometimes themſelves imperfectly formed, and the viſcera eſcape through unnatural apertures. See Anatomy, &c. of Inguinal and Congenital Hernia, chap. i.

The various herniæ receive different appellations, according to their ſituation, and the nature of their contents.

In the male ſex, the moſt frequent caſe is that in which the parts are protruded at the abdominal ring, deſcending in the ſame direction as the ſpermatic cord. Women are alſo ſubject to the ſame ſpecies of rupture, with this difference, that they do not have it nearly ſo often as the other ſex, and when they do, the round ligament of the uterus bears the ſame relation to the hernia, as the ſpermatic cord does to it in males. When the protruded parts deſcend no lower than the groin, the diſeaſe is called a *bubonocele*, or *inguinal hernia*;

but when they reach down into the ſcrotum, it is commonly named an *oſcheocele*, or *ſcrotal rupture*.

The hernia to which women are moſt liable, is the *crural* or *femoral*, in which the parts are protruded, under Poupart's ligament at the upper part of the thigh, through a ſmall opening in a tendon deſtined for the paſſage of the femoral veſſels. The technical name of *merocele* is ſometimes given to this particular caſe.

In the linea alba, upon the front of the abdomen, there is a round opening, through which, in the fœtal ſtate, the blood-veſſels uſed to paſs from and to the placenta. When the viſcera are protruded through this aperture, the hernia is named *umbilical*, or *exomphalos*, *omphalocele*, &c.

The epithet of *ventral* is given to all protruſions of the viſcera which occur at any part of the belly, except the navel and abdominal ring. Herniæ of this kind are moſt frequent in the courſe of the linea alba.

The *congenital hernia* is ſo named from its generally coming on ſhortly after birth, before the communication between the cavity of the belly, and that of the tunica vaginalis, has been cloſed. The peculiarity of the caſe conſiſts in the protruded parts being lodged in the tunica vaginalis, in contact with the teſticle, and in their having no common hernial ſac. One leſs frequent ſort of congenital hernia, in which the protruded viſcera puſh before them a production of the peritoneum into the tunica vaginalis, will be hereafter deſcribed.

The inguinal, crural, umbilical, ventral, and congenital herniæ, particularly the three former, are thoſe moſtly met with in practice. There are, however, ſome leſs frequent ſorts of hernia, which muſt not be omitted in the preſent work.

Sometimes the viſcera are protruded at the foramen ovale of the pelvis, when the diſeaſe is called a *hernia of the foramen ovale*.

On other occaſions the viſcera are forced between the bladder and rectum in men, and between the uterus and rectum in women, ſo as to be protruded in the perineum. Such a caſe is diſtinguiſhed by the appellation of a *hernia of the perineum*.

A tumour may be produced in the vagina by the diſplaced bowels, when the caſe is named a *vaginal hernia*.

A rare kind of rupture ſometimes occurs at the iſchiatic notch. In this inſtance, the viſcera are protruded by the ſide of the ſciatic nerve under the glutei muſcles, and the diſeaſe is called an *iſchiatocele*, or *hernia of the iſchiatic foramen*.

Diaphragmatic herniæ have alſo been noticed, the viſcera protruding either by the ſide of the œſophagus, the ſide of the vena cava, or leſs commonly by the ſide of the aorta. Herniæ of the diaphragm, however, generally happen through unnatural openings in the muſcle.

Mr. Aſtley Cooper has ſeen a hernia protruding into the labium pudendi, under the ramus of the iſchium, and extending up into the pelvis by the ſide of the vagina.

The ſame eminent ſurgeon has in his poſſeſſion, preparations, exhibiting caſes in which herniæ were formed between the layers of the meſocolon and meſentery. On Inguinal Hernia, p. 2.

Beſides theſe many different ſpecies of herniæ, the bowels ſometimes become ſtrangulated by various kinds of adheſions, by ſlipping through unnatural holes in the meſentery, &c.

The names of herniæ are frequently derived from the nature of their contents. Thus, when the hernia contains nothing but omentum, it is called an *epiplocele*, or *omental rupture*. When it includes inteſtine alone, it is named an *enterocele*, or *inteſtinal hernia*. But when the contents conſiſt both of omentum and inteſtine, it is often denominated an *entero-epiplocele*.

When the bladder is protruded, the hernia receives the name of *cyſtocele*. Alſo, the terms *ſplenocele*, *gaſtrocele*, *hyſterocele*, &c. are occaſionally employed, when the ſpleen, ſtomach, or uterus is contained in the hernia.

When the prolapſed viſcera admit of being returned into the abdomen, without any difficulty, or when they are accuſtomed to aſcend and deſcend ſpontaneouſly, according as the patient is in a recumbent or erect poſture, the caſe is denominated a *reducible hernia*.

When the return of the contents of the tumour, however, is prevented either by adheſions to each other, or to the hernial ſac, or by the increaſed bulk which they have acquired in their unnatural ſituation, the hernia is termed *irreducible*.

Laſtly, when the reduction is rendered impracticable by the conſtriction, which the viſcera ſuffer in the opening through which they have paſſed, the caſe is named a *ſtrangulated*, or *incarcerated hernia*.

This latter ſtate of the diſeaſe proves a frequent cauſe of death, and always demands prompt ſurgical aſſiſtance.

The parts, which moſt commonly form the contents of herniæ, are the omentum and inteſtines. The ilium, in conſequence of its nearneſs to the ring, is moſt frequently protruded. The next, in order of frequency, is the colon; then the cæcum, and often the jejunum. But though theſe are the parts contained in ordinary herniæ, all the reſt of the abdominal viſcera have been known to be protruded in rarer inſtances, with the exception of the pancreas and duodenum, which, owing to the intimate connection they have with the ſpine, hardly admit of being ſufficiently diſplaced.

Only a part of the circle of an inteſtine, or a mere fold, may make the contents of a hernia; but nearly the whole alimentary canal has been been contained in ſome enormous herniæ.

Protruſions of the large inteſtines generally conſiſt, either of the cæcum, or ſigmoid flexure of the colon, theſe being the parts leaſt fixed. The cæcum is uſually protruded on the right ſide; the ſigmoid flexure on the left. Yet the cæcum and vermiform appendix have ſometimes been found in herniæ on the left ſide. (Sandifort Tab. Anat. Expl. of plates 5 and 6. Camper Demonſtrat. Anat. Pathol. part ii. p. 17.) "When we conſider," (ſays an excellent modern writer,) "that the inteſtines may deſcend to the knees, dragging even the ſtomach to the pubes, we ſhall be convinced, that the natural poſition of an organ cannot, of itſelf, enable us to determine at which opening it may be protruded." Lawrence on Ruptures, p. 11. ed. ii.

From the few obſervations already made, it muſt be ſeen, that there is ſcarcely a point of the whole circumference of the abdomen (except where the bones form an inſuperable obſtacle), at which herniæ have not been ſeen. They may occur at any part of the front and ſides of the belly; when the muſcles are imperfect, they may happen in the loins, where the kidnies have actually been protruded (Cooper on Inguinal Hernia, &c. p. 2.); hernial tumours may take place through the diaphragm into the cheſt; or they may exiſt in various ſituations about the pelvis.

The cavity of the abdomen is every where lined by a ſmooth elaſtic membrane, named the peritoneum, which may be regarded as a kind of bag including all the viſcera, and having internal productions, which ſerve to keep the various organs in their reſpective ſituations. Therefore, when a hernia happens, the protruded viſcera neceſſarily carry before them the part of the peritoneum, which happens to be immediately between them and the opening, at which the protruſion occurs. The membrane, in fact, becomes elongated into a ſort of pouch, in which the prolapſed parts lie, and to which the appellation of the *hernial ſac* is given. The opening by which the cavity of the ſac communicates with that of the abdomen is comparatively ſmall, and is named its *mouth*; the contracted part, juſt below this, is called its *neck*, while the broadeſt and moſt diſtant portion from the abdomen is denominated its *fundus*. In ſmall recent herniæ the ſac is uſually of the ſame thin texture, as the peritoneum in its natural ſtate. But in large old ruptures, the hernial ſac is ſometimes found to be of an extraordinary thickneſs. It deſerves notice, however, that the thick appearance of the peritoneal ſac is rather owing to the thickened ſtate of ſome membrane-like coverings which it has, conſiſting of faſciæ and condenſed cellular ſubſtance.

It was anciently ſuppoſed that herniæ originated from a laceration of the peritoneum and abdominal muſcles, and hence aroſe the uſe of the term *rupture*. Diſſections have now repeatedly proved, that a laceration of this deſcription is exceedingly uncommon, and that the hernial ſac is produced by an elongation of the peritoneum. By reaſon of the continual diſtenſion and preſſure which the ſac ſuſtains from its contents, it often undergoes a gradual enlargement, particularly when the maſs of the protruded viſcera is from time to time receiving additions. In this manner immenſe hernial ſacs are ſometimes formed, extending to various diſtances down the thigh, and, in ſome inſtances, even to the knee.

It is remarked by Mr. Aſtley Cooper, that a long continued preſſure of moderate force will produce an elongation and thickening of fibre; but that a greater degree will bring about an entire abſorption of parts. This, he ſays, is proved, in the firſt caſe, by the vaſt increaſe of ſize and thickneſs which the tunica vaginalis undergoes in old hydroceles; and, in the ſecond, by the entire removal of the ſternum and cartilages of the ribs in aneuriſm. It is upon the firſt of theſe principles that the hernial ſac is thickened; for in ſome very large ruptures indeed, the preſſure upon the containing parts exceeds that degree which occaſions them to become thickened, ſo that they are affected with an oppoſite change, and grow thinner and thinner. This is the reaſon why, in ſome ruptures of vaſt ſize and long duration, the convolutions and periſtaltic motions of the bowels may be diſcerned through the integuments. It alſo explains why ſome herniæ are found in part without any hernial ſac, the chief portion of it having been abſorbed, ſo that the protruded viſcera lie immediately under the ſkin and cellular ſubſtance, while the remains of the ſac are only diſtinguiſhable juſt in the neighbourhood of its mouth.

While a hernia is ſmall, and in a moſt recent ſtate, that is to ſay, immediately after its firſt occurrence, the ſac is not adherent to the ſurrounding parts, and may be puſhed back into the abdomen. At the ſame time it ought to be well underſtood by ſurgeons, that very ſoon indeed after its protruſion, it becomes ſo intimately connected by adheſions with the parts about it, that every idea of getting it back into the cavity of the belly again is vain, ſince it can ſcarcely be ſeparated from its attachments by the knife of the anatomiſt in the dead ſubject. This difficulty of detaching the hernial ſac from the ſurrounding parts, eſpecially from the ſpermatic cord, will ever forbid the practice of trying to return the ſac into the abdomen, with a view of effecting a radical cure.

It is the covering of the ſac, and not the ſac itſelf, as we have already obſerved, which is chiefly thickened in old herniæ. It appears alſo probable, from Mr. Aſtley Cooper's obſervations, that if the accounts of ſtrictures being formed by a thickening of the neck of the ſac are not always miſrepreſentations, theſe caſes are, at all events, exceedingly rare.

In ſome ſubjects ſeveral hernial ſacs exiſt at the ſame time. The foregoing author has a preparation of two hernial ſacs in each groin, and of one in an incipient ſtate on the left ſide. In theſe caſes, the viſcera do not generally protrude into all the ſacs at the ſame time. (Cooper, part i. p. 3.)

Examples are recorded of hernial ſacs being burſt by blows. (See Supplement au Traité de J. L. Petit ſur les Mal. Chir. p. 113, and Cooper, part i. p. 3.) In this circumſtance the viſcera may project immediately under the ſkin, and muſt be returned into the ſac before there is a poſſibility of getting them back into the abdomen.

Although the ſtatement, that the prolapſed bowels are contained in a hernial ſac, formed by the peritoneum, is, generally ſpeaking, perfectly correct; yet it ought to be well known that there are a few exceptions to this obſervation. Were a practitioner, from ignorance of this circumſtance, to employ his knife with incautious boldneſs, the conſequences might be of the moſt fatal nature to his patient, and of the moſt diſgraceful kind to himſelf. Thoſe herniæ which occur through unnatural holes, left by the imperfect formation of the muſcles, are ſaid to be ſometimes without any covering of peritoneum. The hernia of the bladder has no hernial ſac, neither has the common congenital hernia. Such ruptures as occur after wounds of the abdomen, or return after the operation, or after the practice of ſome method for the deſtruction of the ſac, are alleged to be without any peritoneal inveſtment. The viſcera, in ſome umbilical herniæ, are aſſerted to have been deſtitute of a hernial ſac, though we are rather inclined to believe that accounts of this laſt kind are founded in miſtake, as will be hereafter more particularly noticed.

Cauſes of Herniæ.—Theſe are divided into the *exciting* and *prediſpoſing*. The principal exciting cauſes are ſuch as operate, either by diminiſhing the cavity of the abdomen and compreſſing the viſcera, or by increaſing the volume of the contents of the belly beyond what the reſiſtance of the containing parts can bear.

The abdominal viſcera may be conſidered as occupying a place where they are expoſed to the compreſſive action of ſome exceedingly powerful organs, namely, the diaphragm and abdominal muſcles. In the indiſpenſible and continual function of reſpiration, theſe muſcles are inceſſantly employed. Their action, however, is alternate; in inſpiration, the diaphragm propelling the viſcera downward, ſo as to enlarge the capacity of the cheſt, while the abdominal muſcles yield and make no reſiſtance; in expiration, the abdominal muſcles acting, ſo as to puſh up the viſcera and diaphragm, which is then paſſive, and thus aid in diminiſhing the cavity of the thorax. In the performance of the vital function of breathing, therefore, the abdominal viſcera are ſuſtaining a certain degree of compreſſion, which muſt incline them to protrude at any point where they are not ſufficiently ſupported by the parietes of the cavity in which they naturally lie. But there are occaſions on which the diaphragm and abdominal muſcles all act at once in compreſſing the bowels and leſſening the ſpace allotted for them. This being the ſtate of things, we muſt not feel ſurpriſed, that protruſions of the viſcera are among the moſt common diſeaſes of the human race.

Violent action of the abdominal muſcles, from whatever cauſe it may ariſe, may be accounted the moſt frequent occaſion of herniæ. Hence the diſeaſe is often brought on by exceſſive coughing, and is particularly common among perſons who play upon wind inſtruments, or who have long been troubled with aſthma. Lifting heavy weights is a thing, above all others, conducive to the complaint, ſince the muſcles of the abdomen exert themſelves with great force at a time when the body is bent, and the openings in the groins conſequently relaxed.

Coſtive perſons are alſo reckoned particularly ſubject to herniæ, becauſe they are compelled to ſtrain, and make the muſcles act with vaſt power on the bowels, before they can void their fæces. In the caſe of ſtraining, the diaphragm is firſt put into action by a deep inſpiration, and then the abdominal muſcles. The viſcera, compreſſed by theſe two forces, eſcape wherever the reſiſtance of the ſides of the abdomen is not equal to the degree of preſſure.

Herniæ are ſaid to be very frequently the conſequence of ſtrictures in the urethra, patients, afflicted with ſtoppages in this canal, being often under the neceſſity of exerting the abdominal muſcles with peculiar force, in order to be able to expel the urine.

Carrying heavy burdens, running, jumping, vomiting, parturition, and, in ſhort, almoſt every ſort of conſiderable effort and exertion, may prove the exciting cauſe of a hernia, by throwing the muſcles, which have the power of compreſſing the viſcera, into a ſtate of ſtrong and violent action. In this laſt circumſtance, a hernia may be formed in a perſon who is no way pre-diſpoſed to the diſeaſe; and with how much greater facility a rupture may occur, when there is a pre-diſpoſition, it is needleſs to dwell upon.

The ſame principles ſerve to explain why herniæ are obſerved to be particularly frequent among the labouring claſſes of ſociety, and the inhabitants of mountainous countries. The hooping-cough and crying are, for the ſame reaſon, not an uncommon occaſion of ruptures in children. See Lawrence on Hernia, p. 18. ed. 2.

We have ſtated that ſome of the exciting cauſes of herniæ operate by increaſing the volume of the contents of the belly beyond what the reſiſtance of the containing parts can bear. Thus, protruſions of the omentum and meſentery are often the conſequence of theſe parts becoming loaded with fat. When fatneſs comes on very ſuddenly, it is particularly apt to occaſion a rupture, the abdominal muſcles not being able to accommodate themſelves to the enlargement of the contents of the belly with ſufficient quickneſs.

The ſwelling of the uterus in pregnancy ſometimes gives riſe to herniæ, eſpecially thoſe of the umbilical and femoral kinds.

Blows and kicks upon the abdomen have been obſerved to excite hernial tumours. Rough horſe exerciſe, the jolting of carriages, and the preſſure of tight clothes around the body, are alſo noticed as promoting the frequency of the diſeaſe. Cooper, part i. p. 13.

The *prediſpoſing cauſes* are generally circumſtances which have a tendency to diminiſh the reſiſtance made by the parietes of the abdomen to the protruſion of the viſcera.

Weakneſs of every kind is accounted a very principal prediſpoſing cauſe of herniæ, and it is ſaid to become ſo by inducing a relaxed ſtate, not only of thoſe apertures through which the bowels uſually eſcape, but alſo a relaxation of the peritoneum, and all the proceſſes of it, which ſerve to confine the various viſcera in their reſpective ſituations, and limit their moveableneſs. Hence, perſons who have been debilitated by fevers are much expoſed to the danger of herniæ, if they ſubject themſelves to great bodily exertions before they have regained their ſtrength.

Old age is likewiſe conſidered as a pre-diſpoſing cauſe, by the general relaxation which it brings into the conſtitution; and hence the great frequency of the diſeaſe among ſuch old perſons as are obliged to labour hard for their livelihood.

Taking large quantities of oil with the food, living more upon liquids than ſolids, wearing too much clothing, and reſiding in warm climates, are all ſet down by ſurgical writers among the cauſes which pre-diſpoſe people to hernia on the principle of relaxation. We cannot venture to pronounce reſpecting the accuracy of ſome of theſe alleged circumſtances; but of the greater prevalence of ruptures in warm than cold climates, not the leaſt doubt can be entertained. Juville, a celebrated truſs-maker in Paris, found that the number of ſubjects with herniæ was about one-thirtieth of the population in Germany, and the north of Europe; one-fifteenth in Italy and Spain; and one-twentieth in France and England. (Traité des Band. Hern. p. 21, 22.) In Malta and Egypt, the vaſt numbers of hernial tumours ſeen among the natives, have attracted the notice of all ſurgeons who have viſited thoſe countries.

Some perſons are, in all probability, born with a prediſpoſition to herniæ, in conſequence of having abdominal rings of a wider and weaker ſtructure than thoſe of people in general. The ſame may be the caſe alſo with reſpect to the other openings through which the abdominal viſcera ſometimes protrude. The difference in the dimenſions of the abdominal ring in the two ſexes ſeems to afford a rational explanation why inguinal herniæ are common in men, and uncommon in women; while the ſpace below Poupart's ligament in the latter, being greater than what it is in the former, offers a reaſon why females are moſt ſubject to the femoral hernia. In the male ſex, alſo, the reſiſtance which the abdominal ring is capable of making to protruſions of the bowels, muſt vary conſiderably in different perſons, according to the ſtrength of the parts concerned in ſhutting up that aperture.

A change of the body, from a very fat to a lean condition, is alſo enumerated among the pre-diſpoſing cauſes of hernia, and is thought to become ſo by the abſorption of the adipous matter which had loaded the ſpermatic cord, and diſtended the ring. (Cooper, part i. p. 12.) Here, perhaps, the principle of weakneſs and relaxation may have ſome ſhare in producing the effect.

Worms, which penetrate the cavity of the belly, are always included, by ſurgical writers, among the pre-diſpoſing cauſes of this diſeaſe. After the injury is healed, it ſeems that the part is incapable of affording the requiſite degree of ſupport, and a protruſion of ſome of the viſcera is of courſe a common conſequence.

A pre-diſpoſition to hernia is obſerved ſometimes to depend upon hereditary conformation. Mr. Aſtley Cooper informs us that he has frequently been conſulted by fathers, themſelves wearing truſſes, for ſeveral of their children afflicted with the diſeaſe. In ſuch caſes he found, by attentive examination, that the abdominal ring was very imperfectly formed, extending nearly as far as the ilium, inſtead of being only about an inch and a half in length. In theſe caſes, the tranſverſe tendinous fibres, which ſhut up the ſuperior margin of the ring, were either abſent, or very imperfect. Cooper, part i. p. 12.

Beſides the foregoing circumſtances, we have to mention dropſy as pre-diſpoſing to the occurrence of umbilical herniæ, probably by diſtending and dilating the natural aperture of the navel. Repeated pregnancy is, on a ſimilar principle, conducive to the formation of hernial diſeaſes.

We ſhall finiſh this account of the cauſes of ruptures with a ſhort quotation from a late matchleſs treatiſe upon the ſubject. "Particular ſubjects manifeſt an unqueſtionable diſpoſition to the complaint. In ſuch perſons, a very ſlight occaſional cauſe, ſuch as the act of coughing or ſneezing, will bring on a rupture. The complaint indeed appears ſometimes ſpontaneouſly. I know, ſays Richter, a ſavant, who leads a ſedentary life, and in whom an inguinal hernia appeared ſuddenly ſome time ago. I applied a bandage, and, in a few weeks, a ſimilar hernia came on the oppoſite ſide; a bandage was applied to this alſo; and in a very ſhort time a crural hernia made its appearance. I have ſeen ſeveral ſimilar caſes, and have known four, or even five herniæ come in the ſame ſubject, without the leaſt occaſional cauſe. (Traité des Hernies, p. 9.) The neceſſity of admitting ſome original difference of ſtructure, favourable to the occurrence of ruptures, is apparent from this conſideration, *viz.* that the openings exiſt in all ſubjects, and the occaſional cauſes are applied in all individuals; but the effect is only partial." Lawrence on Ruptures, p. 21. ed. 2.

Of Reducible Herniæ.—Under this head are comprehended ſuch as are in a quiet ſtate, and admit of being put back into the cavity of the abdomen without difficulty, or, indeed, often return of themſelves into that ſituation when the patient is in a recumbent poſture. The protruded parts commonly go up at night upon the patient lying down in bed, and come down again in the morning upon his getting up and reſuming an erect poſition.

The uſual ſymptoms of a reducible hernia, quite free from ſtrangulation, are of the following deſcription. An indolent tumour may be ſeen or felt at ſome point of the parietes of the abdomen, moſt frequently deſcending out of the abdominal ring, or from juſt below Poupart's ligament, or elſe out of the navel, but occaſionally from various other ſituations, as we have already mentioned. The ſwelling moſtly originates ſuddenly, except when that kind of pre-diſpoſition prevails, in which the diſeaſe ſeems to ariſe almoſt ſpontaneouſly, and to conſiſt of a gradual yielding of the containing parts. The tumour is generally ſubject to a change of ſize, being ſmaller when the patient lies down on his back, and larger when he ſtands up, or holds his breath. It frequently undergoes a diminution when preſſed, and grows large again when the preſſure is removed. Its ſize and tenſion often increaſe after a meal, or when the patient is flatulent. It is free from pain, inflammation, and diſcolouration of the integuments. Its contents, if omentum, betray a ſoft doughy feel; if inteſtine, the ſenſation communicated to the fingers of an examiner is frequently ſomewhat tenſe and elaſtic. It is alſo a circumſtance, highly meriting notice, that patients, with large reducible herniæ, are apt to be troubled with colic, conſtipation, and vomiting, in conſequence of the unnatural ſituation of the bowels. Very often, however, the functions of the viſcera ſeem to ſuffer little or no interruption.

In ſome inſtances, the reduction is attended with a degree of trouble, and requires the aid of preſſure. A perſon, in the foregoing condition, lives in a conſtant ſtate of danger. Any accidental fall, violent effort, or ſlight inattention to the ſtate of the bowels, is apt to produce a ſtrangulation of the prolapſed parts, the conſequences of which change are fatal, without ſpeedy and judicious aſſiſtance.

If the caſe be an *enterocele*, and the portion of inteſtine be ſmall, the tumour is ſmall in proportion; but though ſmall, if the gut be diſtended with wind, inflamed, or have any degree of ſtricture made on it, it will be tenſe, reſiſt the impreſſion of the finger, and give pain upon being handled. On the contrary, if there be no ſtricture, (which is the caſe we are immediately conſidering,) and the inteſtine ſuffers no degree of inflammation, let the prolapſed piece be of what length it may, and the tumour of whatever ſize, yet the tenſion will be little, and no pain will attend the handling of it; upon the patient's coughing, it will feel as if it were blown into; and, in general, it will be found very eaſily returnable, a guggling noiſe being often audible, when the bowel is aſcending.

If the hernia be an *epiplocele*, or one of the omental kind, the tumour has a more flabby, and a more unequal feel; it is in general perfectly indolent, is more compreſſible, and, if in the ſcrotum, is more oblong, and leſs round, than the ſwelling occaſioned by an inteſtinal hernia in the ſame ſituation; and if the quantity be large, and the patient adult, it is, in ſome meaſure, diſtinguiſhable by its greater weight. A piece of omentum in general paſſes up very ſlowly, and never makes a guggling noiſe.

If the caſe be an *entero-epiplocele*, that is, one conſiſting of both inteſtine and omentum, the characteriſtic marks will be leſs clear than in either of the ſimple caſes; but the diſeaſe may eaſily be diſtinguiſhed from every one, by any one in the habit of making the examination. See Pott on Ruptures.

It muſt be acknowledged, however, that it is often difficult, and even impoſſible, to aſcertain what are the contents of the hernia, by merely handling the ſwelling. This is more eſpecially the caſe when the hernia is old, large, and tenſe. In ſuch inſtances the protruded viſcera undergo ſurpriſing changes in their figure and ſtructure, while the thickneſs of the hernial ſac tends materially to impede the acquirement of any accurate information, as to the nature of its contents, by the fingers of an examiner. It is often equally difficult to form a right opinion in regard to what is contained in a ſmall hernia.

In caſes of indolent reducible herniæ, a piece of inteſtine is generally found to paſs up into the abdomen with more facility than a portion of omentum. This circumſtance is ſaid to be owing to the very ſmooth and ſlippery ſurface of the inteſtine. On the other hand, the omentum, being ſoft and unequal, and having its ſurface moulded by the contiguous parts, paſſes up with more difficulty. Hence, when a portion of the contents of a hernia ſlips up quickly, and with a guggling noiſe, leaving ſome thing behind, which is leſs eaſy of reduction, it is reaſonable to infer, that the diſeaſe is, in all probability, an entero-epiplocele. See Lawrence on Ruptures, edit. 2. p. 28.

Nothing is more common, than to ſee perſons with indolent reducible herniæ walking about, and following their wonted avocations, with the tumours down, expoſed to every ſort of accident, and totally unſupported. Since no preſent pain, nor any immediate conſiderable inconvenience, is experienced, all idea of what may be the conſequences of the hernia is too often quite out of the mind; nor does, in many inſtances, a juſt ſenſe of the manner, in which ſuch patients are continually expoſed to peril, have the leaſt effect, either in making them pay due attention to the diſeaſe, or in leading them to obſerve as quiet, temperate, and regular a mode of living, as their circumſtances in life might permit.

That the protruſion of any part of the viſcera from the cavity of the abdomen renders a perſon particularly expoſed to the danger of an additional quantity of the viſcera becoming alſo protruded, and probably ſtrangulated, is an important truth, which cannot be too deeply impreſſed upon the memory of both patient and ſurgeon. While a prolapſed bowel is ſuffered to remain ſo, it keeps the mouth of the hernial ſac always open, and ready to receive any additional protruſion. Therefore, every perſon afflicted with a reducible hernia, ought to have the danger of ſuffering it to continue down properly explained to him by his ſurgeon, who ſhould alſo repreſent the prudence and neceſſity of never neglecting to wear a truſs. By this a conſtant preſſure is to be applied to the part, where the hernia opens into the abdomen, ſo as to ſhut the mouth of the ſac, and thus make an effectual reſiſtance to the protruſion of its contents.

Herniæ, which are capable of eaſy and immediate reduction, and are not attended by any troubleſome, or bad ſymptoms, are often met with both in infants and adults. "In the former," ſays Mr. Pott, "as the deſcent ſeldom happens, but when the infant ſtrains to cry, and the gut is either eaſily put up, or returns *ſuâ ſponte*, as ſoon as the child becomes quiet, it is often either totally unattended to, or an attempt made to reſtrain it only by a bandage made of cloth, or dimity, and which being ineffectual for ſuch purpoſe, lays the foundation for future trouble and miſchief.

"This is, in great meaſure, owing to a common opinion, that a young infant cannot wear a ſteel truſs: a generally prevailing error, and which ought to be corrected. There is no age at which ſuch truſs may not be worn, or ought not to be applied; it is, when well made, and properly put on, not only perfectly ſafe and eaſy, but the only kind of bandage that can be depended upon: and as a radical cure depends greatly on the thinneſs of the hernial ſac, and its being capable of being ſo compreſſed as poſſibly to unite, and thereby entirely cloſe the paſſage from the belly, it muſt therefore appear to every one who will give himſelf the trouble of thinking on the ſubject, that the fewer times the parts have made a deſcent, and the ſmaller and finer the elongation of the peritoneum is, the greater the probability of ſuch cure muſt be.

"The ſame method of acting muſt, for the ſame reaſons, be good in every age in which a radical cure may reaſonably be expected; that is, the prolapſed parts cannot be too ſoon returned, nor too carefully prevented from falling down again, every new deſcent rendering a cure both more diſtant and more uncertain.

"As ſoon as the parts are returned, the truſs ſhould be immediately put on, and worn without remiſſion, care being taken, eſpecially if the patient be an infant, to keep the parts on which it preſſes conſtantly waſhed, to prevent galling.

"It can hardly be neceſſary to ſay, that the ſurgeon ſhould be careful to ſee that the truſs fits, as his ſucceſs and reputation depend on ſuch care. A truſs which does not preſs enough, is worſe than none at all, as it occaſions loſs of time, and deceives the patient, or his friends; and one which preſſes too much, or on an improper part, gives pain and trouble, by producing an inflammation and ſwelling of the ſpermatic cord, and ſometimes of the teſticle.

"In adults, whoſe ruptures are of long ſtanding, and accuſtomed to frequent deſcent, the hernial ſac is generally firm and thick, and the aperture in the tendon of the abdominal muſcle large; the freedom and eaſe with which the parts return into the belly, when the patient is in a ſupine poſture, and the little pain which attends a rupture of this kind, often render the perſons who labour under it careleſs: but all ſuch ſhould be informed, that they are in conſtant danger of ſuch alteration in their complaint, as may put them into great hazard, and perhaps deſtroy them. The paſſage from the belly being open, the quantity of inteſtine in the hernial ſac is always liable to be increaſed, and when down to be bound by a ſtricture. An inflammation of that portion of the gut which is down, or ſuch obſtruction in it as may diſtend and enlarge it, may at all times produce ſuch complaints as may put the life of the patient into imminent danger; and therefore, notwithſtanding this kind of hernia may have been borne for a great length of time, without having proved either troubleſome or hazardous, yet as it is always poſſible to become ſo, and that very ſuddenly, it can never be prudent or ſafe to neglect it.

"Even though the rupture ſhould be of the omental kind, (which conſidered abſtractedly is not ſubject to that degree or kind of danger to which the inteſtinal is liable) yet it may be ſecondarily, or by accident, the cauſe of all the ſame miſchief; for while it keeps the mouth of the hernial ſac open, it renders the deſcent of a piece of inteſtine always poſſible, and conſequently always likely to produce the miſchief which may proceed from thence.

"They who labour under a hernia thus circumſtanced, that is, whoſe ruptures have been generally down while they have been in an erect poſture, and which have either gone up of themſelves, or have been eaſily put up in a ſupine one, ſhould be particularly careful to have their truſs well made, and properly fitted; for the mouth of the ſac, and the opening of the tendon being both large and lax, and the parts having been uſed to deſcend through them, if the pad of the truſs be not placed right, and there be not a due degree of elaſticity in the ſpring, a piece of inteſtine will, in ſome poſture, ſlip down behind it, and render the truſs productive of that very kind of miſchief which it ought to prevent.

"It is ſcarcely credible how very ſmall an opening will ſerve for a portion of gut or caul to inſinuate themſelves into at ſome times. Now, though in perſons of mature age it moſt frequently proves impracticable ſo to compreſs the mouth of the hernial ſac, as abſolutely to cloſe it, yet by the conſtant uſe of a well-made truſs, it may be ſo leſſened, as to render the deſcent of a piece of inteſtine into it much more difficult: from whence we may learn the great conſequence of having the part completely reduced before the truſs is applied, and the danger that may be incurred by laying ſuch bandage aſide after it has been worn ſome time; ſince the ſame alteration which renders the deſcent of the gut leſs eaſy, will alſo make the reduction more difficult, if a piece ſhould happen to get down: and hence alſo we may learn why the bandage ſhould be long and unremittingly worn by all thoſe whoſe time of life makes the expectations of a perfect cure reaſonable, many of the ruptures of adults being owing to the negligent manner in which children at ſchool are ſuffered to wear their truſſes.

"I know a gentleman who has for ſome years had an omental rupture, which was neglected while he was young, and he having naturally a lax habit, and the abdominal opening being much dilated, he finds it extremely difficult to keep it up, even with the beſt truſs he can get, behind which it will ſometimes ſlip down: when this happens, it gives him ſuch immediate and acute pain at his ſtomach, and makes him ſo intolerably ſick, that he is obliged immediately to throw himſelf on his back, and procure the return of the piece of omentum." See Pott on Ruptures.

The preceding obſervations are truly worthy of the great and diſtinguiſhed ſurgeon who is the author of them. This, and ſeveral other parts of his treatiſe on ruptures, will always ſtand high in the eſtimation of the ſurgical profeſſion. Much we owe to ſome later writers for the manner in which they have extended and improved our information, concerning hernial diſeaſes; yet, in no book can we find more knowledge of the right practical kind, than ſtill exiſts in Pott's account of ruptures. The defect of this part of his writings principally lies in ſome anatomical points, which have ſubſequently been rendered more correct by the united obſervations of Gimbernat, Mr. Hey, Mr. Aſtley Cooper, and Mr. Lawrence.

But, to return to the ſubject of reducible herniæ, it behoves every ſurgeon to underſtand, that though theſe caſes are attended with no immediately preſſing ſymptoms, they ſometimes occaſion conſiderable trouble, eſpecially when neglected, and nothing is done to check their becoming of immenſe ſize. The degree of inconvenience, in fact, always increaſes with the ſize of the tumour. The portion of inteſtine, or omentum, which has quitted the abdomen, produces (as Mr. Lawrence deſcribes) various complaints from its connection with the parts within. From this ſource of irritation proceed nauſea and vomiting, indigeſtion and colic. As the viſcera become accuſtomed to their unnatural ſituation, theſe ſymptoms gradually wear away. Still, as the tumour conſtantly increaſes in ſize, a large part of the viſcera is deprived of that preſſure and ſupport which it naturally derives from the reſpiratory muſcles; the paſſage of the food through the alimentary canal becomes difficult and protracted; and hence large ruptures are almoſt invariably attended with flatulence and conſtipation. The patient is precluded from all active and laborious employments, and from all conſiderable exertions which neceſſarily augment the tumour, and are attended with great riſk of more immediate danger, by forcing down freſh parts, ſo as to cauſe ſtrangulation. The opening through which the viſcera paſs out, muſt ſubject them to more or leſs preſſure, which will enable us to account for that effuſion of fluid into the cavity of the ſac, generally obſerved in old ruptures, as well as for the formation of ſuch adheſions of the parts to each other, and to the hernial ſac; circumſtances changing the caſe from a reducible to an irreducible ſwelling. As the opening is rendered larger by the protruſion of the parts, and the preſſure on the viſcera, which cauſes the deſcent, is frequently renewed, additions to the tumour are eaſily made. In ſituations where poſition is favourable, and the ſurrounding parts offer no obſtacle, as in the ſcrotum, the only limit to the poſſible bulk of a rupture ariſes from the connections of the parts within. Inſtances are not uncommon where all the moveable viſcera have been contained in ſuch a ſwelling; and even thoſe which are more fixed may be gradually diſplaced by the conſtant dragging of organs connected with them. See Lawrence on Ruptures, p. 31, 32. edit. 2.

Of Truſſes.—We have endeavoured to repreſent the imprudence of ſuffering the parts, which form the contents of a hernia, to lodge in the hernial ſac, when they are capable of reduction. In this circumſtance, they ought always to be returned into the cavity of the belly with as little delay as poſſible, and conſtantly kept there by means of a truſs. A perſon may have a hernia, and allow its contents to deſcend into the ſac, perhaps without any preſent inconvenience; but the perils and diſagreeable circumſtances which may be the conſequence of ſuch temerity, ought to frighten him into a different line of conduct. The quiet harmleſs ſtate of the protruded viſcera is not at all to be depended upon, being of very uncertain continuance. Many things may lead to a change, in which the patient's life will be brought into the moſt imminent danger. Any exertion which occaſions an additional protruſion; any ſlight blow on the tumour; any intemperance in diet; may ſuddenly convert a ſimple, reducible, indolent hernia, into a caſe attended with all the alarming, and often fatal ſymptoms, which proceed from the ſtrangulation of the protruded parts. But, ſuppoſing the patient to eſcape theſe evils for a great length of time, other unpleaſant things will be the reſult of his raſh neglect. The hernia, as we have already deſcribed, will continue to grow larger and larger, until its magnitude is ſuch, as interferes with the exerciſe of any active kind of life, is accompanied with a protruſion of all the moveable viſcera of the abdomen, and brings on afflicting diſorders of the functions of the various parts. Even the pylorus of the ſtomach has been found dragged into the mouth of a hernial ſac.

The effect of every eligible truſs, or bandage for ruptures, is to produce an adequate, unremitting, equal degree of preſſure upon the part where the hernia opens into the abdomen, ſo as to ſhut up the paſſage through which the parts eſcape from the cavity in which they are naturally contained. No reaſonable expectation can be indulged, that any contrivance will operate in this manner, unleſs the preſſure which it makes is uninterrupted, and of ſufficient power, being alſo ſuch as will not induce any complaints which might oblige the patient, for a certain time, to deſiſt from wearing the apparatus.

All bandages for ruptures are either elaſtic, or inelaſtic. The laſt are uſually made of dimity or leather. They are by no means fit for common uſe. In conſequence of the continual change which is taking place in the dimenſions of the abdomen, in expiration and inſpiration, ſuch bandages are neceſſarily rendered now too ſlack, and now too tight; and ſince the viſcera are liable to be protruded, on the paſſage being left in the leaſt open, it is quite obvious that, in truſting to any inelaſtic apparatus, the patient puts his life into great danger. This peril will always be ſtill more conſiderable, in proportion as the perſon is in an active mode of living. The inefficacy of the bandage is ſoon perceived by the patient himſelf, who endeavours to make its operation more availing by tightening it. But this is not only apt to bring on pain and ſwelling of the teſticles, (ſuppoſing the caſe to be an inguinal hernia,) but the ſame affection of the external parts, to which the bandage is applied. Theſe circumſtances compel the patient to diſcontinue its employment, till the complaints which it has occaſioned have had time to ſubſide. Now, nothing is more dangerous than even leaving off any kind of contrivance deſigned to keep the contents of a reducible hernia within the abdomen. In Germany, where inelaſtic bandages are much uſed, Richter has ſeen a ſwelling of the teſticle, cirſoceles, and hydroceles, ariſe from their employment.

We have already delivered Mr. Pott's ſentiments, with reſpect to the propriety of applying ſteel truſſes to infants. Such inſtruments are as much calculated for them as for adults, and the opinion to the contrary is totally deſtitute of foundation.

All inelaſtic bandages for the ſupport of herniæ are now juſtly regarded as only affording a falſe ſecurity, more dangerous even than a total omiſſion of this kind of ſupport, ſince they encourage the patient to take violent exerciſe, without apprehenſion of the probable conſequences. Cooper, part i p. 14.

The only way in which any apparatus of this kind may be uſeful in caſes of ruptures, is as a ſuſpenſory bandage, when the hernia does not admit of being reduced in conſequence of adheſion, &c. Here it may be very ſerviceable in ſupporting the parts, and preventing the hernia from acquiring a vaſt and dangerous magnitude. Elaſtic bandages for hernia, or (as they are commonly called) truſſes, may be ſo made as always to act with an equal unremitting force in every attitude of the body. When the abdomen riſes, they yield by reaſon of their elaſticity; and when it ſinks down, the ſame property ſtill keeps them in contact with its ſurface. The moſt important part of a common truſs conſiſts of a flat narrow piece of ſteel, termed the *ſpring*, which goes round one-half of the body, the anterior end extending to the abdominal ring, the poſterior reaching beyond the ſpine. To give the ſpring a proper degree of elaſticity has always been looked upon as a matter of the higheſt conſequence. It has been alleged that ſteel is too hard, and iron too ſoft for the purpoſe, and, therefore, Arnaud and Richter have recommended making the ſprings of a mixture of ſteel and malleable iron. However, this advice is now deemed objectionable, and it is univerſally acknowledged in this country, that as the ſpring cannot be made too elaſtic, the beſt ſteel is what ſhould be employed for its conſtruction. Much of the power of the ſpring muſt manifeſtly depend upon the thickneſs of the piece of ſteel. When the patient leads an active life, and has a rupture which it is difficult to keep up, as is often the caſe with omental ruptures, and large old herniæ with great dilatation of the abdominal ring, a ſtrong ſpring will be neceſſary, and, of courſe, the plate of ſteel ſhould be ſomewhat thicker than in other inſtances. In children, and perſons who lead ſedentary lives, a weaker ſpring will ſuffice.

A great deal will depend upon making the ſpring fit cloſely upon every part of the body, ſo as to leave no hollow under the ſteel, which ſhould be adapted to all prominences and depreſſions.

The anterior end of the ſpring terminates in an expanded plate of iron called its *head*, to which it is rivetted. This latter part has its poſterior ſurface furniſhed with a cuſhion, termed the *pad*, and adapted in ſize and ſhape to the opening which it is intended to cloſe. Now, if the pad of the truſs does not fit cloſely, no preſſure will be made upon the aperture through which the viſcera are ready to paſs, and, conſequently, a protruſion is liable to happen. When any other part of the truſs does not apply itſelf accurately to the ſurface of the body, the whole inſtrument will not fit with ſufficient firmneſs, and will be apt to ſlip. Beſides, when a truſs makes more preſſure in one place than another, it is likely to be productive of pain.

A truſs, properly ſuited for every particular caſe, may be obtained, either by making the patient try on ſeveral already conſtructed, and chooſing one which fits well; or by having one made from the patient's meaſure. The beſt thing for taking ſuch meaſure, is a piece of flexible wire, doubled and twiſted, which will take and retain the neceſſary curvatures. According to Richter, however, it is proper to let the meaſure by the wire be an inch longer than appears requiſite, as the ſtuff uſed for covering the ſpring makes this allowance neceſſary. Above all things, it is eſſential to give a proper degree of curvature to that part of the ſpring which forms the middle of the ſemi-circle, and which, when the truſs is put on, ſurrounds the os ilium. When the circle, which it deſcribes, is too ſmall, the head of the truſs will not fit with due cloſeneſs upon the abdominal ring, and the patient will not be in a ſtate of ſecurity. When the circle is too large, the truſs will not fit cloſely upon the hip, and will be likely to change its ſituation. The preſſure, which is made by the pad of the truſs upon the abdominal ring and neck of the hernial ſac, ſhould be in a direction obliquely upwards, eſpecially upon patients who are very fat. Hence, the lower margin of the front plate of the ſemi-circular ſpring ought to incline a little inwards, ſo as to turn its inner ſurface obliquely upwards. By this means, an equal preſſure will be made upon every point of the abdominal ring. When the plate of the truſs has a perpendicular conſtruction, and conſequently preſſes upon the ring in an horizontal way, the preſſure is greater above than below, and an opportunity is left for the bowels to be protruded through the lower part of the ring. The poſterior end of the ſpring, which is applied to the ſpine, muſt have a contrary inclination, that is to ſay, the upper edge of the back part of the ſteel muſt incline ſomewhat more forwards than the lower one, whereby the inner ſurface will be turned forwards and a little downwards. When this part of a truſs is made in a perpendicular manner, its lower edge generally makes more preſſure than the upper one, and the place which is preſſed upon is rendered ſore and painful.

Some are of opinion, that the ſpring of a truſs ſhould be no more than a ſemi-circle, the forepart of which ſhould be upon the abdominal ring, while the poſterior end lies upon the ſpine. Others have been in favour of making the ſpring of ſuch a length, that its back end may extend over the ſpine, and reach as far as the front edge of the os ilium of the ſound ſide. It is alſo alleged, that a truſs of this conſtruction fits more ſteadily, and is capable of making more effectual preſſure. (Camper, Mem. de l'Acad. de Chirurgie, t. 15, p. 57.) Richter, however, expreſſes his inability to comprehend how a long ſpring can make more preſſure than a ſhort one, and, indeed, when inelaſtic iron was uſed, it could not. The inelaſtic iron ſemi-circle had its two fixed points of action; one was upon the abdominal ring, the other upon the ſpine. Theſe two points, being oppoſite to each other, were, with ſuch a ſpring, more advantageous than any others. But there can be no doubt, that when the ſpring is made of highly tempered elaſtic ſteel, the length of this part of the truſs increaſes its power of making preſſure. We do not mean, however, to ſay, that Camper's advice upon this point ought to be adopted. A truſs, with ſo long a ſpring, might be objectionable; for when the patient lies upon the ſound ſide, he would certainly preſs the whole inſtrument towards the other ſide, ſo as to create a riſk of the pad of the truſs being puſhed away from the abdominal ring. Such a truſs muſt alſo be particularly inconvenient to the patient.

In order that a truſs may fit in a ſteady manner, it is neceſſary that it be applied round fixed immoveable points. Of this deſcription are the ſacrum and the os ilium. Were the inſtrument applied to the ſoft parts of the abdomen above the pelvis, which parts afford no fixed points, it would never continue in the ſame poſition. A truſs likewiſe ought always to be put on in ſuch a manner, that it may paſs round the os ilium. At the ſame time, it ſhould not reach ſo low as to touch the trochanter major, as it would then be ſubject to diſturbance from every motion of the thigh. When the ſpring is arranged at a proper height for avoiding the trochanter major, it is obvious, that if its anterior end were to run forward in a ſtraight horizontal direction, the pad of the truſs would be ſo high as to be incapable of covering the lower part of the abdominal ring. Hence, that part of the ſpring which is behind and next to its head, and which has been called the neck of the truſs, has ſometimes been made with an angle, which carries the head of the truſs ſomewhat lower, ſo as to apply itſelf properly to the abdominal ring. Camper has found fault with this kind of conſtruction, and aſſerts, that it makes the head of the truſs liable to be puſhed upwards too far. His advice is, let the neck of the inſtrument have a courſe ſtraight forwards. But, according to Richter, with a truſs of this kind, two defects can hardly be avoided. He obſerves, that when the truſs is put on high enough to be clear of the trochanter major, the pad will not cover the lower part of the abdominal ring. On the other hand, when it is ſo applied, as to make its pad properly cover this opening, the body of the truſs will be ſo near the trochanter as to be affected by its motions.

Notwithſtanding a truſs may be made according to the foregoing rules, and fit very cloſely, its head will ſometimes ſlip about. In fat perſons, whoſe bellies project much, it is apt to ſlip down; in lean people, it readily gets up too high. The latter change is the worſt, as the lower part of the ring thereby becomes unguarded, the very place where a protruſion of the viſcera is moſt diſpoſed to occur. The ſlipping of the pad of the truſs upward, however, may be eaſily prevented by the application of a thigh-ſtrap, which generally paſſes from the middle of the ſpring, under the thigh of the affected ſide, and is faſtened to the head of the truſs. When, as is often the caſe, the thigh-ſtrap is found to incommode the patient exceedingly, it may at all events be diſpenſed with, provided care be taken to hinder the aſcent of the pad of the truſs by having the hook, to which the body-ſtrap is faſtened, placed at the upper part of the pad of the truſs, or upon the angle of the neck, which is ſtill higher. So, alſo, in the oppoſite caſe, in which the pad of the truſs has a tendency to ſlip too far down, the inconvenience may be obviated by placing the hook at the loweſt part of the plate of iron.

The ſpring of the truſs is commonly covered with ſoft leather, while its inner ſurface, which comes into contact with the patient's body, is lined with thick flannel, between which and the metal wool is ſometimes put, in order to prevent any chafing or painful preſſure. As leather readily imbibes perſpiration, and thereby becomes ſpoilt, a propoſal has been made to cover truſſes with hare-ſkin, with the hair outwards. This covering is ſaid to be more durable, and to be better capable of reſiſting the effect of perſpiration. This appears to us an improvement of conſequence, becauſe the employment of any covering, which ſoon wears out, obliges the patient, every now and then, to leave his truſs off, for the ſake of getting it repaired, ſo that he becomes expoſed to the danger of leaving the mouth of the hernial ſac open.

Upon the inner ſurface of the anterior plate of the truſs is placed the pad, which is to be made of ſomething ſtuffed with hair or wool. The inſide of the pad ſhould have a ſlightly excavated ſurface, and be neither too hard nor too ſoft. When it is too ſoft, the preſſure which it makes is too feeble; and when its hardneſs is beyond the proper degree, it is apt to injure the ſpermatic cord, and does not apply itſelf accurately to the ſurface of the part to which it is applied. In the Journal de Medecine, tom. 36, a propoſal has been made to uſe a bladder, ſtrongly diſtended with air, as a pad, inſtead of one made of wool. Such a contrivance, however, does not ſeem likely to continue long ſerviceable, as the bladder would, in all probability, ſoon become flaccid. When the ſurface of the pad is too convex or conical, which is a very common defect, its prominent central part makes ſtrong preſſure, while, on the other hand, the ſides lie hollow, ſo that the bowels are apt to protrude, eſpecially when the pad ſlips in the leaſt. The preſſing power of the whole apparatus operates principally at the point of the conical inner ſurface of the pad, and not properly in other places. Hence the preſſure is very likely to be productive of pain and uneaſineſs. On the contrary, when the inner ſurface of the pad is flat, the truſs, though endued with conſiderable elaſtic force, will not create any unpleaſant ſenſations, becauſe the preſſure of the pad will be made upon a ſpace of greater extent, or, in other terms, upon a greater number of points. Beſides, a conical pad preſſes inward the margins of the abdominal ring, and tends to keep this opening continually dilated, ſo as rather to facilitate the occurrence of a hernia than promote its radical cure.

The larger and older the hernia is, the wider and more open is in general the abdominal ring. In ſuch a caſe, therefore, the pad of the truſs muſt be made large, in order that it may cover and ſhut up the whole of the ring. The ſize of the pad, indeed, ſhould always, in ſome meaſure, be regulated by that of the hernia. A ſmall pad is alſo ſubject to the defect of eaſily ſlipping out of its proper place, whereby the danger of a protruſion through the ring is produced. Let it not be inferred, however, that a truſs is always better, and that the hernia muſt certainly be more ſecurely kept up, in proportion as the pad is larger. For the greater its ſize, the more numerous are the points on which its preſſure is divided, and, conſequently, the weaker ſuch preſſure muſt be. "It is eaſier," ſays Richter, "to keep up a hernia with two of our fingers, than with the whole palm of the hand." When the pad is much too large, it touches the thigh, by the motions of which it is puſhed about, ſo as not only to create a riſk of the hernia deſcending, but to fret and irritate the part of the ſkin which it rubs.

A truſs, according to Richter, ought always to be applied in ſuch a manner, that, at leaſt, the lower third of the pad ſhould lie upon the os pubis, and cloſe the neck of the hernial ſac, while the upper part ſhuts up the abdominal ring. The preſſure, which is made againſt the os pubis, is the moſt material, as it operates againſt a fixed point, and has the effect of rendering the neck of the hernial ſac impervious. Since the ſoft parts yield and give way, Richter thinks all preſſure upon them cannot be truſted. He cenſures ſuch practitioners as are in the habit of applying the truſs, ſo as to make its pad only preſs upon the abdominal ring, and merely touch the os pubis with its lower edge. He ſtates, that by the deſcent of the viſcera, from the cavity of the abdomen, into the hernial ſac, the lower angle of the abdominal ring becomes drawn down, ſo far as to be ſituated cloſe to the os pubis; and, conſequently, he maintains, that when the lower edge of the pad merely touches the upper margin of the os pubis, the abdominal ring is not ſufficiently, nor ſecurely covered, being apt to be left unguarded, whenever the pad ſlips in the leaſt upwards. In fat ſubjects, the pad would not long remain in this ſituation, as it would be forced downward by the projection of the parietes of the abdomen above it.

On perſons who are neither too fat nor too thin, and have not too prominent a pubes, when a truſs is applied according to the preceding directions, it will be found, that the pad does not make too much preſſure upon the os pubis, while it makes effectual preſſure upon the abdominal ring. However, there are ſome patients, in whom this opening lies in ſuch a depreſſion, and the os pubis is ſo prominent, that the pad of the truſs makes too little preſſure on the ring, but far too much on the bone. In this ſort of caſe, a tranſverſe furrow may be made at the lower part of the pad, by which means its preſſure upon the os pubis will be diminiſhed, while that upon the ring is rendered more powerful. Some herniæ are met with, eſpecially epiploceles, which are very difficult to be retained in the abdomen, and can only be ſo by a very ſtrong truſs, which is apt to excite pain and ſwelling of the ſpermatic cord. In this caſe a grooved ſort of pad is ſaid to prove highly ſerviceable.

When a patient is afflicted with a hernia in each groin, it is cuſtomary to direct him, either to wear two diſtinct truſſes, the pads and back ends of which are joined together with ſtraps and buckles; or to wear a truſs which is provided with two pads. (See Surgical Plates.) The double truſs is generally found to be very inconvenient, and, therefore, a ſingle one with two pads is moſtly had recourſe to. Since, in this inſtance, a double degree of preſſure is requiſite, the ſpring of the truſs ſhould always be ſtronger than that for ordinary caſes. As the pad, ſituated next to the ſpring, always makes more preſſure than the other one; the ſpring of the truſs ſhould invariably be put on that ſide, where the hernia, which it is moſt difficult to keep up, is ſituated. Should one hernia be an enterocele, the other an epiplocele, the ſpring ought to be applied on the ſide on which the latter rupture is ſituated, becauſe an omental hernia is generally more difficult to be retained in the abdomen, than one of the inteſtinal kind. The part of the inſtrument, which unites the two pads, ought to form an angle outwards. The two rami of the oſſa pubis do not make a ſtraight line in the place of their junction, but an angle, and it is to this angle, that the one made in the truſs, between the two pads, ought to be adapted. Were this part of the apparatus ſtraight, or not ſufficiently hollow, the pad, fartheſt from the ſpring, could not touch the parts underneath as it ought to do, nor, of courſe, make effectual preſſure.

The pad of a truſs ought to lie upon the ſurface, to which it is applied, in ſuch a manner, that it will make an equal preſſure upon every point of ſuch ſurface. When the upper part of the pad makes more preſſure than the lower, a pain is produced above, and the hernia protrudes below. When its lower edge preſſes more forcibly than the upper part, the ſpermatic cord is injured below, and a protruſion of the viſcera may occur above: ſimilar evils may enſue, when one ſide of the pad preſſes much more than the other. Hence, it is an object of great importance to have a pad of a flat conſtruction, ſo that, when it is applied, and an attempt is made to puſh a finger under it, an equal reſiſtance is encountered on every ſide. Truſſes are alſo fabricated with pads, which admit of being turned in various directions by means of a ſcrew, and of being fixed in any poſition, which may be thought moſt proper, by means of a catch.

Richter ſtates, that although a truſs, made upon this principle, is not to be entirely rejected, yet the pad is only capable of one kind of motion, namely, that in which its inner ſurface is turned either more upwards or downwards. Though, by this means, the pad may be ſo arranged, that its lower part will not make more preſſure than its upper. Richter contends, that this is not enough, and that we ought alſo to be able to turn the pad, in ſuch a manner, that one ſide will not preſs more forcibly than the other. Such power, however, is not afforded, the pad not being capable of moving to either ſide. We obſerve, that this ſurgical author gives a preference to making the hoop of the truſs with iron, which will admit of being bent, ſo as to make the pad take the exact poſition which may be wiſhed. He does not appear to have a proper conception of the advantages to be derived from making the ſprings of truſſes of highly tempered ſteel, in order that they may poſſeſs more elaſtic power. Therefore, we cannot be ſurpriſed, that he ſhould betray a prejudice to truſſes, which have pads moveable by means of ſcrews, &c. He fancies, that his flexible iron hoops, which give him a certain power of altering the poſition of the pad *in almoſt any way*, remove all occaſion for moveable pads, which alſo can only be moved in the *limited* manner already mentioned. However, ſince highly elaſtic ſprings have been accounted the beſt, by all the moſt eminent ſurgeons of the preſent time; the uſe of pads, which admit of having their poſition altered with a ſcrew, ſeems to promiſe advantages in particular caſes. Thoſe truſſes, which Richter alludes to, are certainly imperfect, inaſmuch as their pads do not admit of being moved in every direction. We think, however, we have ſeen pads in this country, ſo contrived, as to allow of being moved, without ſuch limitation, as that which Richter deems a ground of imperfection. We know that there are caſes, which may be ſerved by truſſes made upon this principle, and, therefore, we do not heſitate to pronounce them to be deſerving of more praiſe than Richter has been willing to give them.

When once a perſon has been obliged to wear a truſs, he ought never to leave it off, if he has any deſire to avoid conſiderable peril, and not to loſe, in an inſtant, the chief advantage reſulting from the employment of the inſtrument. The conſtant preſſure of the pad, upon the neck of the hernial ſac, ſometimes excites adheſions in it, or even a total obliteration of its cavity, whereby a radical cure of the diſeaſe is accompliſhed. Now, when a patient, after wearing a truſs a certain time, lays it aſide, even for the ſpace of a few moments, an opportunity is afforded for the viſcera to deſcend again, and they may unfortunately do ſo, ſhort as the omiſſion of the truſs may have been. When this happens, the freſh protruſion may deſtroy whatever degree of cloſure may have taken place in the neck of the ſac; the obliteration of the paſſage may be for ever prevented; and thus the patient, in an inſtant, may be deprived of the benefit, which perhaps has been the effect of his having worn a truſs for ſeveral years before. But the greateſt misfortune is, that the hernia, in becoming prolapſed again, is exceedingly apt to be ſtrangulated, by reaſon of the alterations made in the hernial ſac and its neck, ſince a former deſcent of the viſcera into them. If the patient is obliged, by ſome urgent cauſe, to take off his truſs for a time, let him be careful to do it in a recumbent poſition, and refrain from getting up upon his feet, till the ſame truſs or another ſuitable one is applied. On this account, it is always a prudent thing to have two proper truſſes, ſo that one may be conſtantly ready for uſe, when the other ſtands in need of any alteration or repairs. At night in bed, where the body is in an horizontal poſture, the hernia is in general not much diſpoſed to be protruded. Hence at firſt, while the patient is not yet habituated to a truſs, permiſſion may be given him to leave it off upon his going to bed in the evening. But as ſoon as he has been ſomewhat accuſtomed to the inſtrument, he will not mind it much, and he ſhould be adviſed to wear it continually, at every time and in all places. The habit of doing ſo will become natural to him, and he will feel no material annoyance from it. For there is no certainty, that a protruſion of the viſcera would not occur, when the patient is lying in an horizontal poſition, particularly from a fit of coughing, or ſome other occaſional cauſe.

Every patient ſhould be provided with at leaſt two truſſes, which he ought to change every morning in bed, before he gets up. The perſpiration penetrates the leather, rots it, and makes it wet. The patient's ſkin becomes reddened and affected with veſicles and excoriations, which compel him to leave off the apparatus for a time. Or elſe, the ſpring itſelf ruſts, and is rendered unſerviceable. To prevent theſe unpleaſant occurrences, Richter recommends putting a ſmall linen compreſs under the pad, and changing it every morning, ſo as to preſerve cleanlineſs. The back part of the truſs ſometimes produces pain about the ſpine, eſpecially in lean perſons. To obviate this, a compreſs may alſo be placed under the back end of the truſs, or elſe a leather little cuſhion may be faſtened under this part of the apparatus.

Before applying a truſs, great care muſt always be taken that every part of the hernia is really reduced. Should the truſs be put on while any portion of the hernial contents is down, the patient is expoſed to three kinds of danger. Either the preſſure of the truſs upon the protruded part makes the hernia ſtrangulated; or elſe it produces adheſions; or, laſtly, if a piece of inteſtine is prolapſed, it may be rendered impervious. Alſo, when the truſs is either not well made, or not well put on, the viſcera may ſlip under the inſtrument, in conſequence of various circumſtances, ſuch as falls, leaping, any great exertion, a ſlipping of the truſs, &c. Hence it behoves all patients, even thoſe who are provided with truſſes of the beſt conſtruction, to be circumſpect, and immediately they perceive that ſomething has deſcended into the hernial ſac, they ſhould lie down upon the back, take off the truſs, and reduce whatever has fallen down. A truſs which may at firſt fit exceedingly well, and keep up the hernia effectually, cannot be at all depended upon, when the patient changes from a fat to an emaciated condition, or from a thin to a corpulent ſtate. It is in particular neceſſary to watch the effect of a truſs for ſome time after the patient has begun to wear it. During the firſt few days, there will almoſt always be found ſomething to improve and rectify, until the patient becomes habituated to the truſs, and the truſs, as it were, to him. When the patient is fat, the truſs makes a depreſſion in the ſkin after a few days, and then no longer fits with the requiſite cloſeneſs, or ſecurity. The wool alſo, with which the covering is ſtuffed, becomes preſſed more cloſely together, and therefore care ſhould be taken to put on a truſs at firſt with particular tightneſs.

A truſs muſt not make uneaſy preſſure upon the buttocks. When the thigh-ſtrap which goes over the buttock is narrow, the truſs is apt to be dragged downward by the weight of this part of the body. The thigh-ſtrap ſhould therefore be broad, and the patient ought to wear braces. Let a truſs fit ever ſo well and ſecurely, the patient ought to ſhun all violent motion, concuſſions, and exertions of the body. When theſe dangerous circumſtances cannot be avoided, as in coughing, or working for a livelihood, the patient ſhould watch that the truſs fits properly, and that nothing has ſlipped down under it. He ſhould alſo make it a rule to preſs rather ſtrongly upon the pad of the truſs with his hand, upon making any effort or performing any violent motion.

There are two deſcriptions of caſes where a truſs cannot be worn. The firſt is, when the hernia cannot be completely, or at all reduced. The ſecond is when the teſticle, or ſpermatic cord, is ſo diſeaſed as to be incapable of allowing the preſſure of a truſs.

The firſt example is a caſe which will be conſidered in the enſuing ſection of this article. In the ſecond, the firſt indication is to cure, if poſſible, the affection of the teſticle or ſpermatic cord. Perhaps, however, a truſs having a pad with ſuitable excavation, might ſtill be worn.

We have a favourable opinion of Mr. Salmon's truſs, a repreſentation of which will be given in the ſurgical plates. It is there exhibited with the additional ſprings, the force of all the three together being equal to nine pounds' weight. A, a ſpring made ſo as to exert a poſitive force on the cuſhions at each end. At the front and back ends are different holes, to which the plates and cuſhions may be inſtantly ſhifted by the wearer, ſo as readily to admit of adjuſtment in length to ſuit the body. Theſe ſprings are made of ſteel, of equal ſubſtance in all its parts, their edges lying parallel in one plane, and bent to the ſhape without the twiſt, which many common truſſes have. Thus they will indifferently apply either to the right or left ſide of the body; and where one ſide only is diſeaſed, they may be made to go round either that, or the oppoſite ſide, and will, in either caſe, effectually apply and perform their operation without other aid.

B, C, the additional ſprings detached, either or both of which may be added, ſo as to increaſe the power of the truſs when required. Theſe ſprings are ſimply introduced into a looſe leather, or other caſe; and the taking them out, or replacing them, can be inſtantly performed. By this mode of caſing, ſays Mr. Salmon, the wearer may have clean caſes as often as he chooſes, and the ſprings may be exchanged without the mountings at no loſs. The having of different ſprings will be advantageous, in affording the wearer an opportunity of gradually reducing the force of the inſtrument. Alſo, if the ſprings ſhould loſe ſome of their power by ruſting, or otherwiſe, the force may be augmented by the additional ſprings.

D, the front plate with its cuſhion. This plate will apply to either of the holes in the ſpring, and is forced upon the mouth of the rupture by the pin on which it turns in all directions; ſo that whatever be the ſhape or inclination of the body, it adjuſts itſelf to ſuch inclination, not being confined in its direction by any power of the ſpring. The cuſhions are ſimple caſes, ſtuffed with the ſofteſt materials, which may be taken out and replaced at pleaſure.

The force of the ſpring is greateſt on the lower edge, and, conſequently, is transferred to the lower edge of the cuſhion, where the complaint moſtly requires it. When any exertion diſtends the lower part of the belly, inſtead of throwing the cuſhion off altogether, it only turns out the upper edge while the lower one is more forcibly directed againſt the hernial opening. This will particularly happen when a perſon ſits down, and inclines very forward. The belly then projects and thruſts out the upper part of the cuſhion, but the force on the lower part is not thereby decreaſed, but may be proved to be abſolutely increaſed, inaſmuch as leſſening the ſurface of any bodies in forcible contact with others increaſes the violence of the contact.

E, the back plate, with a ſoft cuſhion in front, and having the quality of turning freely in any direction. On both the front and back plates the ſpring reſts ſo free, that the wearer may turn about the plates and cuſhions in any direction, without taking off the ſpring, and the ſpring may be turned up and down, and be worn either above or below the hip without moving the cuſhion. The covers of both cuſhions may be readily changed, and clean ones had at a trifling expence.

Though Mr. Salmon mentions the poſſibility of placing the ſpring above the hip, we preſume he does not mean to recommend the plan. The proper ſituation for the ſpring is always juſt under the ſpine of the os ilium, where it is leaſt ſubject to diſturbance from the action of the muſcles.

F F, a ſtrap to be uſed, if neceſſary, for preventing a forcible removal of the cuſhions. This ſtrap branches out from the ſpring near the hip, and may be regulated nearer or further from the front end. Mr. Salmon's cuſhions are ſtuffed with ſoft materials, ſo as not to be likely to injure the parts preſſed upon. See A Mechanical Analyſis of the General Conſtruction of Truſſes, &c., by R. Salmon, 1807.

In caſes of inguinal hernia, the preſſure of the pads of truſſes has almoſt always been directed to be made upon the abdominal ring. It is contended, however, by Mr. Aſtley Cooper, that this is preciſely the circumſtance in which truſſes are defective. He obſerves, that the object of applying a truſs is to cloſe the mouth of the hernial ſac, and deſtroy its communication with the abdomen, and that this object can never be perfectly fulfilled by any truſs, which is applied in the uſual manner upon the abdominal ring, and extends from it upon the os pubis. In this caſe the cure muſt be incomplete, becauſe a conſiderable portion of the hernial ſac remains uncompreſſed towards the abdomen, and is ſituated between the abdominal ring and the opening of the ſac into the belly. In Mr. Aſtley Cooper's work are to be ſeen engravings, repreſenting hernial ſacs, which have been cloſed by the preſſure of a truſs oppoſite the abdominal ring, but are ſtill open to the abdomen above and outwards. Beſides the imperfect operation of common truſſes, Mr. Aſtley Cooper remarks, that the manner in which they preſs the ſpermatic cord againſt the os pubis, frequently occaſions great pain, to relieve which, the patient is conſtantly ſhifting its ſituations and deſtroying its effect, and that often the teſtes themſelves become waſted by the interruption of the paſſage of the blood through the ſpermatic veſſels.

We ſhall find, from the anatomical account which we ſhall preſently give of the inguinal hernia, that the place where the viſcera firſt quit the abdomen, in moſt caſes, is not directly behind the ring, but about an inch and a half from this opening, in a direction upward and outward. Therefore, according to Mr. Aſtley Cooper, the proper method of completely obliterating the mouth of the hernial ſac is to apply the truſs, not upon the abdominal ring, but upon the part at which the ſpermatic cord, and, with it, the hernia firſt quits the abdomen. When the hernia has been reduced, the ſurgeon ſhould lay his fingers oblique above, and on the outſide of the ring, and direct his patient to cough; the furtheſt part from the ring, towards the ſpine of the ilium, where the hernial ſac is felt to be protruded, is the point, which, in Mr. Aſtley Cooper's opinion, ſhould be noted for the application of the pad of the truſs, and the inſtrument ought to be made accordingly. Meaſurement is taken for making the truſs by laying one end of a piece of ſtring upon this ſpot, and carrying the other round the pelvis, midway between the trochanter major and ſpine of the ilium, till it meets the fixed point at firſt determined, and completes the circle. When the hips make an unuſual projection, a piece of wire muſt be uſed.

In large herniæ, Mr. Aſtley Cooper allows, that the pad of a truſs ought to be placed nearer the abdominal ring than in ſmall ruptures. He obſerves, that where the protruſion is ſmall, the pad may be fixed midway, between the ſymphyſis pubis and the ſpine of the ilium. But ſince, in proportion as the hernia grows larger, the mouth of the ſac moves gradually nearer to the abdominal ring, the preſſure of the truſs muſt be regulated accordingly. However, this gentleman ſays, it ſhould never be directed on the os pubis, as preſſure upon the upper and outer part of the ring will ſtill ſerve to retain the viſcera within the abdomen.

In order to enable patients to bathe with a truſs on them, Mr. Aſtley Cooper recommends covering the ſpring with oil-ſkin, which will keep it from becoming ruſty.

When the mouth of a hernial ſac has been obliterated, another ſac has been protruded cloſe by the ſide of the other. A collection of water has alſo been known to occur, in a hernial ſac, after the cloſure of its neck, forming a particular ſort of hydrocele. See Cooper on Inguinal Hernia, chap. v.

Of irreducible Herniæ.—Under this head ſurgical writers comprehend all caſes in which the protruded viſcera cannot be reduced, although they are not ſtrangulated. This incapacity of reduction may be owing to ſeveral circumſtances; but, moſt frequently, ariſes either from the largeneſs of the quantity of the contents, from an alteration made in their form and texture, or from connections and adheſions which they have contracted with each other, or with their containing bag. Sometimes the reduction is prevented by membranous bands, which extend acroſs the ſac and entangle its contents.

The omentum and meſentery are very apt to become enlarged and thickened, in conſequence of long reſidence in a hernial ſac, and ſuch change makes it impoſſible to reduce them through the upper narrow part of the ſac into the belly again. The omentum, from being naturally thin and ſoft, often becomes hard, firm, and compact. When a portion of it has been ſuffered to remain a great length of time in the ſcrotum, without ever having been returned into the belly, it often happens, that although that part of it which is in the lower part of the hernial ſac preſerves its natural, ſoft, expanſile ſtate, yet all that part which paſſes through what is called the neck of the ſac is, by conſtant preſſure, formed into a hard, firm, incompreſſible carnous kind of body, incapable of being expanded, and taking the form of the paſſage in which it is confined, exactly filling that paſſage, and rendering it impoſſible to puſh up the looſe part which fills the ſcrotum. See Pott on Ruptures.

Beſides this ſort of change, we have often ſeen the lower part of the omentum hardened and expanded into a large knob, which enlarged portion was connected with the ſound part within the abdomen by a comparatively ſlender continuation.

In whatever way a hernia is rendered irreducible, the alteration expoſes the patient to ſeveral inconveniences and dangers. There is a continual danger of the protruded parts becoming ſtrangulated, and their ſituation expoſes them to the effects of external violence, by which the bowels have been known to be ruptured, and the patients killed. Another danger is ulceration, which may take place when any pointed body is ſwallowed, and follows the courſe of the food; for when it reaches the hernia, it has been known to make its way outward by ulceration, leaving a paſſage for the feces.

An irreducible hernia, when unſupported, may acquire an enormous ſize, and prove a ſource of other inconveniences. Nearly all the viſcera may deſcend into the ſac, and the ſwelling reach to the knees. Large quantities of fluid may accumulate in the ſac with the viſcera, ſo as to bring on ſerious complaints, and even a burſting of the tumour. The ſwelling may draw over moſt of the ſkin of the penis, and impede copulation. An abſceſs is alſo apt to form in the ſcrotum itſelf, and be kept fiſtulous by the conſtant diſtention of the part. The urine ſometimes trickles over the ſwelling, and excoriates it. See Cooper on Inguinal Hernia, p. 18.

Though ſome perſons with irreducible ruptures have been raſhly adviſed to ſubmit to have the tumour opened, and the parts returned by ſuch operation, yet the attempt has frequently been found to prove fatal. No eminent ſurgeons of the preſent day, therefore, ſanction any proceeding of this kind.

It is remarked by Mr. Pott, that “many, or perhaps moſt of theſe irreducible ruptures, become ſo by mere time and neglect, and might at firſt have been returned; but when they are got into this ſtate, they are capable of no relief from ſurgery, but the application of a ſuſpenſory bag, to take off or leſſen the inconvenience ariſing from the weight of the ſcrotum.

“People in this ſituation ſhould be particularly careful not to make any attempts beyond their ſtrength, nor aim at feats of agility; they ſhould take care to ſuſpend the loaded ſcrotum, and to keep it out of the way of all harm from preſſure, bruiſe, &c. When the tumour is very large, a ſoft quilted bolſter ſhould be worn at the bottom of the ſuſpenſory to prevent excoriation, and the ſcrotum ſhould be frequently waſhed for the ſame reaſon; a loſs of ſkin in this part, and in ſuch circumſtances, being ſometimes of the utmoſt importance. They ought alſo to be particularly attentive to the office of the inteſtinal canal, to ſee that they do not by any irregularity of diet diſorder it, and keep themelves from being coſtive, for reaſons too obvious to need relating. By theſe means, and with theſe cautions, many people have paſſed their lives for many years free from diſeaſe or complaint with very large irreducible ruptures.

“ On the other hand, it is fit that mankind ſhould be appriſed, that the quiet inoffenſive ſtate of this kind of hernia is by no means to be depended upon; many things may happen to it by which it may be ſo altered, as to become hazardous, and even fatal; an inflammation of that part of the gut which is down, any obſtruction to the paſſage of the aliment or feces through it, a ſtricture made by the abdominal tendon, either on what has been long down, or on a new portion which may at any time be added to it, are always capable of ſo altering the ſtate of the caſe, as to put the life of the patient into danger.

“ Indeed, the hazard ariſing from a ſtricture made on a piece of inteſtine contained in the ſac of an old irreducible hernia, is in one reſpect greater than that attending one that has been found at times reducible; ſince, from the nature of the caſe, it will hardly admit of any attempt toward relief, but the operation, and that in theſe circumſtances muſt neceſſarily be accompanied with additional difficulty.

“ Among the ruptures which have been thought not reducible, and treated as ſuch, there have been ſome which, upon more judicious and more patient attempts, have been capable of reduction.

“ When this is ſuſpected to be the caſe, the proper method is by abſolute reſt, in a ſupine poſture, for a conſiderable length of time, by great abſtinence, and the uſe of evacuants, ſo to leſſen the ſize of the parts in the hernial ſac, as to render them capable of paſſing back again into the belly.” Pott on Ruptures.

Fabricius Hildanus gives an account of a man who was radically cured of a rupture, of twenty years' date, by ſix months' confinement to bed. (Cent. 5. Obſ. 54.)

Le Dran and Arnaud relate inſtances of monſtrous bubonoceles, which diſappeared entirely after the patients had been long confined to bed, and become much emaciated by tedious illneſſes. Some of the moderns have imitated this operation of nature, and by frequent bleedings and repeated purges, have ſometimes ſo far reduced the ſize of the hernia, that it has been returned into the abdomen. Mr. Hey has ſeveral times ſucceeded in this way, (p. 219.) But this practice cannot prove ſucceſsful, when the viſcera adhere to the ſac, or to the peritoneum, juſt within the abdomen. The greateſt objection to this method of cure is the want of an abſolute criterion, by which to diſtinguiſh when the parts do or do not adhere to the hernial ſac, and, in advanced years, though one were ſure that the viſcera were free from the ſac, the poſſibility of hurting the body by the neceſſary evacuations is alſo another objection. Sharp's Critical Enquiry, p. 15.

Were the plan to be thought worthy of trial, keeping up a conſtant preſſure on the tumour by means of a ſuſpenſory bandage, made to lace in front, would be proper for promoting the abſorption of the thickened parts in the hernial ſac. Mr. A. Cooper has reduced ſuch herniæ, after applying ice to them, the good effects of which he imputes to its producing a contraction of the ſcrotum, which performs the office of a ſtrong and permanent compreſſion of the tumour.

Whenever any attempts of this kind ſucceed, “ a truſs ſhould be immediately put on, and worn conſtantly without remiſſion; for in theſe people the largeneſs of the abdominal aperture, the thickneſs of the hernial ſac, and the relaxation of the meſentery, make a new deſcent always to be apprehended and guarded againſt.” Pott.

There are inſtances, however, on record, in which the capacity of the abdomen had become ſo adapted to the diminiſhed quantity of the viſcera, that when the contents of the hernia were reduced, ſerious complaints aroſe from their introduction into the belly. Schmucker has met with ſeveral ſuch caſes, in which he has been obliged to take off the truſs. Petit has known the reduction of a hernia of this kind prove fatal, the parts not deſcending again when the truſs was removed, the nauſea and vomiting which aroſe continuing, and peritonitis taking place. Chirurgiſche, Wahrnehmungen, vol. ii. p. 243. Traité des Maladies Chirurgicales, tom. ii. p. 392.

Mr. Pott remarks, that “ an omental rupture, which has been ſo long in the ſcrotum as to have become irreducible, is very ſeldom attended with any bad ſymptoms conſidered abſtractedly; but it is conſtantly capable of being the occaſion of an inteſtinal hernia, and all its conſequences; neither is that all, for the omentum, either ſo altered in form and texture, or ſo connected as to be incapable of reduction, may by accident inflame, and either become gangrenous or ſuppurate, and the occaſion of a great deal of trouble.” In a few inſtances, epiploceles produce very bad ſymptoms indeed, caſes of which are to be found in Garengeot, Dionis, &c.

Sometimes, in old caſes of entero-epiplocele, the inteſtine is reducible, but the omentum is not, in which caſe ſome have adviſed keeping up the piece of bowel with a truſs, the pad of which muſt be ſo contrived as not to preſs on the omentum. Mr. Pott, however, contends that this is not often practicable, and ſhould ſuch a truſs be uſed, he adviſes its being particularly attended to, leſt a ſmall piece of gut ſlip down, and, being preſſed on by the truſs, produce fatal miſchief.

Herniæ are ſometimes, though not very often, rendered irreducible by a contraction of the ſac. Mr. Aſtley Cooper has ſeen ſuch a contraction happen at the middle of the ſac, ſo as to occaſion an hour-glaſs appearance, a piece of omentum lodging both above and below the conſtriction.

The omentum, in old irreducible herniæ, occaſionally becomes affected with ſuch hardneſs as is called ſchirrus, though it does not end in cancer.

Strangulated Hernia.—The ſtrangulated or incarcerated hernia is not only attended with a preſent incapacity of reduction, but the protruded viſcera ſuffer in the paſſage through which they deſcend into the hernial ſac, a degree of preſſure which brings on a train of alarming and too frequently fatal complaints. When inteſtine is lodged in the ſac, a total interruption to the paſſage of the feces is produced. The prolapſed viſcera inflame, and the tumour is rendered exceedingly painful, while an excruciating ſenſation is experienced, ſeeming to proceed from a tight cord round the navel or upper part of the abdomen. Frequent eructations and vomiting ſoon come on. The contents of the ſtomach are firſt diſcharged, and, after an antiperiſtaltic motion has begun in the bowels, bilious matter is thrown up. When the ſtrangulation has been in the colon, Mr. A. Cooper is certain that he has ſeen feculent matter evacuated by vomiting, a circumſtance which he accounts for by the frequently imperfect ſtate of the valve of the cæcum, and by its action being reverſed by the antiperiſtaltic contractions of the inteſtines. An obſtinate conſtipation attends the vomiting, ſo that no ſtools can be obtained, except from the portion of inteſtine below the ſtrangulation by glyſters.

The obſtruction to the paſſage of the inteſtinal contents may not be ſo clearly marked, where a part only of the diameter of the inteſtine is ſtrangulated; but it will often occur to as great a degree in this circumſtance, and will be equally inſuperable by purgative medicines, as where the whole width of a bowel is included.

From a note in Mr. Lawrence's excellent treatiſe on ruptures, it appears that Morgagni mentions a caſe in which a part only of the diameter was included where the ſtools were not ſuppreſſed ; yet it ended fatally. (De Cauſis et Sed. Morb. ep. 34. art. 15.) Mr. Lawrence refers to many inſtances in which the conſtipation was complete, recorded in the Mémoires de l'Acad. de Chirurgie, tom. iii. p. 151. London, Med. Obſ. and Enquiries, vol. iv. p. 178 and 355. Philoſophical Magazine, vol. xxxi. p. 214 et ſeq. De Haen, Ratio Medendi, p. 2 c. 4. Morgagni is alſo ſtated to have had a patient who died on the ſixth day, after conſtipation continuing the whole time. The entire diameter of the inteſtino was unobſtructed, the protruded part being merely a diverticulum. (Ep. 34. art. 18.) A ſimilar caſe is ſaid to be related by Benevoli, in Due Relazioni Chir. art. 19. See Lawrence on Ruptures, edit. 2. p. 33.

Beſides the vomiting, conſtipation, &c. the pulſe is quick and at firſt hard. If effectual relief be not obtained, the tumour becomes red and more painful, and when handled, the mark of each finger is left in a white hollow impreſſion, like what occurs on preſſing a dropſical limb. The abdomen now becomes ſlightly tenſe and ſore upon preſſure. The vomiting is very frequent, and the whole body covered with ſweat. The conſtipation remains obſtinate, and inſtead of eructation hiccough comes on, whilſt the countenance ſinks and ſhews great anxiety, and the pulſe grows ſo ſmall, as to induce the inexperienced to ſuppoſe the patient is dying. Theſe ſymptoms, however, are ſubject to exacerbations. They are now very violent, but preſently the patient feels comparatively eaſy, and a vain hope of the ſucceſs of the treatment is raiſed

After moſt ſevere ſufferings during the firſt ſtage, the patient ſuddenly feels better. The tumour, which ſtill continues, all at once aſſumes a purple or leaden colour, and gives a crackling feel, owing to air being contained in the cellular membrane. The abdomen becomes more tenſe, the hiccough grows more violent, a cold ſweat breaks out over the whole body, and the pulſe, though now fuller and ſofter than before, will, upon careful examination, be found to intermit. Still, however, the patient remains perfectly ſenſible, full of hopes, and generally continues ſo till death, which now ſpeedily happens. Mr. A. Cooper ſtates, that this deluſive feeling of amendment is ſo ſtrong, that he has known a patient, at this extremity, inſiſt upon riſing, and expire in the very act ; and another who ſat up in bed, called for ſomething to drink, and died as he was putting it to his lips. We have alſo known a patient call for ſome fiſh and a pint of porter, eat and drink ravenouſly for a minute or ſo, and then expire.

It is a very curious fact, that ſometimes that remarkable ſymptom, the conſtipation, will attend a ſtrangulated hernia, although the omentum is the only part in the ſac, and of courſe the only part which can ſuffer conſtriction.

When we examine the hernial tumour after death, a quantity of clear ſerum is found under the ſkin, while the ſac itſelf contains a coffee-coloured bloody fluid. The inteſtine is of a chocolate brown colour, with here and there a black ſpot, which eaſily breaks down on being touched with the finger. A coat of coagulable lymph, of the ſame colour as the inteſtine, may be peeled from its ſurface, and adheſions of no great ſtrength exiſt between the bowel and ſac. Where the ſtricture is, the inteſtine is either ulcerated through, or may be readily pulled aſunder. Air is alſo found in the cellular membrane, when the inflammation has been very extenſive.

Within the abdomen, the peritoneum and bowels are found inflamed. The inteſtines are ſtreaked with red lines, and glued together. The tenſion of the belly depends, not upon any general effuſion, but upon the quantity of air in the bowels. Cooper on Inguinal Hernia, &c. p. 21.

An omental rupture is not ſo ſubject to ſtrangulation as an inteſtinal one, and, when ſtrangulated, the ſymptoms which are brought on are leſs violent than in caſes of enterocele, and their progreſs is not ſo rapid. The vomiting is not ſo frequent, the pain in the tumour leſs, the tenſion over the abdomen not ſo great, and the conſtipation by no means ſo complete ; for ſtools can in general be procured both by glyſters and cathartics, through the whole duration of the diſeaſe The hiccoughs are leſs violent and conſtant, and the pulſe, though ſmall and frequent, is not ſo remarkably ſmall and thready, as in the inteſtinal hernia. The patient lives alſo longer, ſometimes as many as fourteen days. The ſkin of the tumour occaſionally inflames ; but it does not do this ſo frequently as in caſes of enterocele ; and when an extenſive ſlough is thrown off, it is attended with much leſs conſtitutional irritation. The ſickneſs and vomiting, we muſt ſuppoſe, proceed from the connection between the ſtomach and omentum. This ſuppoſition ſeems to be confirmed by the fact of the ſymptoms being often influenced by the poſition of the body, as a mitigation is frequently the conſequence of bending the trunk, while an aggravation ſeems to be the effect of extending it.

When the parts are examined, in caſes of death from a ſtrangulated epiplocele, the omentum is found but little changed from its natural colour, being only trivially darker than uſual. There is not much fluid in the ſac. Though the abdomen is inflamed, and the inteſtines ſlightly adherent together, they never appear to have ſuffered ſo much as in caſes of ſtrangulated enteroceles.

On examining the ſeat of the ſtrangulation in inguinal herniæ, it will ſometimes be found, (ſays Mr. Aſtley Cooper,) at the abdominal ring, which, from its unyielding nature, has operated like a tight cord upon the protruded omentum, or inteſtine. This is the principal point of ſtrangulation in old and large herniæ ; but in other caſes, it is more commonly ſituated above the ring, at the place where the ſpermatic cord firſt quits the abdomen. The ſtrangulating preſſure is here made by the tranſverſalis muſcle and its tendon, which paſs over the hernial ſac in a ſemi-circular direction, and by the faſcia ariſing from Poupart's ligament, the ſemicircular border of which paſſes under the ſac. Hence if a ſurgeon, in operating for a bubonocele, will pay attention to the preciſe ſeat of the ſtrangulation, he will find, that except in large herniæ, cutting through the ring is inſufficient to releaſe the protruded parts, and he muſt proceed with his knife further up towards the ſpinous proceſs of the ilium, before he can return the ſwelling.

This fact has led many to ſuſpect the ſtrangulation to be the effect of a thickening of the neck of the ſac ; but Mr. A. Cooper has learned from diſſections, that ſuch a caſe is unfrequent.

Some affections, which have ſymptoms ſomewhat like thoſe of an incarcerated hernia, ought to be carefully diſcriminated. Mr. Lawrence has judiciouſly remarked, that "the inteſtine, included in a large hernia, may be affected with colic, and thus give riſe to conſtipation and vomiting. This may be the more eaſily miſtaken for ſtrangulation, if the parts are adherent, and incapable of reduction. Such an attack may render a reducible hernia incapable of being replaced; particularly if the bowels are much inflated. Clyſters and oily purgatives will produce ſtools under theſe circumſtances, and thereby throw light on the real nature of the caſe.

“The firſt appearance of a rupture may occaſion hiccough, vomiting, and pain; and the ſame ſymptoms may be exhibited in an old caſe, after the patient has taken much exerciſe, or remained long in the erect poſture, in conſequence of irritation, excited by the protruded viſcera in the contents of the abdomen. Here, too, ſtools may be eaſily procured by purgatives.

“The moſt important caſe, however, is where a patient with a rupture has an attack of ileus from ſome other cauſe, in which the original complaint is not at all concerned. The operation, performed on the ſuppoſition that the ſymptoms ariſe from the hernia, would here be not only uſeleſs, but even injurious; and the ſurgeon would neglect thoſe means which the inflammation of the bowels ſo urgently demands.

“Whenever we ſee a patient labouring under the ſymptoms of ileus, we ſhould ſuſpect the exiſtence of a rupture, and make thoſe enquiries and examinations which ſuch a ſuſpicion would naturally ſuggeſt, particularly in females, who are often led to concealment by motives of falſe delicacy. A ſuperficial examination is not ſufficient on theſe occaſions, as a very ſmall portion of inteſtine, not forming any external tumour, may, by its incarceration, cauſe the ſymptoms. If the latter have appeared ſuddenly, and under circumſtances which might cauſe a rupture, if the pain have been firſt felt about the ring, or crural arch, and if preſſure in theſe ſituations increaſe it, and laſtly, if the patient, ſhortly before, had been in perfect health, there is ſtrong reaſon to ſuſpect the exiſtence of a hernia.

“When a perſon, labouring under ileus, has a hernia, which can be reduced eaſily, there is no ground for doubt. If, on the contrary, the parts cannot be replaced, ſtrangulation may be reaſonably ſuſpected, although we cannot immediately conclude, with certainty, that the ſwelling is the cauſe of the inflammation. We ſhould firſt aſcertain whether the parts could be replaced previouſly to the attack; if they could not, and the ſwelling be large and old, they are probably adherent; and the impoſſibility of reduction proves nothing. If they could be returned, and particularly a ſhort time only before the acceſs of the ſymptoms, ſtrangulation may be ſuſpected with juſtice; but it is ſtill not quite certain.

“The following circumſtances will enable the practitioner to decide, in ſimilar caſes, that the ſymptoms are not produced by the hernia; that it is not ſtrangulated; and that the ileus ariſes from an internal cauſe. The pain is felt in the abdomen and not in the ſwelling, which continues ſoft, while the belly is inflated, hard, and tenſe. The attack is ſudden, and not preceded by any of the occaſional cauſes, which could affect the rupture; and the ring is free. The affection extends in the ſequel to the ſwelling, which then becomes painful and tenſe; but it appears later here than in the belly, and does not proceed to ſo great a degree.

“The moſt embarraſſing caſe of all is, where inflammation attacks the protruded parts; but is entirely independent of the rupture. The occurrence is rare, but very poſſible; ſince the inteſtines, included in a hernia, are expoſed to the ſame cauſes of diſeaſe as in their natural ſituation. It may be expected to happen principally in large herniæ. The ſwelling is the ſeat, and not the cauſe, of the diſeaſe. The diſtinction muſt be very difficult. The want of tenſion and of pain at the ring, while the ſwelling itſelf was painful; and the previous attack of feveriſh rigour; might lead us to ſuſpect inflammation of the protruded inteſtine. If the ring afterwards became tenſe, and the included parts conſiderably painful, we ſhould conclude that ſtrangulation had ſupervened, and act accordingly.” Lawrence on Ruptures, chap. iv. edit. 2.

Unleſs a ſtrangulated hernia is ſpeedily reduced, it almoſt always proves fatal. However, a few examples do occur in which the ſloughs are thrown off, and the patient ſurvives with a fiſtulous opening in the ſeat of the tumour, through which opening the feces are diſcharged during the remainder of his life.

Prognoſis of Herniæ.—It has been remarked, by that truly eminent ſurgeon, Mr. Pott, that the ſame kind of rupture, in different people, and under different circumſtances, wears a very various face; the age and conſtitution of the ſubject, the date of the diſeaſe, its being free or not free from ſtricture or inflammation, the ſymptoms which attend it, and the probability or improbability of its being returnable, neceſſarily producing much variety. The degree of hazard attending this complaint will be alſo more or leſs as it ſhall happen to be circumſtanced.

“If the ſubject be an infant, the caſe is not often atttended with much difficulty or hazard, the ſoftneſs and ductility of its fibres generally rendering the reduction eaſy as well as the deſcent; and though, from neglect or inattention, it may fall down again, yet it is as eaſily replaced, and ſeldom produces any miſchief. I ſay ſeldom,” repeats Mr. Pott, “becauſe I have ſeen an infant, one year old, die of a ſtrangulated hernia, which had not been down two days, with all the ſymptoms of mortified inteſtine.

“If the patient be adult and in the vigour of life, the conſequences of neglect or of mal-treatment are more to be feared than at any other time, for reaſons too obvious to need relating. The great and principal miſchief to be apprehended, in an inteſtinal hernia, is an inflammation of the gut, and an obſtruction to the paſſage of the aliment and feces through it, which inflammation and obſtruction are generally produced by a ſtricture made on the inteſtine. In very old people the ſymptoms do not uſually make ſuch rapid progreſs, both on account of the laxity of their frame, and their more languid circulation, and alſo that their ruptures are moſt frequently of ancient date, and the paſſage a good deal dilated; but then, on the other hand, it ſhould alſo be remembered that they are by no means exempt from inflammatory ſymptoms, and that, if ſuch ſhould come on, the infirmity of old age is no favourable circumſtance in the treatment which may become neceſſary.

“If the diſeaſe be recent, and the patient young, immediate reduction, and conſtant care to prevent its puſhing out again, are the only means whereby it is poſſible to obtain a perfect cure.

“If the diſeaſe be of long ſtanding, has been neglected, or ſuffered to be frequently down, and has given little or no trouble, the aperture in the abdominal muſcle, and the neck of the hernial ſac, may both be preſumed to be large; which circumſtances in general render immediate reduction leſs neceſſary and leſs difficult, and alſo fruſtrate all rational expectation of a perfect cure. On the contrary, if the rupture be recent, or, though old, has generally been kept up, its immediate reduction is more abſolutely neceſſary, as the riſk of ſtricture is greater from the ſuppoſed ſmallneſs of the aperture, and narrowneſs of the neck of the ſac. If the rupture be very large and ancient, the patient far advanced in life, the inteſtine not bound by any degree of ſtricture, but does its office in the ſcrotum regularly, and no other inconvenience be found to attend it but what proceeds from its weight, it will in general be better not to attempt reduction, as it will, in theſe circumſtances, moſt probably prove fruitleſs, and the handling the parts in the attempt may ſo bruiſe and injure them as to do miſchief; but this muſt be underſtood to be ſpoken of thoſe only in which there is not the ſmalleſt degree of ſtricture, nor any ſymptom of obſtruction in the inteſtine, ſuch circumſtances making reduction neceſſary at all times, and in every caſe.

“ With regard to the contents of a hernia, if it be a portion of omentum only, and has been gradually formed, it ſeldom occaſions any bad ſymptoms, though its weight will ſometimes render it very troubleſome. But if it be produced ſuddenly by effort or violence, that is, if a conſiderable piece of the caul, by accident, ſlip down at once, it will ſometimes prove painful, and cauſe very diſagreeable complaints; the connection between the omentum, ſtomach, duodenum, &c. being ſuch as to render the ſudden deſcent of a large piece of the firſt ſometimes productive of nauſea, vomiting, colic, and all the diſagreeable ſymptoms ariſing from the derangement of theſe viſcera. When the piece of caul is engaged in ſuch a degree of ſtricture as to prevent the circulation of blood through it, it will ſometimes, by becoming gangrenous, be the occaſion of very bad ſymptoms, and even of death, as I have more than once ſeen; and thus, as a mere omental hernia, it may ſometimes be ſubject to great hazard. But even though it ſhould never be liable to the juſt mentioned evil, that is, though the portion of the caul ſhould remain uninjured in the ſcrotum, yet it renders the patient conſtantly liable to hazard from another quarter; it makes it every moment poſſible for a piece of inteſtine to ſlip into the ſame ſac, and thereby add to the caſe all the trouble and all the danger ariſing from an inteſtinal rupture. It is by no means an uncommon thing for a piece of gut to be added to a rupture, which had for many years been merely omental, and for that piece to be ſtrangulated, and require immediate help.

“ An old omental hernia is often rendered not reducible, more by an alteration made in the ſtate of the prolapſed piece of caul than by its quantity. It is very common for that part of the omentum, which paſſes through the neck of the ſac, to be compreſſed into a hard, ſmooth body, and loſe all appearance of caul, while what is below in the ſcrotum is looſe and expanded, and enjoys its natural texture. In this caſe reduction is often impoſſible, from the mere figure of the part; and I have ſo often ſeen this, both in the living and the dead, that I am ſatisfied, that for one omental rupture, rendered irreducible by adheſions, many more become ſo from the cauſe above-mentioned.

“ In the ſac of old omental ruptures that have been long down, and only ſuſpended by a bag truſs, it is no very uncommon thing to have a pretty conſiderable quantity of fluid collected. This, in different ſtates and circumſtances of the diſeaſe, is of different colour and conſiſtence, and ſeldom ſo much in quantity as to occaſion any particular attention to it; but, on the other hand, it ſometimes is ſo much in quantity as to become an additional diſeaſe to the original one. I have more than once been obliged to let it out, in order to remove the inconvenience ariſing from its weight and the diſtention of the ſcrotum, which I have alſo ſeen become gangrenous by the neglect of this operation.

“ If the hernia be of the inteſtinal kind, merely, and the portion of gut be ſmall, the riſk is greater, ſtrangulation being more likely to happen in this caſe, and more productive of miſchief when it has happened; for the ſmaller the portion of gut is, which is engaged, the tighter the tendon binds, and the more hazardous is the conſequence. I have ſeen a fatal gangrene in a bubonocele which had not been formed forty-eight hours, and in which the piece of inteſtine was little more than half an inch. There are few practitioners, who have ſeen buſineſs, but know the truth of this; but perhaps the reaſon of it is not ſufficiently explained to the unknowing. It is this. When a conſiderable portion of inteſtine paſſes out from the belly into a hernial ſac, it neceſſarily and unavoidably carries with it a proportional quantity of the meſentery, which every body knows is a ſtrong double membrane. When the prolapſed part is at all conſiderable this double membrane is again, in ſome meaſure, folded on itſelf, and takes off a good deal of the effect of the ſtricture on the inteſtine. Now, although this circumſtance will not prevent the effect if the means of relief be totally neglected, yet it will moſt certainly retard the evil, and give more time for aſſiſtance; whereas, when there is little or none of the meſentery got through the tendon, and the thin tender inteſtine bears all the force of the ſtricture, it is immediately brought into hazard.”

The practical inference to be drawn from hence is too obvious to need mentioning.

“ In the inteſtinal, as in the omental hernia, they which have been often or long down, are in general more eaſily returned, and do not require ſuch immediate aſſiſtance as they which have ſeldom been down, or have recently deſcended; and, in the one kind of hernia as well as in the other, the ſtate of the hernial ſac, with regard to ſize, thickneſs, &c. depends very much on the date of the diſeaſe, and the regard that has been paid to it.

“ If the hernia be cauſed by a portion of the inteſtine ilium only, it is in general more eaſily reducible than if a part of the colon has deſcended with it, which will alſo require more addreſs and more patience in the attempt. The reduction of a mere inteſtinal hernia too, *cæteris paribus*, will always remain more practicable than that of a mere omental one after it has attained to a certain ſize and ſtate, as the part contained within the former is liable to leſs alteration of form than that within the latter, which alteration, &c. is no infrequent hindrance of the return of an old caul-rupture.

“ Not that the parts, within a mere inteſtinal hernia, are abſolutely exempt from ſuch an alteration, as may render their return into the belly impracticable, even where there is no ſtricture; for I have ſeen that part of the meſentery, which has lain long in the neck of the ſac of an old rupture, ſo conſiderably hardened and thickened as to prove an inſuperable obſtacle to its reduction.

“ Upon the whole, every thing conſidered, I think it may be ſaid that an inteſtinal rupture is ſubject to worſe ſymptoms and a greater degree of hazard than an omental one, though the latter is by no means ſo void of either as it is commonly ſuppoſed to be; that bad ſymptoms are more likely to attend a recent rupture than one of ancient date; that the deſcent of a very ſmall piece of inteſtine is more hazardous than that of a larger; that the hernia which conſiſts of gut only, is in general attended with worſe circumſtances than that which is made up both of gut and caul; and that no true judgment can be formed of any rupture at all unleſs every circumſtance relating to it be taken into conſideration.” Pott on Ruptures.

Treatment of Hernia, particularly the Strangulated Hernia.— Every hernia ought, if poſſible, to be reduced, and be kept from deſcending again by means of a truſs.

When the protruded parts are free from ſtrangulation, but yet are rendered irreducible by any of the cauſes which we have noticed above, all that can be prudently done is to wear a ſuſpenſory bandage, to check the increaſe of the ſwelling. As we have already related the kind of danger in which patients with irreducible herniæ continually live, and as we have alſo inſerted the ſentiments of ſome of the beſt ſurgical writers on the prudence of ſuch patients avoiding coſtiveneſs, exceſſes in eating or drinking, and all violent exerciſes and exertions, we ſhall not expatiate upon theſe topics again.

A ſtrangulated hernia is one of the moſt urgent caſes in ſurgery; if not ſoon relieved it is almoſt always fatal. What is highly worthy of attention is, than no relief can be derived from any plan whatſoever, unleſs it avails in procuring the return of the parts into the cavity of the abdomen, and obviates the conſtriction which the protruded viſcera ſuffer. When theſe objects are not accompliſhed, and this within a very ſhort period of time, gangrenous miſchief takes place in the hernial tumour, and the patient dies of ſuch ſymptoms as have been already deſcribed.

The caſe of a ſtrangulated hernia, therefore, demands a conſiderable ſhare of deciſion and profeſſional judgment on the part of the ſurgeon. He ſhould be familiarly acquainted with all the beſt methods to be tried before the operation, have a determination to put them in practice without the leaſt unneceſſary loſs of time, and be prepared to operate the moment they have manifeſtly failed. Very bad conſequences are often occaſioned by loſing time in the trial of remedies, which promiſe little or no chance of doing good. The plans which a prudent ſurgeon will try are only thoſe which are ſtrongly recommended by real and frequent ſucceſs. Upon all others he will waſte no time, nor will he let even ſuch as have been often effectual induce him to defer the operation to too late a period. Mr. Hey has performed the operation 40 times, and ſtates, that he has often had occaſion to lament that he had performed it too late, but never that he had done it too ſoon. There are ſome caſes ſo urgent that it is not adviſable to loſe any time in the trial of means to produce a reduction. The delay of a few hours may cut off all hope of ſucceſs, when a ſpeedy operation would ſave the life of the patient. Hey's Practical Obſervations in Surgery, p. 130, edit. 2.

Taxis.—When a ſurgeon is called to a ſtrangulated hernia, his firſt duty is to endeavour to reduce the protruded parts with his hands. This is technically called the operation of the taxis, and is performed by making preſſure upon the tumour with the hands, and, at the ſame time, placing the patient in that poſture which gives as much room as poſſible in the abdomen, and relaxes its muſcles and apertures. According to Mr. Aſtley Cooper, the beſt poſition for this purpoſe is ſupine, with the body moderately incurvated. This is effected by laying the patient upon his back, and putting one pillow under the pelvis, and another under the ſhoulders. Both the thighs ſhould alſo be elevated to a right angle with the patient's body, and the knees ſhould be brought ſo cloſe together as only to admit the ſurgeon's arm between them. Mr. A. Cooper repreſents this laſt as a moſt eſſential point, ſince it relaxes the faſcia of the thigh, and conſequently the aperture through which the hernia firſt quits the abdomen, and which is ultimately connected with this faſcia. The patient ought alſo to be deſired to void his urine. The ſurgeon then places himſelf by the patient's right ſide, and, embracing the tumour with his right hand, he preſſes it towards the abdominal ring, ſo as to keep it from receding. Then, applying the finger and thumb of his left hand upon the neck of the tumour, at the part where it enters the abdomen, he gently preſſes it from ſide to ſide, thus endeavouring to get a ſmall portion of it within the abdomen. If any part can be forced up, the reſt generally follows without difficulty. Mr. A. Cooper recommends the preſſure to be maintained from a quarter to half an hour. He adviſes the degree of force to be moderate, as the chief dependance ſhould be placed on continuance rather than violence of preſſure, the latter having been ſometimes known to produce a laceration of the protruded parts. He obſerves, that the longer the hernial tumour has been ſtrangulated, the more dangerous is it to uſe any conſiderable preſſure for its reduction, as the parts then have much leſs power of a reſiſtance than in their natural ſtate. The force of the preſſure ſhould always be directed towards the anterior ſuperior ſpinous proceſs of the ilium, in the courſe which the tumour takes obliquely upwards, and not towards the abdomen immediately behind the abdominal ring. Cooper on Ingunial Hernia, &c. p. 23.

During the taxis the patient is carefully to abſtain from coughing, or making any effort.

The prudence of employing gentle preſſure cannot be too deeply impreſſed upon a ſurgeon's mind. Violence, as Mr. Lawrence remarks, cannot be beneficial, as it is more likely to preſs the parts in a maſs againſt the ring, and thereby bruiſe and injure them, than urge them through the opening. The ſame intereſting writer adverts to ſeveral caſes recorded by Mr. A. Cooper, Mr. Charles Bell, Petit, Morand, and Arnaud, where unſcientific roughneſs produced either ſuppuration of the omentum, or a gangrene or rupture of the inteſtine. Every impartial man muſt agree with Mr. Lawrence, that the danger of the ſubſequent operation will be greatly increaſed by all rough manual attempts, ſuppoſing that they prove ineffectual in accompliſhing the reduction. Petit had much confidence in the plan of making a general preſſure upon the whole ſurface of the ſwelling with both hands.

Mr. Lawrence informs us, that in a bubonocele the following method will ſometimes ſucceed, when more ordinary plans fail; eſpecially when the ſtrangulation ſeems to have been cauſed by an accumulation of fecal matter. "Let the ſurgeon embrace the neck of the ſwelling, cloſe to the tendon, with the finger and thumb of one hand, and carry them downwards with a moderate preſſure, ſo as to remove the contents from the portion next the ring: this will reduce the ſize of that part, which he may then attempt to paſs into the ring with the other hand." Treatiſe on Ruptures, edit. ii. p. 115.

When the common mode of reducing a hernia with the hands has failed, ſome practitioners have adviſed ſuſpending the patient by his knees over the ſhoulders of a ſtrong aſſiſtant, and, in this poſture, endeavouring to return the parts. No eminent modern ſurgeons, however, ſeem to put any confidence in this method. The poſition does not relax the abdominal muſcles; and it is painful to the patient, and awkward to the ſurgeon. Mr. Hey ſays, that he has often tried the plan; but having found it inefficacious, he has, for many years paſt, laid it aſide. Mr. Aſtley Cooper affirms alſo, that he has never found it anſwer when the common method has failed, after being fairly and fully performed.

In attempting the taxis, in caſes of femoral hernia, the direction in which the parts deſcend ſhould be well remembered. They paſs firſt downwards, and then forwards, and of courſe the preſſure ſhould be directed firſt backwards, and then upwards.

Generally ſpeaking, a piece of inteſtine may be more eaſily reduced than a portion of omentum. The former goes up ſuddenly; the latter returns ſlowly, excepting the very laſt bit, which does indeed ſlip up rapidly, but without any noiſe. When the inelaſticity of the ſwelling clearly indicates that the contents are entirely omentum, the ſurgeon may venture to uſe more force in his attempts at reduction than could be prudently exerted, were the caſe an enterocele. See Cooper on Inguinal Hernia, &c. p. 24.

It is difficult to lay down any fixed rule reſpecting the time which ſhould be allotted for the trial of the taxis. We have ſtated Mr. A. Cooper's opinion, that the manual attempts ſhould be continued for a quarter, or half an hour. Several celebrated writers on the preſent ſubject, as, for inſtance, Richter, Hey, Deſault, and Lawrence, are ſtrongly adverſe to continuing the manual attempts at reduction, after the tumour has fallen into a painful, inflamed ſtate. Mr. Hey ſays, he is perſuaded that much harm has been done by long continued efforts to replace the ſtrangulated inteſtine, eſpecially when it is in a painful ſtate. The patient, who has been accuſtomed to reduce his own hernia, will perform the operation of the taxis with the greateſt ſafety. If he fails, the ſurgeon ſhould be cautious of doing much. (Pract. Obſ. edit. ii. p. 131.) Mr. Lawrence thinks, that "when the rupture becomes painful, we are no longer juſtified in perſevering in attempts at reduction by the hand. A ſufficient preſſure cannot now be endured; and the force which is employed only tends to increaſe the inflammation and accelerate the approach of gangrene. At this period the operation is required, and ſhould be performed without delay." P. 117.

Experience taught Deſault, that herniæ, attended with highly inflammatory ſymptoms, and ſeldom reducible by the taxis, and that the long continued and violent attempts at reduction, before the operation, have a very unfavourable influence on the event of the caſe. Deſault, therefore, forbade the taxis in ſtrangulated herniæ, accompanied with much inflammation and pain, until the previous uſe of other means had effected a change in the ſtate of the ſwelling. Œuvres Chirurgicales de Deſault par Bichat, tom ii. p. 332, &c.

We conſider the following obſervation exceedingly judicious; it is from the pen of Mr. Lawrence. After ſtating, that he does not mean ſome previous remarks to convey a general diſapprobation of the taxis, he adds, "they are applied to thoſe caſes only in which the exiſtence of conſiderable pain in the ſwelling and abdomen, together with other circumſtances, denotes that the incarceration is of the inflammatory kind. Where the rupture is tolerably free from pain and tenſion, and the general character of the caſe is ſlow and languid, a judicious uſe of the taxis can never be injurious. And although it is undoubtedly true, that the firſt attempt is the moſt likely to be ſucceſsful, and that the hope of reduction diminiſhes as the ſtrangulation continues, it does not follow that other trials ſhould be proſcribed. They may be renewed when the means employed to promote the return appear to have made any formidable change in the tumour, or in the general condition of the patient." P. 120.

When the taxis fails at firſt, it will frequently ſucceed after the patient has been bled, or put in a warm bath. It frequently ſucceeds alſo when aided by ſome other means, which we ſhall preſently conſider.

Bleeding.—When the firſt attempts to reduce the hernia prove ineffectual, many ſurgeons are advocates for immediately bleeding the patient, and then trying the taxis again. Mr. Pott was ſtrenuouſly in favour of veneſection in theſe caſes. "Perhaps," ſays he, "there is no diſeaſe affecting the human body in which bleeding is found more immediately and eminently ſerviceable than in this; and which, therefore, if there are no particular circumſtances in the conſtitution prohibiting it, ought never to be omitted; but, on the contrary, ſhould be freely and largely repeated, if it appears at all neceſſary." (Pott's Chirurgical Works, vol. ii. p. 79.) Benjamin Bell, Calliſen, Richter, Mr. Samuel Sharp, and ſeveral other noted ſurgical authors, are equally favourable to the practice.

A general aſſent, however, has not been given to the plan, ſupported, as it is, upon very high authority. Mr. Wilmer, of Coventry, thinks, that "in theſe caſes, the death of the patient can only be explained by the inverted periſtaltic motion immediately leſſening the powers of life,"—and that "large and repeated bleedings muſt increaſe the debility, and do much miſchief." (Obſ. on Hernia, p. 39.) He alſo entertains an opinion, that bleeding "is extremely unfavourable to the patient's recovery," when the operation cannot be avoided.

Mr. Wilmer has been ſeconded by Mr. Alanſon, on the inutility of bleeding in caſes of ſtrangulated hernia. The latter informs us, that bleeding ad deliquium had been the conſtant practice at Liverpool, and that, "as ſoon as the deliquium happened, the taxis was tried during that ſtage; but I never ſaw this method ſucceſsful, nor do I think bleeding ever of the ſmalleſt ſervice in forwarding reduction." P. 44.

Mr. Aſtley Cooper confeſſes, that though bleeding and the warm bath appear likely to produce a ſtate of body highly favourable for reduction, he has ſeldom been gratified by ſeeing a hernia reduced by them, though they were moſt fairly tried.

The principle upon which bleeding has been ſuppoſed to be uſeful in the caſe of a ſtrangulated hernia, is by occaſioning a general languor, and a conſequent relaxation of the ſtricture, and by checking the inflammation, not only of the protruded parts, but of thoſe which lie within the abdomen. As a ſwoon has been conſidered a very auſpicious moment for reducing the hernia, it has been uſual to endeavour to make the patient faint by bleeding him as he ſtands up, and making a large opening in the vein, in order that the evacuation may be very ſudden.

There can be little doubt that the repreſentations of this ſubject, given by Mr. Wilmer and Mr. Alanſon, have ariſen from the blindeſt prejudices. The good effects of bleeding may have been exaggerated; but have not the ills reſulting from it been magnified beyond all moderation? That a ſtrangulated hernia is a caſe attended with much inflammation is completely viſible. That patients who die after the operation have the contents of their abdomen highly inflamed, may be aſcertained by ocular inſpection of the appearances which preſent themſelves in the dead ſubject. The aſſertion about the patient's death happening from the inverted periſtaltic action of the bowels *depreſſing the powers of life*, may be ſaid to be nothing but an aſſertion, quite unproved and deſtitute of all probability. Nor is the allegation, that bleeding increaſes the danger of the operation, at all more worthy of a ſerious refutation, when we ſee a ſubject opened who has died after the operation, and caſt our eyes on the reddened and thickened ſtate of the inteſtines, the coagulable lymph effuſed on their ſurfaces, the agglutination of their convolutions together, and, ſometimes, the gangrenous miſchief preſent, we conclude, that the inflammation within the abdomen has had a conſiderable ſhare in bringing on the patient's diſeaſe. Were Mr. Wilmer's idea of the harm which bleeding has done to come into our head juſt at this moment, we ſhould ſcarcely be able to look upon it as much better than nonſenſe.

We entirely agree with Mr. Lawrence, that the advocates and opponents of blood-letting have ſtated their opinions too ſtrongly on the oppoſite ſides of the queſtion, and that a prudent practitioner will take a middle courſe between the two extremes. He will not with Pott uſe veneſection in all inſtances; neither will he follow Mr. Wilmer in diſcarding it entirely from the treatment of hernia; but will reſtrict its employment to a certain claſs of caſes. He will have recourſe to it when the ſtrangulation is of the inflammatory kind; when the hernia is ſmall and recent; the abdomen tenſe and painful; and the patient young, ſtrong and plethoric. Treatiſe on Ruptures, edit. 2. p. 129.

The inexperienced may ſometimes be deterred from employing the lancet by the weakneſs and ſmallneſs of the pulſe, coldneſs of the extremities, and other marks of debility; ſuch ſymptoms, however, always accompany inflammation of the bowels, and are therefore rather to be regarded as reaſons for bleeding than againſt it, eſpecially when pain and tenſion evidently prevail. The apparent proſtration of the ſtrength is found to be diminiſhed by the evacuation; the pulſe riſes; and warmth is diffuſed over the limbs.

Warm Bath.—When the firſt trial of the taxis has failed, veneſection is to be immediately performed, if the nature of the caſe requires this kind of evacuation. Sometimes, a ſpontaneous aſcent of the hernia follows the loſs of blood. In other inſtances, the reduction is now eaſily effected by the taxis. Frequently all manual endeavours ſtill prove unſucceſsful. When this happens, it is common to direct the patient to be put into a warm bath. Mr. Aſtley Cooper acquaints us, that he generally orders the warm bath immediately after veneſection, before making the ſecond attempt at reduction by the taxis.

The principle on which the warm bath becomes uſeful is ſimilar to that of bleeding. A general relaxation and faintneſs of the body are brought on, which are deemed highly favourable to the reduction of the hernia.

The temperature of the water ſhould be at firſt about one hundred degrees, and it ought to be gradually raiſed, till the patient faints, or feels likely to do ſo. This will commonly happen in about fifteen or twenty minutes; when another attempt to reduce the hernia with the hands is to be made.

Mr. Hey notices that many inſtances are upon record of the good effect of warm bathing, in procuring the reduction of a ſtrangulated hernia. He has often ſeen it uſeful; and often ſeen it fail. When it is tried, he recommends placing the patient, if poſſible, in a horizontal poſition. He thinks that gentle efforts with the hand to reduce the prolapſed part are, perhaps, attended with leſs danger, and with greater proſpect of ſucceſs, while the patient lies in the bath, than in any other poſition. The free uſe of opiates, he ſays, coincides with that of warm bathing, and, under ſome circumſtances, theſe means deſerve to be tried in conjunction. Pract. Obſ. edit. 2. p. 118.

The greateſt objection to the uſe of the warm bath is, that a vaſt deal of time is frequently loſt in preparing the water. Now this is a material conſideration in the choice of every plan in caſes of ſtrangulated hernia. A proceeding which conſumes but a little time, like bleeding, is therefore often to be preferred to ſomething elſe, which may be quite as likely to ſucceed, though, on account of the time it takes up, its failure may leave the patient almoſt paſt relief from any other means. Notwithſtanding we entertain a very favourable opinion of the efficacy of the warm bath, ſince its ſucceſs is always uncertain, we ſhould never have recourſe to it, unleſs it could be got ready in a few minutes. Time is of more conſequence in caſes of ſtrangulated hernia, than in any other ſurgical diſeaſe.

Every one muſt concur with Mr. Lawrence, that the warm bath may be uſed in the early ſtages of the complaint, when the ſymptoms are not yet very urgent. But if the ſtrangulation has laſted ſome time, ſo that the circumſtances require diſpatch; if it has reſiſted more powerful means, ſuch as the topical application of cold and the tobacco clyſter, it would be mere waſte of time to employ this remedy. Treatiſe on Ruptures, edit. 2. p. 132.

Purgatives.—Purgative medicines have been preſcribed in caſes of ſtrangulated hernia, for the purpoſe of exciting the periſtaltic action of the bowels, ſo that the portion confined in the ſtricture may have a chance of being drawn out.

Mr Hey's experience leads him to condemn, almoſt univerſally, the uſe of purgatives, taken by the mouth, while an inteſtine remains firmly ſtrangulated. In this ſtate of the caſe they uſually increaſe the vomiting, and add to the patient's diſtreſs. Mr. Hey is of opinion, that if they are to be tried, the beſt time is when the vomiting has been relieved by means of an opiate. However, he acknowledges, that he has repeatedly given them in vain, during ſuch an interval of relief.

Though cathartics are moſt properly abandoned, in caſes of hernia attended with conſiderable ſtrangulation, there are ſome circumſtances in which their utility is confeſſed by very excellent ſurgeons. Mr. Aſtley Cooper thinks, that when the ſymptoms are only ſlight, aperient medicines may be given, if there is either no vomiting, or only at diſtant intervals. In ſuch caſes, he has known opium, joined with calomel and cathartic extract, produce ſtools, and relieve the patient. On Inguinal Hernia, p. 25.

In the entero-epiplocele, when the inteſtine has retired, and the omentum remains ſtrangulated; or in a ſimple ſtrangulation of the omentum, where the inteſtine has not been prolapſed; purgatives are of great utility. So likewiſe, in very large and old herniæ, where there is reaſon to doubt whether the diſeaſe is not to be conſidered as a morbid affection of the inteſtinal canal, rather than the effect of ſtrangulation, purgatives may be as uſeful as in the ſimple ileus without hernia. (Hey, p. 114. edit. 2.) Alſo, in old large herniæ, where an accumulation of fecal matter, from torpor of the inteſtine, is the cauſe of ſtrangulation, and the ſymptoms are of the chronic kind, purgatives may be employed with ſucceſs. Mild aperients, however, like the Epſom ſalt, exhibited in ſmall repeated doſes, are here better than ſtronger cathartics, and opium may be added to make them agree with the ſtomach. See Lawrence on Ruptures, p. 133. edit. 2.

Purgative Clyſters.—Theſe are not liable to the objection of increaſing the irritation and vomiting, in the manner cathartics taken by the mouth do; but they ſeem to poſſeſs little efficacy. Mr. Hey declares, that he never ſaw an inſtance, in which clyſters, either made with purgative ingredients, or ſimply laxative, as of broth, or water gruel with oil, produced a return of the ſtrangulated hernia. They merely empty the large inteſtines, and do no more. This muſt alſo be in general an uſeleſs ſtep, as it is uſual for a motion ſoon to follow the occurrence of ſtrangulation. However, when purgatives are indicated, their operation may be aſſiſted with clyſters.

Opiates.—Mr. Hey has met with ſeveral examples, in which the free exhibition of opiates, after bleeding, has procured the reduction of a ſtrangulated hernia in athletic ſubjects.

According to the ſame practical writer, opium will often remove, for a time, the pain and vomiting uſually attendant upon a ſtrangulation, even where it proves ultimately inefficacious. This will frequently enable patients to keep upon their ſtomachs ſuch other medicines as may be deemed neceſſary. For the ſame reaſon, opium may be a very valuable medicine, when it is requiſite to move the patient any diſtance to be operated upon. When opium is tried, with a view of relieving the ſtrangulation, the doſes ſhould be large; and, when the ſymptoms return, after being appeaſed by this medicine, Mr. Hey thinks, that the performance of the operation ought to be no longer deferred. P. 121. edit. 2.

Mr. Aſtley Cooper coincides with Mr. Hey, in regard to the efficacy of opium, in allaying the violence of the vomiting, and in aſſiſting the attempts at reduction after a copious bleeding. On Inguinal Hernia, p. 25.

Tobacco Clyſter.—All modern ſurgeons ſeem univerſally to agree, that, next to the operation, the tobacco clyſter, aſſiſted by cold applications to the tumour, is the moſt effectual means of relief. Mr. Aſtley Cooper confeſſes, that if this method were to fail, he ſhould be little inclined to await the trial of any other remedy. Tobacco has been employed in caſes of ſtrangulated hernia, both in the form of ſmoke, and as a liquid clyſter. To uſe the ſmoke with any effect requires a complicated apparatus. This plan, beſides being the moſt troubleſome, is alſo the leaſt certain in its operation. Hence it is at preſent not much adopted by judicious practitioners. Mr. Hey ſays, that he has frequently injected the fume of tobacco; but is inclined to prefer the decoction, both on account of its more powerful and ſpeedy effect, and as being more conveniently adminiſtered. Pract. Obſ. p. 126. edit. 2.

The moſt advantageous way of making the tobacco clyſter, is to infuſe a dram of tobacco, for ten minutes, in twelve ounces of boiling water, and then ſtrain the fluid for uſe. As dangerous and even fatal effects, however, may ariſe from this powerful plant, the moſt prudent method is to inject only half of the preceding quantity at firſt, and the remainder half an hour afterwards, if the previous portion has not proved ſufficient. The tobacco clyſter appears ſometimes to operate with dangerous violence, which may be owing either to the ſort of tobacco uſed, or to ſome particularity in the patient's conſtitution.

Mr. Aſtley Cooper moſt properly condemns the raſhneſs of injecting all at once a clyſter made with two drams of the plant, as ſome ſurgeons have ventured to do. He obſerves, that he once ſaw a man, with whom the tobacco clyſter had been uſed in this way, without effecting the reduction of the ſwelling, who, about half an hour afterwards, was put upon the table to have the operation performed, when his pulſe was found ſo low, his countenance ſo depreſſed, and his body ſo covered with cold ſweats, that he was ordered back to bed, and, on carrying him thither, he expired. The ſame gentleman tells us of another inſtance, in which a girl died thirty-five minutes after ſuch employment of tobacco, and moſt obviouſly from its effects. On Inguinal Hernia, &c. p. 24.

Cold Applications.—The cold bath, and the throwing of cold water upon the patient, are ſaid to have ſometimes ſucceeded; but they have failed ſo often, that judicious practitioners are little inclined to devote time to a trial of them. Next to the tobacco clyſter, the beſt ſurgeons ſeem now univerſally to agree, that putting cold applications upon the tumour has the moſt effect in promoting the reduction of a ſtrangulated hernia. It is in ſome meaſure fortunate, that ſuch applications, and the tobacco injection, admit of being put into practice together, ſo as to give the patient the chance of benefit ariſing from their combined effect. Vinegar and brandy, and vinegar with ſal ammoniac, have been uſed for this purpoſe. The moſt ſimple and efficacious method, however, is to apply ice to the tumour, when it can be procured. Mr. Aſtley Cooper recommends it to be broken in ſmall pieces, and a bladder to be about half filled with it; tied up, wiped dry, and laid upon the hernia, ſo as to cover the inflamed and ſwollen parts. According to this gentleman, the effect of this plan is almoſt immediately to diminiſh pain, to make the ſkin over the tumour contract, and to effect the reduction of the protruded parts by the preſſure thus produced. He ſtates, that one advantage of this remedy is, that it arreſts, for a length of time, the progreſs of the ſymptoms, ſo that it may be continued for ſeveral hours upon the part, without incurring the riſk of loſing too much time. If, after a trial of about four hours, the ſymptoms become mitigated, and the tumour is leſſened, M. A. Cooper adviſes a perſeverance in the plan for ſome time longer; but if they continue with unabated violence, and the tumour reſiſts every attempt at reduction, no farther trial of the ice ſhould be made. By mixing ſalt with the ice, the degree of cold may be increaſed, even beyond what can ſafely be employed.

Mr. A. Cooper cenſures the cuſtom of applying the ice, wrapped up between folds of cloth, ſince the melted portion keeps the patient's bed wet and uncomfortable, beſides the method being apt to render the parts froſt bitten, and apt to ſlough.

Since ice cannot always be procured, it is ſometimes neceſſary to apply a ſubſtitute. The moſt convenient is a mixture of ſal ammoniac and nitre, finely powdered, and blended together in equal proportions. Ten ounces of the mixed ſalt is to be put into a bladder, into which has been previouſly put ſixteen ounces of water. The bladder is then to be tied up, and laid upon the tumour. The degree of cold, produced by this mixture, is lower, in the hotteſt weather, than the freezing point of water, and if the water be previouſly cooled, the cold will be greater.

Nitrated ammonia and water, in equal parts, produce a ſtill greater intenſity of cold; but this ſalt cannot commonly be had. The cold produced by vinegar and ſal ammoniac, and by vinegar and ſpirits of wine, is too ſlight to be depended upon. Cooper on Inguinal Hernia, p. 25.

Fomentations and Poultices.—Of all the means of promoting the reduction of a ſtrangulated hernia, theſe are certainly the moſt inſignificant. Were they uſed in any other leſs urgent diſeaſe, the thing would not be of ſo much conſequence. But, in the preſent inſtance, the loſs of a very little time often makes a fatal difference in the fate of the patient. For this reaſon, though poultices and fomentations do no harm of themſelves, they create a waſte of time, hinder the trial of more effectual meaſures, and become indirectly highly detrimental. We ſhall only add, that their efficacy is almoſt univerſally doubted, if not denied, by ſuch ſurgeons as have had much experience. Thus we ſee, that all the means for removing the viſcera from their ſtrangulated ſtate are, with the exception of the operation, exceedingly uncertain. Hence it ſhould be a principle with the ſurgeon, not to ſpend too much time upon them. The neceſſity of an early recourſe to the operation can ſcarcely be preſſed in too ſtrong terms upon the mind of the practitioner. If Mr. Pott's opinion be true, that the operation, when performed in a proper manner, and in due time, does not prove the cauſe of death oftener, than, perhaps, once in fifty times; it would undoubtedly preſerve the lives of many to perform it almoſt as ſoon as the diſeaſe commenced, without increaſing the danger by ſpending much time in the uſe of means, which cannot be depended upon for a cure. Mr. Hey has twice ſeen this diſeaſe prove fatal in about twenty-four hours. He remarks, that, in ſuch caſes, there is evidently little time for delay. A ſurgeon, who is competent to perform the operation, is not, perhaps, conſulted, till the inteſtine is on the point of being mortified; or is actually in a ſtate of mortification. The dilemma, into which he is then caſt, is painful indeed. But when the fulleſt opportunity is afforded him of uſing the beſt mode of treatment, his ſucceſs will be the greateſt when the operation is not long delayed. Mr. Hey declares, that when he firſt entered the profeſſion of ſurgeon, it was cuſtomary to conſider the operation as the laſt reſource, and as improper until the danger appeared imminent. By this dilatory mode of practice, he loſt three patients in five, upon whom the operation was performed. After having more experience, he made it a cuſtom, when called to a patient, who had laboured two or three days under the diſeaſe, to wait only about two hours, in order to try the effect of bleeding, (when this was not forbidden,) and of the tobacco glyſter. By this method he has only loſt about two patients out of nine, after the operation. This compariſon is ſaid to be drawn from caſes nearly ſimilar, inſtances with gangrene being excluded from the computation. See Pract. Obſ. in Surgery, p. 128—130. edit. 2.

Every one muſt coincide with Mr. Aſtley Cooper, that it would be a fortunate thing if ſurgeons were poſſeſſed of any criterion, which, by ſhewing the exact ſtate of the protruded parts, would enable them to judge of the lateſt time, to which the operation could be ſafely delayed. This gentleman remarks, that hiccough has been named as the deciſive ſymptom of mortification; but that this opinion is now known to be inaccurate, ſince the operation has ſeveral times been performed in the hoſpitals of the Borough, after this ſymptom has occurred, when the parts have been found free from mortification, and the patients have recovered. On the other hand, the body of a woman was examined, who had died of a ſtrangulated hernia, in which a portion of the ilium was mortified, though there had not been the ſlighteſt hiccough during the progreſs of the diſeaſe.

Mr. Aſtley Cooper is always anxious to perform the opetion before the abdomen feels ſore upon being preſſed. He obſerves, that ſoon after the ſymptoms of ſtrangulation appear, the abdomen becomes tenſe, owing to the flatulent diſtention of the inteſtines; but ſtill the patient does not immediately complain of ſoreneſs upon preſſure. No ſooner, however, does ſuch tenderneſs ariſe, in conjunction with the tenſion, than it is manifeſt that the inflammation has extended into the cavity of the abdomen. In this ſtate we have peritoneal inflammation to contend with, which, unfortunately, is likely to be increaſed by the operation, the only means of relieving the ſtricture. Hence this gentleman is of opinion, that as ſoon as bleeding, the warm bath, the tobacco glyſter, and topical cold, have been fairly tried, and have proved unſucceſsful, if the abdomen is becoming affected, the operation ſhould be no longer delayed. Indeed, ſays he, if the warm bath cannot be conveniently and quickly procured, it is better to omit it altogether, than endanger the patient's life by the delay.

The ſoreneſs, upon preſſing the abdomen, is repreſented as being a much better criterion than the time which has elapſed ſince the occurrence of the firſt ſymptoms of ſtrangulation; for there is the utmoſt variety in the time which elapſes between theſe ſymptoms and a fatal termination. Mr. Aſtley Cooper further informs us, that in the muſeum of St. Thomas's hoſpital, there is a drawing of a large inteſtinal and omental hernia, which Mr. Elſe uſed to ſtate in his lectures, proved fatal in eight hours from the firſt appearance of ſtrangulation. Mr. Cooper himſelf has, on the other hand, known the operation to be ſucceſsfully performed at the end of eight days, after the acceſſion of the ſymptoms of ſtrangulation, although death generally happens on the ſixth or ſeventh day from the commencement of the ſymptoms.

This eminent ſurgeon thinks, that ſome judgment may be formed from the pulſe, and from the patient's general appearance. If the pulſe be ſo ſmall as to be ſcarcely perceptible, and the countenance anxious and ſunk, no time is to be loſt. He has known the operation ſucceed in theſe circumſtances, though conjoined with hiccough. Indeed, the operation may ſave life, even when the parts are gangrenous, by promoting the ſeparation of the ſloughs. On Inguinal Hernia, &c. chap. 9.

Small herniæ more frequently demand the operation than large ones, and epiploceles, generally ſpeaking, admit of rather more delay than enteroceles.

We ſhall next enter upon an account of particular herniæ, and the mode of operating in different caſes.

Inguinal Hernia, or Bubonocele.—In this caſe, the viſcera are protruded from the abdomen in the courſe of the ſpermatic cord. While the ſwelling reaches no lower than the groin, the name of bubonocele is adopted; when the parts have deſcended lower, the caſe is called an oſcheocele, or ſcrotal hernia. The viſcera firſt eſcape out of the cavity of the abdomen, about an inch and a half on the outer ſide of the abdominal ring, in a line extending from the pubes to the anterior ſuperior ſpinous proceſs of the ilium. If the progreſs of the hernia be unchecked, it proceeds, by degrees, obliquely downwards and inwards, as far as the abdominal ring. While the tumour lies within the ring, the diſeaſe is often unſuſpected by the patient. The tumour then deſcends through the abdominal ring into the ſcrotum, where, being leſs confined, its exiſtence becomes completely manifeſt, and it is apt to increaſe to an enormous ſize, ſo as even to reach down as far as the knees.

Upon diſſecting an inguinal hernia, we find under the ſkin of the ſcrotum a faſcia, which is more or leſs thick in proportion to the duration and ſize of the ſwelling. This faſcia is given off by the tendon of the external oblique muſcle above the abdominal ring.

Beneath ſuch faſcia lies the cremaſter muſcle, which forms another covering of the hernial ſac, and is often found much thickened and expanded.

When the faſcia and cremaſter muſcle are removed, the proper hernial ſac comes into view, being thinner than the two former coverings, but ſomewhat thicker than the peritoneum, from which it is derived.

Behind the hernial ſac the ſpermatic cord is ſituated above, and the teſticle below. The ſac, therefore, lies between the cord and the cremaſter muſcle, anterior to the former, and poſterior to the latter. Above the abdominal ring the direction of the hernia is obliquely upwards and outwards towards the ſpine of the ilium, like that of the ſpermatic cord. Here the hernial ſac is covered in front by the tendon of the external oblique muſcle, the ſpermatic cord being ſtill behind, and yet more backward, the tendons of the internal oblique and tranſverſalis muſcles, and the above faſcia. At the upper aperture in the faſcia, the ſac penetrates the abdomen along with the ſpermatic cord. This part is called the mouth of the ſac, between which and the ſymphyſis pubis paſſes the epigaſtric artery, running in ſome degree under the ſac and along its inner ſide. As Mr. Aſtley Cooper further explains, there is no veſſel of importance above the mouth of the ſac, nor externally between it and the ſpinous proceſs of the ilium.

From the very accurate accounts publiſhed by this gentleman, it appears, that in old and large herniæ the poſitions of the internal and external openings of the ring are changed, in relation to the tumour, by the conſtant preſſure of the protruded parts, the mouth of the ſac coming then almoſt into contact with, and nearly oppoſite to, the abdominal ring.

Mr. A. Cooper informs us, however, that ſuch change produces no alteration in the relative poſition of the epigaſtric artery, except in giving it a greater curve.

The hernial ſac is commonly in front of the ſpermatic cord; but occaſional inſtances are met with, in which the ſpermatic cord is ſeparated, and the hernial ſac protruded between its veſſels, the vas deferens being on one ſide, and the blood-veſſels on the other. The ſpermatic vein and artery have been ſeen in front of the ſac, and the vas deferens behind it. The whole of the cord is alleged to have been found in front of the ſac. Hence operators ſhould not make their firſt inciſions without caution and conſideration.

The diſtinguiſhing ſymptoms of an inguinal hernia are, according to Mr. Aſtley Cooper, of the following kind.

When the patient is deſired to cough, the tumour becomes immediately diſtended. When the patient can ſtate, from his remembrance, that on the firſt appearance of the tumour in the groin, it uſed to return into the abdomen, when he was in a horizontal poſture, and to re-appear, when he ſtood up, though circumſtances may long have rendered ſuch aſcent and deſcent impoſſible. When the progreſs of the tumour has been from the groin gradually downwards to the ſcrotum. When the caſe is an enterocele, it has an elaſtic and uniform feel, and goes up with a guggling noiſe. When the caſe is an epiplocele, the tumour is leſs equal upon its ſurface, receives an impreſſion from the fingers, is heavier than the former ſwelling, and does not make a noiſe on aſcending into the abdomen. Laſtly, eructations, ſickneſs, conſtipation, colic pains, and diſtention of the abdomen, are apt to occur; and pain is produced by violent exertions, coughing, ſneezing, &c. Such complaints generally firſt lead the patient to ſuſpect the diſeaſe.

There are ſome diſeaſes which have often been miſtaken for an inguinal hernia.

The hydrocele may be known by the ſwelling beginning at the lower part of the ſcrotum, and afterwards gradually extending upwards towards the ring. The ſpermatic cord and teſticle can only be felt with difficulty, while in hernia they may, in general, be plainly felt behind the tumour. A hydrocele does not become dilated when the patient coughs; it communicates the ſenſation of a fluctuation, when ſtruck with the fingers, and has a tranſparent appearance, when a lighted candle is put behind it.

Cyſts, filled with water, ſometimes form upon the ſpermatic cord. When quite below the ring, they may be readily diſcriminated by their not being connected with the abdomen. When it reaches within the ring, and has no diſtinct tranſparency or fluctuation, it ſhould be opened with great circumſpection. We have known ſuch an hydrocele of the cord accompany the exiſtence of an old hernial ſac, be miſtaken for a protruſion of the viſcera, and on account of complaints induced by a kick in the groin, operated upon, under the idea of the caſe being a ſtrangulated hernia. When the cyſt, the ſuppoſed hernial ſac, was opened, the fluid which it contained was diſcharged, and, on introducing the finger, nothing was found but a circumſcribed cavity. After ſome more inciſions, an opening was made in the real hernial ſac, which was not ſuſpected of being ſo, and had no protruſion of the viſcera within it. Upon paſſing a finger upwards, ſome fluid, which came from the abdomen, eſcaped. All now ſeemed uncertainty reſpecting what the caſe actually was, nor did the doubt ſubſide, till the parts were examined, after death, the following day.

An enlargement of the teſticle may be diſcriminated from a hernia by its ſhape, which is retained even in diſeaſe by its weight, the pain generally attending it, and by the intolerable ſenſation ariſing when this organ is preſſed.

Hæmatocele, or a collection of blood in the tunica vaginalis, is very apt to be confounded with a hernia, in conſequence of its generally proceeding from a blow, and having the ſame ſhape as the laſt diſeaſe. But, ſays Mr. Aſtley Cooper, the firmneſs of hæmatocele, the redneſs of the ſkin accompanying it, its not dilating when the patient coughs, and the ſpermatic cord being free from ſwelling at the ring, will point out the difference of the complaint from a hernia.

Of all diſeaſes the varicocele is moſt liable to be miſtaken for a hernia. When large it dilates upon coughing, but not otherwiſe. It appears in the erect, and retires in the recumbent poſture. It is firſt obſerved near the ring. The only ſure method of diſtinction with which Mr. Aſtley Cooper is acquainted, is to make the patient lie upon his back and then to empty the ſwelling by preſſure upon the ſcrotum. The ſurgeon now putting his fingers firmly upon the upper part of the abdominal ring, the patient is deſired to riſe. If it is a hernia the tumour cannot re-appear, while the preſſure upon the ring is continued. But if it is a varicocele the ſwelling returns with increaſed ſize in conſequence of ſuch preſſure. See Cooper on the Anatomy, &c. of Inguinal Hernia.

Operation for the Strangulated Inguinal Hernia.—When relief cannot be obtained from the plans already detailed in the foregoing columns, the ſurgeon is called upon to perform an operation which conſiſts in dividing the integuments, diſſecting down to the ſac, and opening it; removing the ſtricture, and replacing the protruded viſcera. The external inciſion ſhould begin an inch above the outer angle of the ring, and extend over the middle of the tumour to its lower part. It is judiciouſly remarked by Mr. Lawrence, that by beginning the inciſion above the ring, the operator gains room where it is much needed in a ſubſequent part of the operation, *viz.* the inciſion of the ſtricture; and for the ſame reaſon the cellular and adipous ſubſtance, in this ſituation, ought to be divided, ſo as to bring the aponeuroſis of the external oblique muſcle fairly into view. Either by this firſt inciſion, or in the ſubſequent diſſection down to the ſac, the external pudic branch of the femoral artery may be divided, and ought to be tied when the hemorrhage from it is profuſe. After thus dividing the ſkin, the cellular ſubſtance lying upon the outſide of the hernial ſac is to be raiſed with a pair of diſſecting forceps and cautiouſly cut, layer by layer. In order to leſſen the riſk of cutting ſuddenly through the ſac and wounding the bowels, the ſurgeon ſhould not only elevate the layers of cellular ſubſtance with the forceps, but take care to divide them with the edge of the knife inclined rather horizontally. Many operators diſplay great awkwardneſs and abſurdity in diſſecting a little in one place and then in another, without effecting the object in view at any point till after a conſiderable time. The thing deſired is to make an opening into the ſac in one particular place. This can be accompliſhed with moſt ſecurity at the lower part of the tumour, becauſe fluid is ſometimes contained in the ſac, and, in that caſe, always gravitates to the bottom of the ſwelling. An opening having been made, it is to be enlarged in both directions with the probe-pointed biſtoury, guided by the finger or director until the whole cavity is laid open. The preſence of fluid is not a conſtant circumſtance, and, therefore, cannot be depended upon as a criterion, which will always ſerve for ſhewing when the firſt aperture is made in the hernial ſac. The circular arrangement of the arteries of the inteſtine, and its very ſmooth ſurface, diſtinguiſh it from the hernial ſac, which is rather rough and cellular on its ſurface, and is in general cloſely connected with the ſurrounding parts. Since the ſpermatic veſſels are apt ſometimes to deviate from their ordinary ſituation, in reſpect to the hernia, and lie more or leſs in front of the ſac, every operator ought to endeavour to aſcertain ſuch variations, if poſſible, before hand, in order that he may avoid parts which ſhould never be injured. When the hernial ſac has been in this manner opened, and its contents fairly brought into view, the next object is to liberate them from the ſtate of ſtricture in which they are. In a few examples, indeed, the parts may be now reduced with the hand, and without any further employment of the knife. In moſt inſtances, however, it is otherwiſe; the ſtricture muſt be cut, and if this ſtep be neglected, the ſurgeon will either not be able to effect the reduction at all, or will only ſucceed by exerting ſuch force and roughneſs on the protruded viſcera, as muſt inevitably be followed by the moſt pernicious effects. Therefore, whenever the parts cannot be returned with eaſe after opening the ſac, it is the duty of the ſurgeon to refrain from all manual violence, and proceed to dilate the ſtricture. With this view he muſt firſt try to aſcertain its ſituation by gently introducing his finger into the neck of the ſac. The requiſite diviſion ſhould be executed with a curved probe-pointed biſtoury, guided by the finger of the operator, which will protect the protruded parts. Should the tightneſs of the contraction exclude the employment of the finger, a grooved director muſt be made uſe of. "The finger ſhould be carried as far into the neck of the ſac as it can be without violence, and between the protruded parts and the upper margin of the ſtricture. The biſtoury, with its back reſting on the finger, is puſhed forwards towards the abdomen, followed and ſupported by the finger which protects the viſcera. The length of the inciſion ſhould not exceed what is ſufficient to allow the viſcera to be replaced with eaſe." Lawrence, p. 203. edit. 2. The direction in which this cut is made is of conſiderable importance, ſince the proximity of the epigaſtric artery to the mouth of the hernial ſac expoſes ſuch veſſel to injury. Sharp and Pott have adviſed practitioners to make the diviſion of the ſtricture in the direction upwards and outwards, a method which is attended with ſafety in all ordinary caſes, and is only exceptionable when the viſcera are protruded on the inner ſide of the epigaſtric artery. Yet, even in the laſt-mentioned example, the veſſel is ſo diſtant from the external angle of the ring, that in general it cannot be wounded by cutting upwards and outwards, unleſs the inciſion be carried to a far greater extent than is uſually requiſite. On the erroneous ſuppoſition that the artery has the ſame relation to the abdominal ring both in ſound and diſeaſed ſtate; Richter and Bertrandi adviſe ſurgeons to divide the ſtricture upwards and inwards, a plan which is highly improper in common caſes, as the preceding artery would be cut; but the method might be followed in the leſs frequent inſtances, where the hernia makes its protruſion on the inner ſide of that blood-veſſel. Unfortunately the caſes of one deſcription and the other hardly admit of being diſcriminated with ſuch certainty as to afford any guidance to the operator, in regard to the direction in which the ſtricture ought to be cut. Mr. Aſtley Cooper recommends always making the diviſion directly upwards, in a courſe parallel to the linea alba, a mode of proceeding which will be free from danger, whatever may be the ſpecies of inguinal hernia. According to that judicious writer, Mr. Lawrence, the preciſe point at which the inciſion of the tendon ſhould be made, is at the middle of the ſuperior margin of the ring; the artery can never be ſituated at this part, nor expoſed to danger, unleſs the inciſion be extended to a moſt unreaſonable length. In every inſtance in which the ſtrangulation exiſts at the ſuperior opening of the ring, the epigaſtric artery is ſituated at the inner margin of the neck of the hernial ſac. When the ſtricture is of this kind, it may be divided much in the ſame way as the aperture in the tendon of the external oblique muſcle, namely, with a probe-pointed biſtoury, guided by the fore-finger of the left hand. Mr. Aſtley Cooper employs for this purpoſe a very good inſtrument, which is a biſtoury, that has a cutting edge reaching only a little way from the point, and which is introduced with the flat ſide towards the finger, until the probe-point has paſſed under the ſtricture, when its edge may be inclined up ſo as to divide the margin of the tranſverſe muſcle as far as circumſtances require. The external opening of the ring in this caſe ought never to be dilated, unleſs there ſhould not be room enough to get at the ſtricture, an event which can happen only ſeldom. The ſtricture may be ſituated both at the outer and inner opening of the ring, and require to be divided in each place, ere the reduction can be accompliſhed with the due degree of facility.

Mr. Aſtley Cooper has conjectured, that it might be advantageous to leave the neck of the hernial ſac undivided, and in dilating the ſtricture, he has been in the habit, therefore, of introducing the curved biſtoury between the abdominal ring, and the portion of peritoneum, which conſtitutes the upper part of the ſac. He thinks, that as, in this method, the wound is further from the peritoneum, inflammation of that membrane is leſs likely to be induced by the operation; and that in caſe the epigaſtric artery ſhould be wounded, the blood cannot inſinuate itſelf into the abdomen. The propriety of this plan has been ably examined by Mr. Lawrence, in his excellent treatiſe on hernia. The two reaſons, adduced by Mr. Aſtley Cooper in favour of the practice, are certainly not weighty, becauſe the firſt has not yet been proved by comparative trials, and the ſecond muſt appear unimportant, if the operator merely follow this author's own excellent maxims relative to the direction, in which the ſtricture ſhould be cut, by which means all riſk of wounding the epigaſtric artery would be entirely out of the queſtion. Mr. Lawrence urges ſeveral objections againſt the plan, founded on its difficulty, or the danger of injuring the protruded parts when the ſtricture is tight, the danger of leaving an inch of the ſac below the ring undivided, forming a ſort of a bag ready to receive any future protruſion, and diminiſhing the chance of a radical cure.

The laſt thing which the ſurgeon has to atchieve in the operation, is to reduce the viſcera into the cavity of the abdomen, a circumſtance, which may be directly done, when the protruded parts are ſound and free from adheſions. At the moment of attempting to make the reduction, the limb ſhould always be placed in a bent poſition. The records of ſurgery furniſh us with innumerable examples, which prove the propriety of never being deterred from returning the bowel merely becauſe it is of a dark brown colour. In fact, poſitive mortification is the only ſtate which can juſtify the operator in not putting the part back into the abdomen again. When the bowel is of the darkeſt brown, and almoſt black colour, it ſhould always be reduced, unleſs actually mortified. The beſt writers on the ſubject are now univerſally of one ſentiment on this important point, and the caſes ſhewing how frequently the diſeaſed action, indicated by the alteration of colour, ſtops, on the removal of the exciting cauſe, may be peruſed in the works of ſome of the moſt accurate obſervers, as thoſe of Warner, Acrel, Theden, Lawrence, &c.

In many caſes the practitioner may feel uncertain, whether a diſcoloured portion of inteſtine is mortified or not, and conſequently may be embarraſſed as to what line of conduct he ought to purſue. For the purpoſe of aſcertaining whether the

the altered bowel is really mortified or not, we are directed to preſs forward the blood in its veins, and if they become filled again, it is inferred that the part is ſtill poſſeſſed of vitality. On the contrary, when the blood is coagulated, and cannot be urged forward, it is concluded that the diſcoloured portion is actually in a ſtate of gangrene. A mortified piece of bowel is black, flabby, and gives way under the finger, while in caſes where it is merely diſcoloured, it retains a degree of firmneſs, and preſents a dark brown or chocolate tint.

Sometimes, on laying open the hernial ſac, the omentum contained in it is found ſo diſeaſed, thickened, and altered, that its reduction is either impracticable or improper.

The treatment of ſuch caſes, as well as of others, where the inteſtine in the ſac is affected with mortification, will be preſently conſidered.

It is an invariable rule with ſurgeons, after opening the hernial ſac and reducing the viſcera, to introduce their finger into the ring, ſo as aſſure themſelves that the parts are fairly and completely returned into the cavity of the abdomen. Unqueſtionably prudent as this proceeding is, it juſtifies no exerciſe of manual roughneſs, but ought to be done in the moſt gentle manner poſſible.

It frequently happens, that, after laying open the hernia, its contents are prevented from being at once reduced, by their having become adherent to each other, or to the hernial ſac. When the adheſions are recent and ſlight, they may be broken with the fingers; when old and ſtrong, they require a cautious and ſkilful employment of the knife. The firmeſt and moſt intimate adheſions are thoſe, which form between the omentum and hernial ſac: the bowels are not often firmly connected together.

When reduction is hindered by ſuch adheſions within the ring, as cannot be ſeen, they muſt not be divided, without firſt bringing them into view by a due dilatation, both of the integuments and ring, leſt the protruded viſcera ſhould be wounded in the attempt.

When the caſe is an entero-epiplocele, it is proper to reduce the inteſtine before the omentum. In all caſes, where the latter membrane preſents itſelf, the operator muſt be exceedingly careful not to practiſe any inciſion upon it, without having firſt convinced himſelf, that there is no piece of inteſtine included between its layers.

When the ſides of the hernial ſac ſeem ſo diſeaſed and thickened, as to be likely to retard the union of the wound, they may be cut away.

The operation being finiſhed, the edges of the inciſion are to be brought together, and kept in this ſtate, by means of the interrupted ſuture and ſtrips of adheſive plaſter. Gentle preſſure ſhould alſo be made upon the part with a compreſs and the T bandage, for the purpoſe of favouring the union of the ſurfaces in contact, and preventing another protruſion. On the patient being put to bed, he is to be enjoined to lie as quietly as poſſible, and refrain from every ſort of exertion, leſt the viſcera ſhould be forced down again.

The firſt dreſſings need not be taken off till about the fourth day after the operation, unleſs particular ſymptoms ſhould require an earlier removal of them. The wound ought afterwards to be regularly dreſſed once every day. When its edges ſwell, and its circumference becomes red, attended with pain, and a good deal of inflammatory fever, the ſutures ought to be immediately cut, and withdrawn, and the part covered with a ſoft linſeed poultice, inſtead of adheſive plaſters and lint.

No patient, who has been operated upon for a ſtrangulated hernia, ſhould be permitted to get out of bed again before applying a proper truſs; nor can this inſtrument be ever afterwards left off without the patient expoſing himſelf to a conſiderable riſk of the recurring, and that, perhaps, in a greater degree, and, what is worſe, poſſibly in a ſtate of ſtrangulation again. The examples, in which a radical cure is the conſequence of the operation, are not ſufficiently frequent to juſtify any one in neglecting to wear a truſs, eſpecially until the hernia has manifeſted no tendency to deſcend again during a courſe of ſeveral years. When the patient's mode of life is active and laborious, we ſhould ſcarcely preſume to adviſe the omiſſion of the truſs, at any period after the operation, however great the hope might be, that a radical cure had been accompliſhed.

After the operation, the practitioner is not to believe that he has done the whole of his duty towards the patient. He ſhould now promote evacuation from the bowels, by means of clyſters, and ſmall doſes of Epſom or Glauber's ſalt, diſſolved in mint water. Nor ſhould this plan be neglected, although ſtools may follow the operation ſpontaneouſly. The patient's diet muſt alſo be light and ſparing, until he is entirely well. When peritoneal inflammation follows the operation, the ſurgeon muſt employ the moſt active meaſures with the greateſt promptitude. The propriety of this advice will be obvious to every one, who reflects, that the abdominal viſcera are frequently tending to inflammation before the operation, and that the latter proceeding often proves of itſelf a cauſe of peritonitis. When, therefore, the belly becomes tenſe and painful, attended with ſickneſs, hiccough, coſtiveneſs, and febrile ſymptoms, the patient ought to be immediately bled, put into the warm bath, have leeches applied to the ſurface of the abdomen, and try the effect of ſmall doſes of the mildeſt purgative ſalts, aided by clyſters. The efferveſcing draught, combined with opium, is recommended to a patient afflicted, after the operation, with an irritable ſtate of his ſtomach and vomiting. When diarrhœa occurs in the courſe of the treatment, relief muſt be ſought from opium and cordial medicines. See Lawrence on Ruptures, edit. 2.

Method of operating on large Herniæ.—The foregoing plan of operating is by no means proper for large, old, and adherent herniæ; for, as it is obſerved by the above incomparable writer, "the ſeparation of the preternatural connections is often extremely tedious and difficult; and the violence which muſt neceſſarily be inflicted, in executing this part of the operation, renders the ſubſequent occurrence of inflammation extremely probable. The extenſive ſurface which muſt be expoſed by laying open the whole of a large hernial tumour, conſtitutes a ſource of great danger to the patient, who, in theſe caſes, is generally advanced in years, and therefore leſs liable to withſtand an extenſive inflammation and ſuppuration." The ſame gentleman adverts to the occaſional impoſſibility, in ſuch caſes, of keeping the returned parts in the abdomen, after they have reſided for many years in a hernial ſac. He calls the attention of his reader to the dilated ſtate of the ring, a circumſtance, which muſt remove all expectation of a radical cure from the operation. He is therefore an advocate for removing the ſtricture without opening the tumour. The operation is to be done by making an inciſion of two or three inches in length, through the integuments over the abdominal ring. We are then directed by Lawrence to diſſect down to the faſcia, which covers the hernial ſac, and make an opening in ſuch faſcia! A director is next to be introduced under the tendon, and the part forming the ſtricture cut with a biſtoury, which is to be guided along the groove of the other inſtrument. When this method is found difficult, it is certainly beſt to make a ſmall opening in the ſac near the ring, by which means the ſurgeon will be enabled to divide the tendon with eaſe. The ſtricture having been thus removed, the parts are to be returned into the abdomen by preſſure, or at leaſt ſuch of them as are capable of reduction. Laſtly, the edges of the inciſion are to be brought together with ſticking plaſter, and united, if poſſible, by the firſt intention. In Mr. Aſtley Cooper's work on hernia, part 1, p. 45 and 46, two convincing caſes are related, one exhibiting the advantage of this plan of operating; the other ſhewing the danger of laying open the whole ſac of a large hernia. Mr. Lawrence records an additional example, in which Mr. Crowther ſucceſsfully operated upon a large ſtrangulated hernia, without laying open the whole of the tumour. According to Mr. Lawrence, the honour of propoſing this method of operating belongs excluſively to Jean Louis Petit, who is ſtated in Garengeot's treatiſe on the operations of ſurgery, publiſhed in 1719, to have adopted the plan the preceding year, in a caſe of crural hernia.

Operation where the Tumour has not paſſed the Ring.—As in this caſe the ſwelling is inconſiderable, the diſeaſe is apt to be miſtaken both by the ſurgeon and the patient; nor can the tumour be expoſed, without dividing the aponeuroſis of the external oblique muſcle. The inciſion through the integuments and aponeuroſis, ſhould be made in a direction parallel to the courſe of the ſpermatic cord within the ring. The ſtricture will always be found ſituated at the inner opening of the ring, and it may be divided either upwards, or upwards and outwards, with invariable ſafety, ſince, in the preſent form of the diſeaſe, the epigaſtric artery is always ſituated at the inner edge of the mouth of the ſac.

Obſervations reſpecting the Treatment of the Omentum found in the Hernial Sac.—We have already obſerved, that when the caſe is an entero-epiplocele, the inteſtine, if ſound, is to be reduced before the omentum. When, however, it is much diſeaſed, thickened, and indurated, as it is frequently found to be, after remaining any conſiderable time in a hernial ſac, the morbid part is to be cut off. It is accurately explained in Mr. Lawrence's excellent treatiſe, that of all the parts which form the contents of herniæ, the omentum is found to deviate moſt frequently from its healthy ſtructure. Indeed, it poſſeſſes very ſeldom a perfectly natural appearance, when it has been incloſed for ſome time in a hernial ſac. It becomes conſiderably thickened below the ring, and hence is firmer to the feel. That part which reſides in the neck of the ſac is ſometimes thickened and indurated, while the portion below retains its natural texture. When it has ſuffered ſtrangulation for a few days, it often becomes of a dark red, or livid colour, and there is an appearance on cutting it, as if ſome blood were extravaſated in its ſubſtance. Mr. Lawrence conceives, that this is the ſtate which ſurgeons have generally deſcribed under the term of gangrene. An inciſion into the part, under theſe circumſtances, is not attended with any bleeding; but the membrane admits of being expanded as in the natural ſtate. Sometimes, in caſes of hernia, the protruded omentum is converted into a ſolid fatty maſs, where every veſtige of the original ſtructure is loſt. In an old umbilical epiplocele, this gentleman has ſeen it forming a mere lump of fat, equal in ſize to two fiſts. He refers to inſtances related by Schmucker, where it has conſtituted in this manner maſſes of twelve ounces, and a pound and a half in weight, and he notices a caſe, deſcribed by Ponteau, in which forty-five ounces were removed in the operation. The hardneſs of the protruded omentum is occaſionally ſo great, as to have been called ſcirrhous and cancerous by Mr. A. Cooper, and Mr. Pott. (Lawrence on Ruptures, edit. 2. p. 246—248.) In ſome examples, the omentum in the hernial ſac is found actually gangrenous. Suppoſing the omentum to be in a diſeaſed, thickened, or indurated ſtate, its reduction into the cavity of the abdomen would be highly objectionable. In fact, the diſeaſed maſs could not be returned, without an immoderate dilatation of the ring, and, if reduced, would in all probability excite inflammation of the ſurrounding viſcera, and occaſion ſymptoms of a very dangerous deſcription. The unſound portion of omentum ſhould always be cut off with a knife, and when the arteries bleed, they ought to be taken up with a tenaculum, and tied ſeparately with a thread or ſmall ligature. The apprehenſion of hemorrhage, gave riſe to the barbarous practice of including the whole ſubſtance of the omentum in a tight ligature, which was applied juſt above the portion about to be removed. Monſieur Pipelet, in an able production, has expoſed the dangers of this method. (Mém. de l'Acad. de Chirurgie, tom. 3. 394). Our countryman, Mr. Pott, gives in his writings the moſt decided condemnation of the plan. "He has, with great candour related (ſays Mr. Hey) the fatal effect of ſuch a practice in a patient of his own. I ſaw him perform the operation (to which I apprehend he alludes) in the year 1758. The patient was in perfect health, and had an epiplocele, which was only troubleſome by its bulk. The omentum was quite ſound. A tight ligature was put upon it, and the part below was cut off. The ſymptoms which ſucceeded are thus accurately deſcribed (in Mr. Pott's own words); 'I have ſeen a whole train of bad ſymptoms, ſuch as nauſea, vomiting, hiccough, fever, anxiety, reſtleſſneſs, great pain in the belly, and an incapacity of ſitting upright, or even of moving without exquiſite pain, precede the death of a man, whoſe omentum was tied merely becauſe of its enlargement, &c.' Surely (adds Mr. Hey) no ſurgeon who has read this account, can, with a good conſcience, apply a tight ligature upon any conſiderable portion of omentum in a ſound ſtate." (Practical Obſervations in Surgery, edit. 2, p. 180.) This practice, indeed, cannot be reprobated in terms too ſevere; for a frequent effect of it is to bring on a fatal inflammation, and even mortification of the omentum extending within the abdomen, as high as the ſtomach and tranſverſe arch of the colon. Mr. Aſtley Cooper has remarked, with great truth, that it is ſurpriſing this cuſtom ſhould ever have prevailed. The very object of the operation, is to extricate the omentum from its ſtrangulated ſtate, ariſing from the preſſure of the ſurrounding tendon, and no ſooner has this been done, than the blind ſurgeon includes it in a ligature, which produces a more perfect conſtriction, than that which exiſted before the operation was undertaken. Let it not be inferred, however, from any thing here ſtated, that there is no riſk of hemorrhage in the abdomen, when the cut end of the omentum is reduced with its veſſels unſecured. On the contrary, we wiſh as much to praiſe the practice of tying the bleeding arteries ſeparately with a fine ligature, as to cenſure the method of tying the whole thickneſs of the omentum. It is true, that ſeveral authors of celebrity have repreſented the apprehenſion of bleeding as unfounded, and the employment of ligatures as utterly uſeleſs. Thus Monſieur Cagué, chief ſurgeon of the Hôtel Dieu at Rheims, aſſerts, that in nine operations he had cut the omentum in its ſound part without ligature, and that no unfavourable accident had reſulted from this treatment. (Mém. de l'Acad. de Chirurgie, tom. iii. p. 407.) Mr. Pott ſpeaks in the ſtrongeſt terms in favour of this method. He ſays, "the fear of hemorrhage is almoſt, if not perfectly, without foundation, as I have ſeveral times experienced." And again, "I will not pretend to ſay, that there never was a dangerous, or fatal flux of blood from the diviſion of the omentum without ligature; but I can truly ſay, that I never ſaw one; that I have ſeveral times cut off portions of it without tying, and never had trouble from it of any kind, though I have always made the exciſion in the ſound part; and that, from the ſucceſs which has attended it, I ſhall always continue to do ſo, whenever it ſhall become neceſſary." (Chirurgical Works, vol. ii. p. 116—118.) However, that there is a degree of danger attending ſuch practice cannot be doubted, after what has occurred to that experienced ſurgeon Mr. Hey, of Leeds. He informs us, that he has twice, and only twice, cut off a pretty large portion of omentum in its ſound part, in the operation for the ſtrangulated hernia, without ſecuring the veſſels which were divided, and he expreſſes his ſorrow at being obliged to ſay, that, in both caſes, the reduction of the remaining omentum was followed by hemorrhage, which nearly proved fatal to one of the patients. (Practical Obſervations in Surgery, p. 188, edit. 2.) Upon the whole, therefore, the moſt prudent, and leaſt objectionable plan, after cutting off a diſeaſed or gangrenous portion of omentum, is to take up each bleeding artery with a tenaculum, and tie it with a ſeparate ſmall ligature or thread, the end of which may be left hanging out of the wound, until it is looſe enough to be withdrawn altogether.

In the operation for a ſtrangulated hernia, it has been propoſed to leave the omentum in the wound unreduced, after returning ſuch part as appears clearly to be ſound, if a portion of this deſcription be prolapſed. The ſame advice has been extended to caſes where the protruded omentum is in a ſound ſtate, of little bulk, and ſtrongly adherent to the hernial ſac; and when, from enquiries made of the patient, we learn that this ſmall part has been prolapſed for many years, without diſturbing the functions of the abdominal viſcera In ſuch a caſe, Mr. Hey has ſuffered the omentum to remain, and he found no difficulty in healing the wound, nor any injury afterwards from the application of a well adapted truſs. We are ſorry that we ſee no reaſon to imitate this laſt method. "It is (as a judicious author obſerves) attended with no particular advantage, but certainly expoſes the patient to the poſſibility of ill conſequences. The omentum, left in the wound, muſt be liable to injury, inflammation, or diſeaſe; and hence ariſes a ſource of danger. Unnatural adheſions, formed by this part, have greatly impaired the functions of the ſtomach. Caſes are recorded, where the unfortunate patient has never been able to take more than a certain quantity of food, without bringing on inſtant vomiting; and even where it has been neceſſary for all the meals to be taken in the recumbent poſition, with the trunk curved, and the thighs bent. (See Gunz. Obſ. Anat. Chir. de Herniis. Mémoires de l'Acad. de Chirurgie, tom. iii. 406.) To avoid the poſſibility of ſuch afflicting conſequences, we ſhould, after removing any diſeaſed portion, carefully replace the ſound part of the omentum in the abdominal cavity, that no obſtacle may exiſt to its regaining that ſituation, in which its connections with the ſtomach and colon would naturally place it.

"Since, then, the practice of removing a diſeaſed portion of omentum, of ſecuring the bleeding veſſels, and of returning the remainder into the abdominal cavity, has never produced any injury to the patient, nor is likely to be followed by any ill conſequence, it muſt, in the preſent ſtate of our knowledge, be conſidered as the moſt adviſable treatment." (Lawrence on Ruptures, p. 260. edit. 2.) We have no doubt that every man of reflection and ſound judgment muſt be quickly ſtruck with the force of theſe arguments, which to us appear unanſwerable.

Treatment when the Inteſtine in the Sac is mortified.—Sometimes, on opening the hernial ſac, the inteſtine is found to be in a gangrenous ſtate, although the occurrence could not be previouſly known, owing to the integuments and the hernial ſac itſelf not being affected with the ſame miſchief. In ordinary caſes, however, both the ſkin and ſac become gangrenous at the ſame time with the contents of the hernia. The tumour, which was before tenſe and elaſtic, now becomes ſoft, doughy, emphyſematous, and of a purple colour. Sometimes the parts now become ſpontaneouſly reduced; but the patient only ſurvives a few hours.

Mr. Aſtley Cooper has accurately remarked, that, in other inſtances, the ſkin, covering the ſwelling, ſloughs to a conſiderable extent, the inteſtine gives way, and, as the feces find vent at the wound, the ſymptoms of ſtrangulation ſoon ſubſide. When the patient continues to live in theſe circumſtances, the living part of the inteſtine becomes adherent to the hernial ſac, the ſloughs ſeparate and come away, and thus an artificial anus is eſtabliſhed, through which the feces are commonly diſcharged, during the remainder of life.

However, though when the patient ſurvives the mortification of an inteſtinal hernia, he commonly obtains the bleſſings of life only combined with the loathſome affliction of an artificial anus; yet things ſometimes take a ſtill more proſperous courſe; the feces gradually reſume their former route to the rectum, and, in proportion as the artificial anus becomes unneceſſary, it is ſhut up. Many inſtances of this ſort have fallen under our obſervation in St. Bartholomew's hoſpital. The chance of a favourable event is much greater in ſome kinds of hernia than in others. When the ſtrangulation only includes a part of the diameter of the gut, the feces are ſometimes only partially diſcharged through the mortified opening. This quantity leſſens as the wound heals, and the patient gets perfectly well. (Louis; Mém. de l'Acad. de Chir. tom. iii.) A ſmall gangrenous ſpot or two may end in the ſame manner. Mortification of the cæcum and its appendix, in a hernial ſac, has happened ſeveral times, without much diſturbing the uſual courſe of the feces to the anus, and the patients have very ſoon recovered. Med. Obſ. and Inq. vol. iii. p. 162, &c.

The grand thing on which the eſtabliſhment of the continuous ſtate of the inteſtinal canal depends, in all theſe caſes, is the adheſion, which the living portion of the bowel, adjoining the mortified part, contracts with the peritoneum all round. In this manner, the eſcape of the contents of the bowels into the cavity of the peritoneum becomes in general completely prevented. When the inteſtine has not already burſt, the ſtricture ſhould be divided; an opening made in the mortified part to let out the feces, and very mild purgatives and glyſters adminiſtered.

It is an obſervation of Mr. Aſtley Cooper's, that the degree of danger attending an artificial anus, depens on the vicinity of the ſphacelated part of the inteſtinal canal to the ſtomach. Thus, if the opening be in the jejunum, there is ſuch a ſmall extent of ſurface for abſorption between it and the ſtomach, that the patient dies of inanition.

Let us now ſuppoſe, that the mortified ſtate of the inteſtine has only been diſcovered, after laying open the hernial ſac in the operation. The miſchief may only conſiſt of one or more ſpots; or of the whole diameter of the protruded bowel. In the firſt caſe, the proper practice is to divide the ſtricture, and return the inteſtine into the abdomen, with the mortified ſpots towards the wound. Mild purgatives and glyſters are then to be exhibited. The moſt favourable mode in which a caſe of this kind ends, is, when the inteſtinal matter gradually reſumes its natural courſe, after being either partly, or entirely diſcharged from the wound. But, ſometimes, an artificial anus continues for life.

The repeated obſervations of modern ſurgeons have now decided, that no ligature, paſſed through the meſentery to keep the gangrenous part of the bowel near the wound, is at all neceſſary. The parts in the neighbourhood of the ring have all become adherent together, in conſequence of inflammation, at the ſame time that the parts in the hernial ſac mortify; and, of courſe, the partially gangrenous bowel, when reduced, is mechanically hindered, by theſe adheſions, from ſlipping far from the wound. Default and De la Faye both confirm the fact, that the inteſtine never recedes far from the ring, and, even were it to do ſo, the adheſions which it ſoon contracts to the adjacent ſurfaces would, as Petit has explained, completely circumſcribe any matter which might be effuſed, and hinder it from being extenſively extravaſated among the convolutions of the viſcera. See Mémoires de l'Acad. de Chirurgie, tom. i. and ii.

Mr. Lawrence, in his late very valuable treatiſe on ruptures, has clearly ſhewn the impropriety of ſewing the ends of the inteſtinal canal together, introducing one within the other, ſupported by a cylinder of iſinglaſs, &c. put in their cavity, in thoſe caſes in which the whole circle of the inteſtine has mortified and been cut away, as is adviſed by the majority of ſurgical writers. "By drawing the inteſtine out of the cavity, in order to remove the dead part, the adheſion behind the ring, on which the proſpect of a cure chiefly depends, muſt be entirely deſtroyed; and new irritation and inflammation muſt be unavoidably produced by handling and ſewing an inflamed part." P. 280. edit. 2.

Inſtead of ſuch practice, this gentleman very judiciouſly recommends dilating the ſtricture, and leaving the ſubſequent progreſs of the cure entirely to nature. The ſloughs will be caſt off, and the ends of the gut are retained by the adheſive proceſs in a ſtate of appoſition to each other, the moſt favourable for their union. Thus there is a chance of the continuity of the inteſtinal canal becoming eſtabliſhed again.

However, in recent wounds of the abdomen, attended with a protruſion of a portion of inteſtine, cut completely acroſs, the bowel is as yet neither inflamed nor adherent to the vicinity of the wound, ſo that it is proper practice to connect the ends together by means of a ſtitch or two made with ſilk or thread, and a ſmall ſewing-needle; and to confine the wounded part of the inteſtine, near the breach in the peritoneum, until adheſions have had time to form.

Mr. A. Cooper has recommended this mode of proceeding, in caſes of hernia attended with mortification of the whole diameter of the bowel; but, for reaſons already ſtated, and many facts referred to in Mr. Lawrence's work, it is to be hoped, that the plan of ſewing the inteſtines, in caſes of hernia with gangrene, will be for ever abandoned. Dictionary of Practical Surgery.

Mr. Hey conjectures, that, in many of the inſtances where a recovery has followed a mortification of the inteſtine, the deſtroyed part of the bowels has conſiſted of the cæcum. He adduces two caſes which fell under his own obſervation, where he concludes that there was little doubt of the prolapſed portion of inteſtine being the head of the colon; and he refers us to another inſtance related in the Medical Obſervations and Inquiries, vol. iii. art. 8, where the patient had a ſcrotal hernia on the right ſide, which, upon being ſtrangulated and neglected, was brought into a ſtate of gangrene. A portion of inteſtine was cut off by the ſurgeon, who then viſited the poor man; and the feces paſſed through the wound for ſome time. However, a complete cure was obtained, and the man lived twenty-five years afterwards, without any return of the hernia. After his death the parts were examined, when the caput coli and appendicula vermiformis were only found wanting. The remaining extremity of the colon adhered to the abdominal ring, and afforded no obſtruction to the paſſage of the feces. Practical Obſervations in Surgery, p. 171. edit. 2.

We have ſtated above, that when the inteſtine in the hernial ſac is found in a completely gangrenous ſtate, the duty of the ſurgeon conſiſts in dividing the ſtricture, and leaving the ſubſequent progreſs of the cure to nature. It is to be underſtood, however, that conſiderable benefit may frequently be derived by giving vent to the contents of the inteſtine. We may ſtate, therefore, with Mr. Aſtley Cooper, that the proper treatment of a mortified inteſtine in ſtrangulated hernia conſiſts in the two following circumſtances:

Firſt, in dividing the ſtricture ſo as entirely to remove the cauſe of ſtrangulation.

Secondly, in making an opening into the inteſtine, ſo as to give a free outlet for the diſcharge of the accumulated feces in the inteſtine within the abdomen. If the ſtricture only is divided, the conſtipation, hiccough, and vomiting continue; but if the inteſtine is opened, the patient, in a few hours, becomes relieved from ſuch ſymptoms. See a caſe communicated to Mr. Hey, by Mr. A. Cooper, and publiſhed in the ſecond edition of the former gentleman's Practical Obſervations, p. 570.

Of the Attempts to effect a Radical Cure of the Bubonocele.— We ſhall take our leave of this ſpecies of hernia, with noticing ſome of the propoſals which have, at different times, been made for the purpoſe of bringing about a radical cure of the diſeaſe. From what has been ſtated in the preceding pages, it muſt appear, that a perſon, afflicted with an inguinal hernia, muſt generally continue the uſe of a truſs the whole, or the greater part of his life, in order to avoid the riſk of ſuffering the viſcera to remain protruded, the examples of a radical cure accompliſhed by truſſes being not very numerous. The hope of ſo deſirable an event from the employment of a truſs, is almoſt confined to caſes of recent ſmall herniæ in young ſubjects. But even here, all chance of the benefit will be entirely loſt, unleſs the rupture be for ſeveral years inceſſantly kept up by a well-made truſs; for the occaſional deſcent of the parts will ſoon deſtroy all tendency of the mouth and neck of the ſac to contract, and become effectually cloſed. Nor does a radical cure, in many inſtances, follow the ordinary operation for a ſtrangulated inguinal hernia, the neceſſity of wearing a truſs continuing as urgent as ever, and the relief only extending to the exiſting dangers brought on by the incarceration. Unapproved, therefore, as moſt of the plans are which have been deviſed for the radical cure of the bubonocele, it muſt be univerſally confeſſed, that the object is one of infinite importance to mankind, and that the diſcovery of a ſafe and ſucceſsful method of attaining it would be little inferior, in point of conſequence, to any of the moſt boaſted improvements in ſurgery. Let it not be imagined, however, that we wiſh to encourage raſh experiments, or to revive any of thoſe cruel practices which were formerly adopted by a murderous ſet of quacks, by whom many an unfortunate patient was duped, mutilated, and deſtroyed.

In the time of Heiſter, there prevailed a baſe and common practice of caſtrating the patient, after putting a ligature round the ſpermatic cord and hernial ſac. This mode of attempting a radical cure of the inguinal hernia was barbarouſly ſevere, and what is worſe, was not a real preſervative againſt a relapſe of the diſorder. Beſides, it put the patient to a great deal of agony, and frequently endangered his life.

Another execrable method was practiſed as follows: the viſcera were reduced, and retained in the abdomen by the hand of an aſſiſtant. A cauſtic was then applied to the ſkin oppoſite the ring, ſo as to form a ſmall eſchar. When this ſeparated, if the ſac was not ſufficiently expoſed, the cauſtic was again applied, until it was deſtroyed. The conſequent cicatrix was ſuppoſed to be capable of oppoſing the future deſcent of the abdominal viſcera. The perils of ſuch proceedings have been well depicted by M. Bordenave. Of three patients, who were made the ſubjects of experiment at one of the hoſpitals in Paris, one died, one ſuffered a relapſe, and a third eſcaped with a ſwelling of the ſpermatic cord. Perforation of the inteſtine, and a fatal gangrene of the ſcrotum, were other conſequences of this method. See Mém. de l'Acad. de Chirurgie, tom. v. p. 651, and the ſupplement, page 88.

An equally objectionable practice was what has made conſiderable noiſe in the world, under the appellation of the royal ſtitch, an operation which conſiſted in firſt expoſing and opening the hernial ſac, and then ſewing it up with the interrupted ſuture; this plan was recommended both as being remarkably efficacious, and not occaſioning a deſtruction of the teſticle.

The punctum aureum, or cure with gold wire, was executed by paſſing a ſmall gold wire round the ſpermatic cord, and upper part of the proceſs of the peritoneum, near the ring of the external oblique muſcle, the teſticle being left in its natural poſition. The gold wire was twiſted by a pair of forceps, ſo as to conſtrict the proceſs of the peritoneum, without compreſſing the ſpermatic veſſels, and keep the inteſtine from falling down again. On this method, Heiſter rightly remarks, that it ſeems uſeleſs and incapable of ſucceeding; for if the wire is not made tight, the inteſtine will not be prevented from protruding, and if it be drawn tight, the ſpermatic cord will be compreſſed, and the teſticle ſlough. Beſides, he objects to leaving the wire permanently applied in this way, as was a part of the ſcheme.

Much as the punctum aureum, in its original form, appears to deſerve condemnation, we conſider an operation, which ſeems to be ſomewhat analogous, as one of the moſt rational propoſals ever made, with a view of effecting a radical cure of the bubonocele. The method alluded to is thus deſcribed in the tranſlation of Heiſter, now before us. "Sermecius, in his treatiſe of lithotomy, mentions another much better method of curing ruptures, without the loſs of the teſticle, which he learnt among the Ruſſians. A longitudinal inciſion was firſt made in the inguen; and the proceſs of the peritoneum, containing the inteſtine, was then freed from the parts; after returning the inteſtine, and drawing the ſaccus ſtrongly out of the wound, it was tied with a ſtrong thread, as near as poſſible to the abdominal muſcles. The ligature was then left hanging out of the wound, which was dreſſed in the uſual manner, till it digeſted off of itſelf. By this method, he aſſures us, many have been cured without injury to the teſticle, or ſpermatic veſſels. This method is by Sermecius recommended as of the greateſt uſe in adults, where the inteſtine cannot be retained in the abdomen by bandage. I have, ſome time ſince, received a treatiſe from an Helvetian, whoſe name is Freitage; in which he mentions this method, and ſays it was practiſed often by his father with great ſucceſs, as deſcribed by Sermecius; with this difference only, that he perforated the ſaccus with a needle and thread before he tied it up. This is a very uſeful and neceſſary caution to prevent the ligature's ſlipping." (See Heiſter's Syſtem of Surgery, part 2. chap. 119.) The moſt ſimple and ſafe method of attempting this operation would undoubtedly be, after reducing the bowels, to make an inciſion about two inches long, through the ſkin over the neck of the ſac, and then to uncover the latter by diſſection to an extent ſufficient to enable the operator to paſs a needle and ligature through it, immediately in front of the ſpermatic cord. The neck of the ſac is then to be firmly tied, juſt as is done to an artery. One ſhould not expect, *à priori*, that ſo ſmall a cut as is requiſite, and tying a part of ſuch little importance in the animal economy as a hernial ſac, would be likely to be frequently followed by dangerous ſymptoms. We find it aſſerted that ſucceſs has often attended the method, nor, until experience proclaims the contrary, can we conſider it as irrational and unworthy of notice. At the ſame time, we wiſh it to be underſtood that we ſhould only deem the experiment juſtifiable in particular caſes, where a truſs fails in keeping the hernia properly reduced, and where the patient, after having things fairly explained to him, is willing to encounter whatever riſk there may be. In the courſe of time the operation might be more extenſively adviſed, after its frequent ſucceſs had been well demonſtrated. Perhaps, alſo, the common operation for ſtrangulated herniæ might oftener terminate in a radical cure, were that opportunity taken to tie the neck of the ſac. We may add to this account, that Schmucker, the celebrated Pruſſian ſurgeon, has deſcribed and practiſed this mode of operating. He has expoſed the hernial ſac by an inciſion through the ſcrotum; he has diſſected it carefully away from the integuments and ſpermatic veſſels; he has opened it, and puſhed up the protruded parts, and then cut off the remainder below the ligature. He did this with ſucceſs in two caſes. Deſault alſo cured a congenital bubonocele at the Hôtel Dieu, by placing a ligature on the mouth of the ſac. Chir. Wahrnehm. b. 2. p. 236. Recueil Périodique, tom. ix. p. 290.

With reſpect to the plan of laying open the hernial ſac, it appears to us equally unneceſſary and unwarrantable. It is well known, and has been proved by many caſes, recorded by Arnaud, Sharp, Petit, Abernethy, &c. that dangerous inflammation of the peritoneum and bowels, frequently ending in death, is apt to be excited by merely opening the ſac of a hernia, and this even though a tumour, before the operation, be entirely free from pain and other complaints uſually attending its ſtrangulated ſtate.

Of the Femoral or Crural Hernia.—The femoral or crural hernia is that to which women are moſt liable It ſeldom occurs in male ſubjects, who, on the other hand, are very ſubject to bubonoceles, from which females are almoſt entirely exempt. It conſiſts of a protruſion of ſome of the abdominal viſcera under the pubic extremity of Poupart's ligament. It rarely acquires a large ſize, and is generally of a globular ſhape, while an inguinal hernia is more or leſs oblong. Anatomical examinations prove, that the aperture through which the parts eſcape is exceedingly ſmall, and hence, we muſt not be ſurpriſed at the remarkable rapidity with which the ſymptoms uſually advance

In order that the reader may have accurate ideas reſpecting the femoral hernia, it is neceſſary for him to know, that the inferior edge of the aponeuroſis of the external oblique muſcle is extended acroſs, under the name of the crural arch, or Poupart's ligament, from the anterior ſuperior ſpinous proceſs of the ilium to the ſpine of the pubes. The ſpace under the crural arch is occupied by the iliacus internus and pſoas magnus muſcles, the crural veſſels, the anterior crural nerve, the lymphatics of the lower extremity, and one or more abſorbent glands. The cleareſt account of the parts concerned in the femoral hernia is that contained in Mr. Lawrence's excellent treatiſe. The aponeuroſis of the external oblique muſcle, as this gentleman deſcribes, " is fixed by a broad inſertion into the pubes; this attachment, which begins at the ſpine, runs along the criſta of the bone. Its poſition, therefore, in the erect ſtate of the body, is nearly, though not entirely, horizontal; conſequently its two margins ſhould be deſcribed by the epithets anterior and poſterior: it being remembered at the ſame time, that the former of theſe is rather higher than the latter. That part of it which is fixed to the ſpine of the bone has the appearance of a firm and ſomewhat round tendinous cord; its inſertion into the criſta of the pubes is effected by means of a thinner portion, which gives to the tendon a clearly defined ſharp edge at its poſterior margin. The latter diviſion of the tendon muſt of courſe be ſituated much more deeply from the ſurface than the former. Its ſharp wiry edge can be felt very diſtinctly by paſſing the finger under the crural arch, on the inner ſide of the femoral vein, either from above or below.

" If we deſcribe a diſtinct part under the name of Poupart's ligament, we ſhould ſtate, that when it approaches the bone it becomes ſuddenly broader; that it is fixed by this broad portion along the whole length of the ſpine and criſta of the pubes; that it has a rounded and ſtrong anterior edge, a thin and ſharp poſterior margin, and that the former of theſe is nearer to the ſurface, while the latter is comparatively deeply ſeated. The breadth of this part varies in different ſubjects; it is generally from three quarters of an inch to an inch. Sometimes, as Gimbernat has ſtated, it meaſures more than an inch. Dr. Monro has obſerved, that it is broader in the male than in the female ſubject; and from this ſtructure he explains in part the more rare occurrence of this rupture in the male.

" The anterior edge of Poupart's ligament repreſents a ſtraight line, drawn from the ilium to the pubes: the poſterior border has an arched form towards the latter bone, in conſequence of the expanded portion which is fixed to its criſta. Hence has ariſen the appellation uſed by Gimbernat of the *crural arch*.

" The parts which have been already enumerated fill up the ſpace between the crural arch and the os innominatum. The crural veſſels, placed in the ſmooth ſlope on the front of the pubes, are ſituated laterally with reſpect to each other. Next to the thin end of the arch is the vein, with the artery lying externally to it. An abſorbing gland is ſometimes found between the vein and the tendon; or elſe this ſpace is only occupied by looſe cellular ſubſtance.

" Since the tendon of the obliquus externus is ſtretched like a cord between two diſtant points, and there is a wide ſpace under it, the ſtudent will ſuppoſe that protruſions of the abdominal viſcera under its edge muſt happen very readily. This is effectually prevented by the attachments of certain faſciæ, confining the tendon cloſely to the ſurface of the parts which it covers.

" The iliacus internus, and that portion of the pſoas magnus which lies by its ſide, are covered by a thin faſcia, ariſing inſenſibly on the ſurface of the muſcles, and intimately connected with the expanded tendon of the pſoas parvus. This faſcia is in immediate contact with the muſcles; the iliac veſſels and the peritoneum cover its anterior ſurface, and are connected to it by a looſe cellular ſubſtance. It is attached on the inſide to the line which bounds the ſuperior aperture of the pelvis; on the outſide, to the anterior portion of the inner edge of the criſta ilii; and below, to the poſterior margin of the crural arch. The latter inſertion terminates in a pointed form juſt over the paſſage of the vein. Another part of the faſcia is continued over the bone, and behind the artery and vein into the thigh, where it forms the poſterior portion of the ſheath, including thoſe veſſels, and is continuous with the faſcia lata.

" In conſequence of the ſtructure juſt deſcribed, the crural arch is firmly confined in its ſituation, and the protruſion of the abdominal viſcera under it is obviated. A ſmall ſpace, however, is left between the iliac vein and the thin border of the tendon, not cloſed towards the abdominal cavity, and, conſequently, affording an opportunity for the occurrence of herniæ. This, which is either filled with cellular ſubſtance, or an abſorbing gland, is called by Gimbernat the *crural*, and by Mr. Hey, the *femoral ring*. The ſpace in queſtion is bounded above and in front by the crural arch; below and behind by the pubes; on the internal or meſial ſide by the thin border of the tendon; and on the outer, or lateral aſpect, by the crural vein.

" The faſcia lata, or faſcia of the thigh, has two diſtinct inſertions at the upper and anterior part of the limb. It is attached to the front edge of the pubes, over the origin of the pectineus, the fibres of which it cloſely covers, and it is alſo fixed to the front of the crural arch. The former of theſe is continuous, behind the femoral veſſels, with the iliac faſcia; the latter is not inſerted along the whole length of the tendon, its attachment ceaſing on the inner ſide of the veſſels, which it covers anteriorly. Here, therefore, the femoral artery and vein are interpoſed between the two diviſions.

" Under the anterior portion of the crural arch a large oval depreſſion is found on the front of the thigh, on the ſurface of the pectineus muſcle. At the upper, outer, and lower ſides, this hollow is bounded by a ſharp and defined edge of the faſcia; but it has no ſuch boundary internally. Where the attachment of the faſcia lata to the crural arch terminates, it forms a diſtinct ſemi-lunar, or creſcent-ſhaped fold. The upper end, or horn of this creſcent, is the laſt portion of the faſcia towards the inſide, connected to the crural arch, and it bends under the tendon ſo as to unite with the thin portion or border at its commencement. The concavity is turned towards the oppoſite limb, and the inferior horn is ſituated downwards and outwards on the thigh. This fold covers the femoral artery and vein juſt under Poupart's ligament, excepting a ſmall portion of the latter at its inner ſide. The lower horn of the creſcent is continuous with a ſecond ſemi-lunar edge, having its concavity turned upwards, and forming the inferior boundary of the oval ſpace. Here the two diviſions of the faſcia lata are continuous. The great ſaphena vein paſſes over the laſt mentioned fold, and opens into the femoral, where that is not covered by the faſcia lata. On the inner ſide, the oval depreſſion is not defined by any boundary. The faſcia covering the pectineus is continued behind the femoral veſſels, and the handle of a ſcalpel may be paſſed on its ſurface in this direction, ſo as to elevate them. The femoral vein is covered by a denſe fibrous ſubſtance, which completes its ſheath in part, where it receives the ſaphena.

" The femoral artery and vein, ſurrounded and connected by a compact fibrous ſubſtance, are covered in front, immediately under the crural arch, by that part of the faſcia lata which terminates in the ſemi-lunar edge; and they lie on the production continued over the pubes from the iliac faſcia.

The latter is united externally to the veſſels, to the ſheath, including the ſartorius. The covering of the vein on the inſide, or concavity of the ſemi-lunar edge, has been juſt mentioned.

"Along the whole bend of the thigh, a thin and irregular faſcia, or condenſed cellular texture, intervenes between the parts now deſcribed and the integuments. This covers the upper part of the faſcia lata, the crural arch, and the lower portion of the aponeuroſis of the obliquus internus. It contains different layers intermixed with the abſorbent glands of the lower extremity, and with the ſuperficial veins which join the trunk of the ſaphena." See Lawrence on Ruptures, edit. 2, chap. 14. p. 334—341. The excellence of the foregoing quotation muſt ſerve as an apology for its length; we were unwilling to mutilate ſo incomparable a deſcription by abridgment.

Having introduced an explanation of the parts in which the femoral hernia is ſituated, it becomes our duty to enter upon a more particular account of this kind of rupture, previous to the obſervations on the treatment.

We find, then, that the viſcera are protruded through the crural ring, which lies under the crural arch, between its thin edge and the external iliac veins. A protruſion of the viſcera, under any other part of the tendon, is prevented by the attachment of the iliac faſcia. The hernia, having paſſed through the crural ring, riſes above its edge, and therefore, as Mr. Hey has obſerved, if a ſurgeon attempts to reduce it when ſtrangulated, by puſhing it upwards, he effectually fruſtrates his intention. The viſcera deſcend from the abdomen at firſt nearly in a perpendicular direction, and come into the hollow in front of the pectineus. They then come forwards to the ſurface, ſo as to lie in general in front of the crural arch. The neck of the ſac, or that portion of it lying under Poupart's ligament, is generally about half an inch in length, and it is obvious that the ſtrangulation muſt have a very deep ſituation, ſince it occurs exactly where the neck of the ſac communicates with the abdomen. The tumour is ſituated in front of the pectineus, and of the faſcia lata. Much praiſe is due to Mr. Lawrence for his having corrected the common miſtaken notion, that the femoral rupture lies under the faſcia of the thigh; an error which was apt to lead to dangerous conſequences, by encouraging the ſurgeon to make his firſt inciſions with unwarrantable boldneſs. One variety of femoral hernia deſcribed by Mr. Aſtley Cooper (part ii. p. 20, Plate VIII. fig. 1.), and in which the parts deſcend into the ſheath of the crural veſſels, forms, however, an exception to the foregoing ſtatement. In this caſe the tumour is ſituated under the faſcia lata, is more obſcure to the feel, and has not a defined edge.

Although the hernial ſac, in ordinary caſes, is not covered by the faſcia lata, yet, what Mr. Aſtley Cooper has named the *faſcia propria* is ſpread over the whole of it to its very neck, being of a thicker ſtructure than the peritoneum.

The upper end of the falciform proceſs paſſes over the upper and outer part of the neck of the tumour; it is then, as Mr. Lawrence deſcribes, folded under the crural arch, and continues into the thin poſterior border. The iliac vein lies on the outer ſide of the neck of the ſac; the pubes is directly behind it; and its upper and inner parts are bounded by the thin poſterior edge of Poupart's ligament. Gimbernat firſt diſcovered, that it was this edge which produces the ſtrangulation. The ſtricture is alſo in ſome meaſure formed by the ſemi-lunar portion of the faſcia, which is attached to the crural arch at the point where the protruſion happens. A relaxation of this part of the faſcia, therefore, affords a degree of relief.

The epigaſtric artery runs obliquely upwards and inwards, on the outſide of the hernial ſac, about half an inch from its neck. When the obturator artery ariſes from the epigaſtric, it may either proceed on the outer or inner ſide of the ſac, in which laſt circumſtance, taking into the account the iliac vein, the neck of the ſac would be ſurrounded by a large veſſel in three-fourths of its circumference. The ſpermatic cord, or round ligament of the uterus, paſſes over the upper part of the tumour, about half an inch from the neck of the ſac. Lawrence on Ruptures.

The femoral hernia is uſually of a rounder form, and leſs bulk when ſtrangulated, than the ſcrotal hernia. Mr. Hey has repeatedly ſeen it reſembling an enlarged inguinal gland. It is apt alſo to extend in a horizontal rather than a vertical direction. It is the common rupture of the female ſex, ſo much ſo, that almoſt all the inſtances of ſtrangulated inteſtinal hernia in females, which have occurred in Mr. Hey's practice, have been of the femoral kind.

From the ſmall ſize of the crural ring, we cannot wonder that the ſtricture ſhould alſo be greater than that which is uſually met with in caſes of bubonocele. Mr. Hey, in the laſt edition of his Practical Obſervations, informs us, that he has now performed the operation for the femoral hernia, 16 times in the female, and twice in the male ſubject; and that he always found great difficulty in introducing the tip of his finger into the femoral ring, for the purpoſe of conducting the knife. Nay, he has thrice found this introduction impracticable, and has been under the neceſſity of making uſe of a director. There are ſome very erroneous ſtatements on this ſubject in Pott's works, in which we are adviſed to reduce the prolapſed parts, without dividing the ſtricture, a thing which is, for the moſt part, utterly impoſſible in the operation for a ſtrangulated femoral hernia.

The opening through which a crural hernia takes place is very ſeldom increaſed to any great ſize, as happens with reſpect to the abdominal ring in large and old ſcrotal ruptures. The ſwelling is likewiſe remarkable for being in general exceedingly ſmall. Exceptions to this account, however, are upon record. See Hey's Practical Obſervations; Cooper, part ii. p. 6.; and Lawrence on Ruptures, edit. 2. p. 358.

A crural hernia moſtly contains inteſtine, and very ſeldom omentum alone. When the tumour is ſmall, and includes a piece of omentum, it may be miſtaken for an enlarged inguinal gland. If the ſwelling has appeared ſuddenly after a violent effort; if it increaſes on exertion, and diminiſhes, or diſappears on preſſure, or in the recumbent poſture; if an impulſe be felt when the patient coughs, and inteſtinal affections have been cauſed by it, the caſe muſt be a hernia. An enlarged gland is uſually more indurated than a hernial tumour; it comes on gradually, does not vary in ſize, and cauſes no diſturbance of the alimentary canal. Every ſenſible ſurgeon will immediately coincide with a late excellent author, that, in all caſes of doubt, when ſymptoms, reſembling thoſe of ſtrangulation, prevail, and do not yield to the uſual remedies, the ſurgeon is called upon to operate No great inconvenience can ariſe from cutting down upon an enlarged gland; while the patient's life would be endangered by putting off the operation, in the event of the caſe being a rupture. Lawrence, p. 360.

The femoral hernia is liable to be miſtaken for a bubonocele, by which error the ſurgeon would be led to direct the preſſure very wrongly in the taxis, and in the operation might make ſome dangerous or fatal blunder with his knife. The caſes may always be diſcriminated by recollecting, that if the ſwelling of a crural hernia be drawn downwards, the crural arch may be traced paſſing over the neck of the ſac, while in bubonocele it extends under that part. The ſpine of the os pubis, which is behind and below the neck of the ſac in an inguinal hernia, is on the ſame horizontal level, and rather within it in the crural rupture. A varix of the femoral vein may be diſtinguiſhed from a crural hernia by the diſappearance of the ſwelling on the patient's lying down, and its recurrence again as ſoon as the vein is preſſed upon above Poupart's ligament. A pſoas abſceſs may be known by the fluctuation of the matter, the preceding pain in the loins and ſhivering, the abſence of inteſtinal complaints, &c.

Treatment of the Femoral or Crural Hernia.—A femoral rupture preſents the ſame general indications as any other hernia. When reducible, it is to be immediately returned into the cavity of the abdomen, and kept up with a ſuitable truſs. In reducing the parts, the ſurgeon ſhould bear in mind that they firſt paſs downwards, and then forwards, riſing ſomewhat above the crural ring. The method of reduction which Mr. Hey has uſed with moſt advantage, is this: after placing the patient upon the ſide oppoſite to that affected with the hernia, with the body bent forwards, and the affected thigh brought to a right angle with the trunk, and thrown acroſs the oppoſite knee with the toes turned inwards; he places the fingers of both his hands upon the upper part of the hernia, and then pulls it gradually but gently downwards. By this method the hernia is turned round the edge of the falciform proceſs of the faſcia lata, and by continuing the preſſure of the fingers it aſcends through the crural ring into the abdomen.

A crural hernia is radically cured by truſſes ſtill more ſeldom than a bubonocele: indeed the crural ring is too deeply ſituated to be much affected by external preſſure.

When a femoral rupture is ſtrangulated, the treatment ſhould be regulated by the ſame principles which apply to other caſes of incarcerated hernia. The taxis is to be attempted, and if this fail, bleeding, the warm bath, cold applications, tobacco clyſters, &c. are to be tried, ſubject to ſuch conſiderations as have been already detailed in a foregoing part of this article. No ſooner have theſe means proved ineffectual, after being fairly tried, than it becomes unjuſtifiable raſhneſs, on the part of the ſurgeon, to waſte any more time upon plans which cannot be depended upon. The operation is now urgently required, and ought on no account to be delayed, ſince the uſual tightneſs of the ſtricture, in theſe caſes, at once precludes all hope of relief from any other proceeding, and renders the progreſs of the ſymptoms more rapid. All the lateſt and beſt writers ſeem to agree, that the delay of the operation is even more dangerous in the crural than the inguinal hernia, as death is very generally ſooner induced by the former than the latter diſeaſe. Mr. Aſtley Cooper has related a caſe where death took place in 21 hours and a half from the acceſſion of the ſymptoms. He mentions two other inſtances, in which, at the end of 40 hours, the parts were too much altered to admit of being reduced. Indeed, this eminent practitioner is ſo ſtrongly impreſſed with the bad effects of delay, that he declares, that if he himſelf were the ſubject of a crural hernia, he would only try the effect of tobacco clyſters, and if they did not ſucceed, he would have the operation performed in 12 hours from the acceſſion of the ſymptoms. Part ii. p. 22.

Operation for the Femoral or Crural Hernia.—The operation for the femoral hernia, like that for the bubonocele, conſiſts in making an inciſion through the integuments, laying open the hernial ſac, dividing the ſtricture, and reducing the viſcera, when they are neither in a mortified nor diſeaſed ſtate. The vicinity of ſo many large blood-veſſels to the neck of the ſac, and the depth of the part forming the ſtricture, however, render the operation more delicate and difficult than that for the bubonocele; or at leaſt accurate anatomical information, and much caution, are requiſite in its performance.

The diviſion of the integuments is to begin an inch above the crural ring, and be continued in a direction downwards and outwards. This plan will afford ſufficient room to get at the ſtricture, without adopting Mr. Aſtley Cooper's method, in which the inciſion of the integuments is to begin "an inch and a half above the crural arch, in a line with the middle of the tumour, and be extended downwards to the centre of the tumour below the arch. A ſecond inciſion, nearly at right angles with the other, is next made, beginning from the middle of the inner ſide of the tumour, and extending acroſs to the outer ſide, ſo that the form of this double inciſion will be that of the letter T reverſed." Mr. Aſtley Cooper next diſſects up the angular flaps and reflects them.

Conſiderable embarraſſment may often be noticed in the deportment of many operators, who, from not knowing that the hernial ſac has any exterior inveſtment beſides the integuments, imagine the ſac to be opened on a diviſion of the faſcia under the ſkin being made. Even fatal blunders have thus been made, the unopened ſac and viſcera in a ſtrangulated ſtate being puſhed together into the abdomen. According to Mr. Aſtley Cooper, "the firſt inciſion expoſes the ſuperficial faſcia, which is given off by the external oblique muſcle, and which covers the anterior part of the hernial ſac; but if the patient is thin, and the hernia has not been long formed, this faſcia eſcapes obſervation, as it is then ſlight and delicate, and adheres cloſely to the inner ſide of the ſkin. When this faſcia is divided, the tumour is ſo far expoſed, that the circumſcribed form of the hernia may be diſtinctly ſeen; and a perſon, not well acquainted with the anatomy of the parts, would readily ſuppoſe that the ſac itſelf was now laid bare. This, however, is not the caſe, for it is ſtill enveloped by a membrane, which is the faſcia, that the hernial ſac puſhes before it, as it paſſes through the inner ſide of the crural ſheath. This membrance, the faſcia propria, is to be next divided longitudinally from the neck to the fundus of the ſac; and if the ſubject is fat, an adipoſe membrane lies between it and the ſac, from which it may be diſtinguiſhed by ſeeing the cellular membrane paſſing from its inner ſide to the ſurface of the ſac.

"This is, in my opinion, the moſt difficult part of the operation; for the faſcia propria is very liable to be miſtaken for the ſac itſelf, ſo that when it is divided, it is ſuppoſed that the ſac is expoſed, and the inteſtine is laid bare; following upon this idea, the ſtricture is divided in the outer part of the ſac, and the inteſtine, ſtill ſtrangulated, is puſhed with the unopened ſac into the cavity of the abdomen.

"The hernial ſac, being expoſed, is to be next opened; and, to divide it with ſafety, it is beſt to pinch up a ſmall part of it between the finger and the thumb; to move the thumb upon the finger, by which the inteſtine is diſtinctly felt, and may be ſeparated from the inner ſide of the ſac; and then to cut into the ſac, by placing the blade of the knife horizontally. Into this opening a director ſhould be paſſed, and the ſac opened from its fundus to the crural ſheath. See A. Cooper on Crural and Umbilical Hernia.

Notwithſtanding the obſervations and advice of Mr. Pott, the moſt experienced ſurgeons of the preſent time almoſt always find, that, after laying open the hernial ſac, the parts cannot be reduced without a diviſion of the crural ring, the ſtricture being in general exceedingly tight. However, were a caſe to preſent itſelf in which the reduction could eaſily be accompliſhed without cutting the ſtricture, the ſurgeon ought undoubtedly to take advantage of the circumſtance. But on no account is he juſtified in omitting to dilate the opening, and making long and tedious manual attempts

tempts at reduction, to the great and ſerious injury of the protruded parts. Nothing is more certain, than that it is far ſafer and more prudent to employ the knife than do any thing hurtful to the prolapſed viſcera.

There has not been any better plan propoſed of dividing the ſtricture in the femoral hernia than that which was recommended by Don Antonio de Gimbernat, ſurgeon to the king of Spain.

“ Introduce, along the internal ſide of the inteſtine, a cannulated or grooved ſound, with a blunt end, and a channel of ſufficient depth. This is to be directed obliquely inwards till it enter the crural ring, which will be known by the increaſed reſiſtance, as alſo, when its point reſts upon the branch of the os pubis. Then ſuſpend the introduction; and, keeping the ſound (with your left hand, if you are operating on the right ſide, and *vice verſâ*) firmly reſting upon the branch of the os pubis, ſo that its back ſhall be turned towards the inteſtine, and its canal to the ſymphyſis pubis, introduce gently, with your other hand, into the groove of the ſound, a biſtoury, with a narrow blade and blunt end, till it enter the ring. Its entry will be known, as before, by a little increaſe of reſiſtance. Cautiouſly preſs the biſtoury to the end of the canal; and, employing your two hands at once, carry both inſtruments cloſe along the branch to the body of the pubis, drawing them out at the ſame time. By this eaſy operation, you will divide the internal edge of the crural arch at its extremity, and within four or five lines of its duplicature, the remainder continuing firmly attached by the inferior band or pillar, of which it is the continuation. This ſimple inciſion being thus made without the ſmalleſt danger, the internal border of the arch, which forms the ſtrangulation, will be conſiderably relaxed, and the parts will be reduced with the greateſt eaſe.” See p. 45, 46.

Mr. Hey notices, that the part to be divided, for removing the ſtricture, lies deeper than the abdominal ring, and on this account the diviſion is made with more difficulty. He adviſes the ſurgeon to take eſpecial care to introduce his finger, or director, within that part where he finds the ſtricture to be the greateſt; which is the moſt interior part of the wound. “ A very ſmall diviſion of the part, which cauſes the ſtricture, is uſually ſufficient to enable the ſurgeon to reduce the prolapſed parts, if he keeps in mind the proper method of reducing the femoral hernia; and, conſidering the vicinity of the blood-veſſels, and other important parts, to this ſpecies of hernia, the diviſion of the femoral ring ought to be no greater than is neceſſary for the eaſy reduction of the hernia.” This gentleman adviſes the diviſion of the ring to begin at that part which is neareſt the ſymphyſis of the pubes, and he has uſually made the inciſion upwards and inwards.

Although Gimbernat's mode of dividing the ſtricture has numerous advocates, it is proper to mention that it has not received the approbation of that diſtinguiſhed ſurgeon, Mr. Aſtley Cooper. Mr. Hey alſo finds fault with Gimbernat's manner of operating. He adverts to this ſurgeon's own confeſſion, that the bladder, if diſtended with urine, and the uterus, in a pregnancy of four months and upwards, are in danger of being wounded. Mr. Hey acquaints us that the firſt of theſe accidents occurred in an operation performed after this method by a ſurgeon of ſome eminence, while he has experienced that the operation may be done with ſafety during the fifth month of pregnancy, by making the inciſion upwards and inwards. He is likewiſe of opinion that the inteſtine is expoſed to great and unneceſſary danger by the manner in which Gimbernat divides the ring, as there is nothing to prevent the inteſtine from ſliding over the edge of that part of the knife which is introduced beyond the ſtricture. (See Practical Obſervations, ed. 2. p. 155, 156.) We have no heſitation in declaring our own belief, that, in the hands of any man of ordinary ſkill, Gimbernat's method is perfectly ſafe. The idea of wounding the inteſtine ſeems to us to reſt upon no foundation; for, as may be ſeen by a reference to Gimbernat's own directions, a probe-pointed knife is to be uſed, the back of the director is to be turned towards the inteſtine, and the inciſion is to be directed away from this latter part.

Mr. Lawrence conſiders “ the beſt and ſafeſt method of executing this part of the operation, to be that of dividing the thin poſterior border of the crural arch in the part firſt recommended by Gimbernat, that is, as nearly as we can, to its inſertion in the pubes. This is the very part which conſtitutes the ſtricture, and where a ſmaller diviſion will accompliſh our object than in any other ſituation; yet, half an inch in all caſes, and, in many inſtances, a longer ſpace may be gained in this quarter, without affecting the main inſertion of the ligament into the ſpine of the bone. The crural arch, therefore, is leſs weakened by a diviſion of this than of any other part. Treatiſe on Ruptures, p. 379. ed. 2.

The advice given us upon this point by Mr. Aſtley Cooper, is to divide the ſtricture obliquely inwards and upwards, at right angles, to the crural arch.

When the blood-veſſels have their ordinary diſtribution, cutting the moſt interior part of the ſtricture, in the direction adviſed by Gimbernat, is unattended with danger; but when, as ſometimes happens, the obturator artery ariſes from the epigaſtric, and runs along the inner margin of the ſac, even this plan is objectionable. In order to avoid all riſk of wounding the obturator artery, in the event of its taking this courſe, a new mode of operating has been propoſed. An inciſion is to be made through the aponeuroſis of the external oblique muſcle juſt above Poupart's ligament, and in a direction parallel to that part. Through this aperture a curved grooved director muſt be introduced, and, keeping it cloſely preſſed againſt that ligament, muſt be puſhed down through the crural ring. Upon this director the tendon is to be divided to the requiſite extent with a curved knife. See Edin. Med. and Surgical Journal, vol. ii. p. 205.

Upon this propoſal, it is remarked by Mr. Hey, that if this deviation from the uſual courſe of the obturator artery were more frequent than it appears to be, he ſhould ſtill think there was no occaſion to have recourſe to an operation attended with ſo much difficulty and uncertainty. In this procedure the patient muſt be ſubjected to the pain of a double operation; one below and another above Poupart's ligament. The director muſt be thruſt down betwixt the parts forming the ſtricture and the hernial ſac, which often adhere firmly to each other. In this attempt the courſe of the director muſt be often interrupted by the projection backwards of Gimbernat's ligament. And after all, the operator cannot be certain that the director has paſſed before the obturator artery; and, conſequently, cannot know that he has gained any advantage by this painful and troubleſome proceſs. (Practical Oſervations in Surgery, edit. 2. p. 157.) It appears to us that, upon the whole, this propoſal ſhould not be followed up in practice, and that the plan would be exceedingly likely to induce a dangerous degree of peritoneal inflammation.

The method, which we prefer, is that recommended by Gimbernat, and which conſiſts in dividing the moſt internal part of the crural ring in the direction inwards. Should the obturator artery be felt pulſating at the inner ſide of the neck of the ſac, the operator muſt of courſe uſe his utmoſt endeavour to avoid it. Perhaps here it might be prudent to divide the part of Poupart's ligament attached to the angle of the pubes, and extend the inciſion as far as neceſſary, by cutting cautiouſly from without inwards. More apprehenſions, however, have ariſen from the occaſional deviation of the obturator artery from its common courſe than appear to be well founded. Monro computes, that the obturator artery may ariſe from the epigaſtric once in twenty-five or thirty ſubjects. But even ſuppoſing it originates more frequently, it then does not always deviate from its uſual courſe along the outſide of the ſac. Mr. A. Cooper acquaints us, that in all the caſes which he has himſelf diſſected, where this variety exiſted with crural hernia, the obturator artery paſſed into the pelvis on the outer ſide of the neck of the ſac, entirely out of the reach of any danger from the knife. On Crural Hernia, p. 1.

Congenital Hernia.—The name of inguinal congenital hernia has been given to that ſpecies of the diſeaſe, where the protruded viſcera have the tunica vaginalis as a hernial ſac, and lie in immediate contact with the teſticle.

The manner in which this rupture was formed was not underſtood by the ancient ſurgeons, who, obſerving that the ſac of a common ſcrotal hernia lay upon the tunica vaginalis, concluded that the viſcera had made their way into its cavity by preſſure. It is now univerſally known that the teſticle is orginally placed near the kidney, where it receives a covering of peritoneum like the other abdominal viſcera; that in the latter months of pregnancy it deſcends through the abdominal ring into the ſcrotum, carrying with it a portion of peritoneum; that the communication between the membranous bag holding this gland, and the abdominal cavity, is deſtroyed before the time of birth; and that the peritoneal coat which ſurrounded the teſticle in the abdomen forms the tunica albuginea, while the looſer proceſs that paſſes with it into the ſcrotum makes the future tunica vaginalis. The obliteration of the communication between the cavity of the tunica vaginalis and abdomen is moſtly effected before birth, though occaſionally not till afterwards, and ſometimes even as late as manhood.

The epithet *congenital* ſeems liable to objection, as conducing to an erroneous ſuppoſition, that the hernia is actually formed at the period of birth. It is indeed true, that while a communication remains open between the tunica vaginalis and abdomen *after birth*, a protruſion of the viſcera muſt be exceedingly apt to take place *on the operation of the uſual exciting cauſes*. But ſince in the fetal ſtate theſe cauſes cannot act, it would be abſurd to ſuppoſe that the rupture was ſtrictly congenital. Immediately, however, the function of reſpiration begins, the diſeaſe may be produced, and although it is uncommon for it to exiſt at the time of birth; it generally makes its appearance ſoon after this event; but it may be delayed even for many years. An example is recorded by Mr. Hey, where a hernia congenita was firſt formed in a young man aged ſixteen, whoſe right teſtis had, a little while before the attack of the diſeaſe, deſcended into the ſcrotum. Richeraud alſo makes mention of the caſe of another young man, twenty years of age, whoſe teſticles, which were previouſly concealed in the abdomen, and ſituated behind the rings, were propelled through theſe openings on his making a violent effort to leap over a broad ditch. The peritoneum was carried down with theſe organs, and conſtituted pouches, into which the viſcera were ſoon afterwards protruded. The hernia congenita, therefore, is rather improperly named, ſince the diſeaſe does not uſually occur till after birth, and ſometimes not till long after it. It might be better to characteriſe the rupture by the peculiarity of its being contained in the tunica vaginalis, which ſerves in every reſpect as the hernial ſac. See Richeraud Noſographie Chirurgicale, tom. iii. p. 399. edit. 2.

We have ſaid that the hernia congenita does not commonly take place till after the period of birth, and that its formation requires the operation of the ordinary exciting cauſes. Such ſtatement is perfectly correct, notwithſtanding we have now to acquaint the reader, that in a few inſtances the rupture is already formed at the time of birth, and is ſtrictly congenital. This occurrence is explicable by the accidental circumſtance of the teſticle ſometimes contracting adheſions to ſome of the viſcera in its progreſs to the ring before birth. In this caſe the piece of inteſtine, omentum, &c. muſt follow the courſe of the teſticle into the ſcrotum, and if the deſcent of this gland is effected at the ordinary period, a ſtrictly congenital hernia muſt be formed. Some facts, corroborating this opinion, are related by Wriſberg. (Comment. Reg. Soc. Scient. Goetting. 1778, p. 43, 44. 71.) Soemmerring has alſo ſeen the appendix vermiformis adhering to the teſticle. (Danz Zergliederungſkunde des ungebohrnen Kindes, vol. ii. p. 164.) The remarkable frequency of adheſions, between the teſticle and viſcera, in caſes of congenital hernia, muſt be well known to all experienced ſurgeons. It was noticed by Pott, and more recently by that incomparable writer Mr. Lawrence.

The anatomy of the congenital hernia reſembles that of the common bubonocele, where the protruſion happens at the inner opening of the ring, excepting that the viſcera lie in the tunica vaginalis, inſtead of an ordinary hernial ſac formed of the peritoneum.

The impoſſibility of feeling the teſticle at the lower part of the ſwelling diſtinguiſhes a congenital from a common ſcrotal hernia. The exiſtence of the diſeaſe from infancy is a ground for ſuſpecting its nature; but it is not a certain criterion, as very young children may have a bubonocele. See a caſe related by Mr. Lawrence, p. 59.

The treatment of the congenital hernia is to be regulated on the principles applicable to ruptures in general. When returnable, it ought, like every other kind of rupture, to be reduced, and conſtantly kept up by a proper truſs; and when attended with ſymptoms of ſtricture, it requires the ſame ſurgical aſſiſtance as the common hernia.

"In very young children," (ſays Mr. Pott,) "there are ſome circumſtances relative to this kind of rupture, which are very well worth attending to, as they may prove of very material conſequence to the patient.

"A piece of inteſtine or omentum may get pretty low down in the ſac, while the teſticle is ſtill in the groin, or even within the abdomen, both which I have ſeen. In this caſe, the application of a truſs would be highly improper; for in the latter, it might prevent the deſcent of the teſticle from the belly into the ſcrotum; in the former, it muſt neceſſarily bruiſe and injure it, give a great deal of unneceſſary pain, and can prove of no real uſe. Such bandage, therefore, ought never to be applied on a rupture in an infant, unleſs the teſticle can be fairly felt in the ſcrotum after the gut or caul is replaced; and when it can be ſo felt, a truſs can never be put on too ſoon.

"As this kind of rupture is ſubject to ſtricture, with all its conſequences, as much as that which is contained in a common hernial ſac, and therefore liable to ſtand in need of the chirurgic operation; it may be very well worth an operator's while to know that an old rupture, which was originally congenital, is ſubject to a ſtricture made by the ſac itſelf, independent of the abdominal tendon, as well as to that made by the ſaid tendon.

"Whether this be owing to the weight of the teſticle at the bottom of the ſac, and the endeavours which nature makes to cloſe the upper part of the tunica vaginalis, or to what other cauſe, I will not pretend to ſay, but the fact I have ſeveral times noticed, both in the dead and in the living. I have ſeen ſuch ſtricture made by the ſac of one of theſe herniæ, as produced all thoſe bad ſymptoms which render the operation neceſſary: and I have met with two different ſtrictures, at near an inch diſtance from each other, in the body of a dead boy, about fourteen, one of which begirt the inteſtine ſo tight, that I could not diſengage it without dividing the ſac.

“ In this kind of hernia I have alſo more frequently found connections and adheſions of the parts to each other, than in the common one; but there is one kind of connection ſometimes met with in the congenital hernia, which can never be found in that which is a common hernial ſac, and which may require all the dexterity of an operator to ſet free; I mean that of the inteſtine with the teſticle, from which I have more than once experienced a good deal of trouble.

“ When a common hernial ſac has been laid open, and the inteſtine and omentum have been replaced, there can be nothing left in it which can require particular regard from the ſurgeon; but by the diviſion of the ſac of a congenital hernia, the teſticle is laid bare, and after the parts compoſing the hernia have been reduced, will require great regard and tenderneſs, in all the future dreſſings, as it is a part very irritable, and very ſuſceptible of pain, inflammation, &c.

“ If a large quantity of fluid ſhould be collected in the ſac of a congenital hernia, and by adheſions and connections of the parts within, the entrance into it from the abdomen ſhould be totally cloſed (a caſe which I have twice ſeen) the tightneſs of the tumour, the difficulty of diſtinguiſhing the teſticle, and the fluctuation of the fluid, may occaſion it to be miſtaken for a common hydrocele; and if, without attending to other circumſtances, but truſting merely to the feel and look of the ſcrotum, a puncture be haſtily made, it may create a great deal of trouble, and poſſibly do fatal miſchief.

“ By what has fallen within my obſervation, I am inclined to believe that the ſac of a congenital hernia is very ſeldom, if ever, diſtended to the degree which a common hernial ſac often is: it alſo, from being leſs dilated, and rather more confined by the upper part of the ſpermatic proceſs, generally preſerves a pyriform kind of figure, and, for the ſame reaſon, is alſo generally thinner, and will therefore require more attention and dexterity in an operator when he is to open it. To which I believe I may add, that common ruptures, or thoſe in a common ſac, are generally gradually formed, that is, they are firſt inguinal, and by degrees become ſcrotal; but the congenital are ſeldom, if ever, remembered by the patient to have been in the groin only.” Pott's Chirurgical Works, vol. 2.

A conſiderable tendency to contract always prevails in the membranous canal, by which the tunica vaginalis communicates with the abdomen. Hence, in young ſubjects, if the viſcera be replaced, and maintained in their natural ſituation by means of a proper truſs, a radical cure of the complaint is likely to be effected. But this beneficial change can ſcarcely be expected, when the diſeaſe has exiſted many years, and the employment of a truſs can then only be regarded as a palliative.

The operation for the congenital hernia bears a cloſe reſemblance to that for the bubonocele, the chief difference being, that the operator has to cut into the tunica vaginalis, inſtead of a common hernial ſac. Unleſs adheſions are preſent, there is no need to lay open the whole cavity of this membrane, and uncover the teſticle completely, ſince a diviſion of its upper part will ſuffice. It has been obſerved, by all the beſt writers on the ſubject, that in theſe caſes, the ſtricture is particularly often produced by a contraction of the neck of the ſac. In ſome inſtances, the contraction has been noticed lower down. It ſhould be remembered, however, that the ſtrangulation may likewiſe be produced either by the inner or outer opening of the ring. The ſtricture is to be divided, either directly upwards, or upwards and outwards, juſt as is done with reſpect to the bubonocele.

Uncommon Congenital Hernia.—Thus we find, that the ordinary congenital hernia differs from other ſpecies of rupture, by the protruded viſcera lying in the cavity of the tunica vaginalis, uncovered by any other production of peritoneum. But it is our duty to relate, that a particular caſe is ſometimes met with, where the bowels, beſides being contained in the tunica vaginalis, have likewiſe a peritoneal covering, or true hernial ſac. The firſt example of this diſeaſe was publiſhed by Mr. Hey, and Mr. Aſtley Cooper has ſubſequently recorded another. In the kind of rupture at preſent engaging our attention, the viſcera are protruded, after the communication between the abdomen and tunica vaginalis is cloſed; and, therefore, the peritoneum is carried down along with the viſcera, and forms the hernial ſac. It is evident, alſo, that the hernia muſt be produced while the original tunica vaginalis remains in the form of a bag as high as the abdominal ring, ſo as to be capable of receiving the hernial ſac and its contents, and permit the ſac to come into contact with the teſticle. In the caſe deſcribed by Mr. Hey, the proper hernial ſac, in conſequence of its remaining conſtantly in a prolapſed ſtate, had every where contracted an adheſion to the original proceſs of the peritoneum, which ſurrounded it, except at its inferior extremity. There the external ſurface of the hernial ſac was ſmooth and ſhining, as the interior ſurface of the tunica vaginalis is in its natural ſtate. The rupture was firſt noticed by the mother, when the child was about two months old. Mr. Hey apprehends, that as male children are often attacked with a ſcrotal hernia, in the firſt or ſecond month after birth; it is probable that the diſeaſe may often be of this ſpecies when it comes on at ſo early a period of life. He thinks, therefore, that this ſort of rupture might not improperly be called *hernia infantilis*, as it can only be formed while the parts retain the ſtate peculiar to early infancy.

An operator, ignorant of the nature of this kind of rupture, might be greatly perplexed, on opening the tunica vaginalis, to find another hernial ſac within it, which would ſtand in need of being divided.

Analogous Hernia to the Inguinal Congenital in Females.—Small productions of the peritoneum have been obſerved in women, extending through the abdominal ring over the round ligament of the uterus, and terminating by a blind extremity at the groin. Such proceſſes of the peritoneum may be compared with the tunica vaginalis of the male. They have been termed *diverticula*. It has not been aſcertained whether the upper part of theſe diverticula become cloſed, like the communication between the abdomen and tunica vaginalis. They have been obſerved by Nuck, Camper, Le Cat, and Wriſberg, and a reference to the works, in which mention is made of them, may be found in Mr. Lawrence's Treatiſe on Ruptures. The exiſtence of ſuch diverticula may favour, in a certain degree, the occurrence of a rupture, which, were it to happen, would bear an analogy to the inguinal congenital hernia of the male ſubject.

Umbilical Hernia, alſo named Exomphalos, Omphalocele, &c.—This hernia, which is leſs common than the inguinal and femoral ruptures, afflicts very young infants, and likewiſe

wiſe women whoſe abdominal parietes have often been diſtended by pregnancy; but it is ſeldom met with in male adults, or old perſons. In grown-up females, it was thought by Petit, that the parts are moſt frequently protruded at one ſide of the umbilicus. (Traité des Mal. Chirurg. tom. ii. p. 250.) But Mr. Aſtley Cooper is of opinion, that the protruſion uſually happens through that opening itſelf. (On Crural and Umbilical Hernia, p. 35.) In a late excellent work on ſurgery, it is remarked, that the umbilicus is a kind of cicatrix, formed, in conſequence of the ſeparation of the funis, by the contraction of the parts with which it was continuous, and that it only gradually acquires the degree of firmneſs which it has in the adult ſubject. As it is for a long while weaker than the reſt of the abdominal parietes, it only makes an inferior degree of reſiſtance to the viſcera; but this reſiſtance increaſes with age; and, as the cicatrix now becomes ſtronger than the ſurrounding parts, it forms a more impenetrable barrier againſt any eſcape of the bowels. From theſe anatomical facts, the following pathological inferences, which are confirmed by experience, are deducible. Firſt; that infancy is more ſubject than any other age to the umbilical hernia, ſtrictly ſo called, in which the parts are protruded through the navel. Secondly; that other periods of life are more ſubject than infancy to falſe umbilical herniæ, or to thoſe which ariſe in the vicinity of the umbilicus. Œuvres Chirurgicales de Deſaalt par Bichat, tom. ii. p. 315.

The obſervations, which Mr. Pott has left us on the exomphalos, are, as far as they go, exceedingly accurate. He takes notice, that this ſpecies of hernia, like others, " has for its general contents, a portion of inteſtine, or omentum, or both. In old umbilical ruptures, the quantity of omentum is ſometimes very great.

" Mr. Ranby ſays, that he found two ells and a half of inteſtine in one of theſe, with about a third part of the ſtomach, all adhering together.

" Mr. Gay and Mr. Nourſe found the liver in the ſac of an umbilical hernia; and Bohnius ſays that he did alſo.

" But whatever are the contents, they are originally contained in the ſac, formed by the protruſion of the peritoneum.

" In recent and ſmall ruptures, this ſac is very viſible; but in old, and large ones, it is broken through at the knot of the navel, by the preſſure and weight of the contents, and is not always to be diſtinguiſhed; which is the reaſon why it has by ſome been doubted whether this kind of rupture has a hernial ſac or not.

" Infants are very ſubject to this diſeaſe, in a ſmall degree, from the ſeparation of the funiculus; but in general they either get rid of it as they gather ſtrength, or are eaſily cured by wearing a proper bandage. It is of ſtill more conſequence to get this diſorder cured in females, even than in males, that its return, when they are become adult, and pregnant, may be prevented as much as poſſible; for at this time it often happens, from the too great diſtention of the belly, or from unguarded motion when the parts are upon the ſtretch. During geſtation, it is often very troubleſome, but after delivery, if the contents have contracted no adheſion, they will often return, and may be kept in their place by a proper bandage.

" If ſuch bandage was always put on in time, and worn conſtantly, the diſeaſe might in general be kept within moderate bounds, and ſome of the very terrible conſequences which often attend it might be prevented. The woman who has the ſmalleſt degree of it, and who from her age and ſituation has reaſon to expect children after its appearance, ſhould be particularly careful to keep it reſtrained.

" In ſome the entrance of the ſac is large, and the parts eaſily reducible; in others they are difficult, and in ſome abſolutely irreducible. Of the laſt kind many have been ſuſpended for years in a proper bag, and have given little or no trouble. They who are afflicted with this diſorder, who are advanced in life, and in whom it is large, are generally ſubject to colics, diarrhœas, and, if the inteſtinal canal be at all obſtructed, to very troubleſome vomitings. (Hence patients are often ſuppoſed to labour under a ſtricture, when they really do not.) It therefore behoves ſuch to take great care to keep that tube as clean and free as poſſible, and neither to eat or drink any thing likely to make any diſturbance in that part." See Pott's Chirurgical Works, vol. ii.

An umbilical hernia, at its commencement, is of a roundiſh conical form; but when it is large, and has exiſted a conſiderable time, the portion, which is moſt diſtant from the navel, becomes broader and more expanded, ſo that the tumour has the appearance of hanging by a kind of pedicle. The protruded parts naturally tend downwards, the opening into the abdomen being at the upper part of the ſwelling, and not at its middle. When the tumour is neglected, it attains an enormous ſize, deſcending to the os pubis, and even over the pudenda, incapacitating the patient for active exertion, and forming a conſtant ſource of inteſtinal complaints. When the patient is fat, the rupture may extend between the integuments and muſcles, without cauſing any external ſwelling. Lawrence on Ruptures, p. 389.

It has been aſſerted by many eminent ſurgeons, that the exomphalos is deſtitute of a hernial ſac. Dionis, De la Faye, Garengeot, and J. L. Petit, maintain ſuch an opinion. The truth is, that the umbilical hernia, like moſt other ruptures, always has originally a hernial ſac, which, however, is often exceedingly thin, and intimately adherent to the muſcles. We have ſeen, that Pott had more accurate information, and that he ſubſcribed to the ſentiment, which is now univerſally adopted, that the exomphalos invariably has at firſt a peritoneal inveſtment. There are ſeveral circumſtances, which contributed to the miſtake, that the umbilical hernia had no hernial ſac. Firſt, it is not unuſual to ſuppoſe, that the umbilical veſſels perforate the peritoneum, which is thereby rendered imperfect juſt behind the navel. This notion admits of being eaſily refuted, by a reference to more correct anatomy. Secondly, it is actually a fact, that, in particular examples, the ſac is in ſome places abſorbed, or lacerated, ſo as to allow of a protruſion of its contents, and threaten, from this cauſe, a double ſtricture. Two ſuch examples have been ſeen by Mr. Aſtley Cooper; but they are the only caſes where he ever ſaw the ſac at all deficient. Even where the ſac is wanting at a part of the ſwelling, in conſequence of the abſorption occaſioned by the preſſure of the viſcera, the deficiency only exiſts at a diſtance from the navel, in the vicinity of which opening, veſtiges of the exiſtence of a hernial ſac may in general be plainly traced.

Although the advice, delivered to us by many writers, to proceed with great caution in the diviſion of the containing parts of an umbilical hernia, is generally founded on the erroneous opinion of there being no hernial ſac, yet, ſince the coverings of this rupture are frequently very thin, the counſel is not to be diſregarded. Indeed, in ſome inſtances, the integuments and hernial ſac are inſeparably confounded together on the forepart of the ſwelling. The viſcera have likewiſe been repeatedly ſeen adhering to the integuments, where a part of the hernial ſac had been deſtroyed by abſorption. See Arnaud on Hernia, p. 323. Mem. de l'Acad. de Chir. tom. ii. p. 590. Monro on Crural Hernia,

nia, p. 24. Cooper on Crural and Umbilical Hernia, p. 37.

When the contents of an exomphalos are free from adheſions, they may in general be eaſily reduced, on the patient being placed in a recumbent poſture, and proper preſſure made on the tumour. The protruſion is then to be prevented from taking place again by the inceſſant employment of a ſuitable truſs. The truſſes for the exomphalos will be deſcribed in a future volume of this work. (See Truss.) Patients, afflicted with umbilical ruptures, are obſerved to be more troubled with occaſional vomiting, flatulence, and colic complaints, than happens with regard to perſons labouring under other kinds of hernia. For this reaſon, too much care cannot be taken to eat ſuch food as is light and eaſy of digeſtion.

An irreducible exomphalos of moderate ſize may ſometimes be prevented from becoming larger, by the uſe of a truſs with a hollow pad; but when the ſwelling is large, its increaſe can only be reſtrained by ſuſpending it in bandages, paſſed under it and over the ſhoulders.

The opening, through which the protruded bowels paſs, being generally capacious, the exomphalos is ſeldom ſtrangulated, though ſymptoms, bearing a near reſemblance to thoſe of an incarcerated hernia, are not unfrequent. As we have already ſtated, the patient is apt to be afflicted with violent colic complaints, which can only be diſtinguiſhed from the conſequences of ſtrangulation by the attentive and judicious ſurgeon. Such diſcrimination, however, is of the higheſt importance to the patient, ſince the performance of an operation unneceſſarily would be likely to aggravate the diſorder ſo ſeriouſly as to prove fatal. We earneſtly enjoin, therefore, the admirers of operative ſurgery not to be in too great a hurry with their ſcalpels; but, on the contrary, to be fully impreſſed with the facts, that an exomphalos is not often ſtrangulated, and that operations done on this ſpecies of rupture have been attended with notorious ill ſucceſs. Hence, before having recourſe to the knife, let the ſurgeon perſiſt a prudent time in trying well the effect of mild, aperient, and laxative glyſters. In ſome caſes, the ſudden enlargement of the ſwelling, and the painful inflamed ſtate of the hernia, will clearly indicate that the diſeaſe is ſtrangulated. Hence the ſame methods ſhould be tried, which have been recommended for incarcerated herniæ in general, before the operation. When the operation is to be done, the tumour is to be opened with much circumſpection, and the ſtricture divided with a probe-pointed biſtoury directly upwards, in the courſe of the linea alba. Some ſurgeons content themſelves with making one longitudinal inciſion through the integuments; others practiſe two, which together reſemble the letter T inverted. We perfectly coincide with Mr. Aſtley Cooper and Mr. Lawrence on the propriety of avoiding to lay open a large umbilical hernia. When the rupture at all exceeds a moderate ſize, this gentleman recommends either dividing the ſtricture, without opening the ſac, or only cutting the latter part ſufficiently to allow the ſtricture to be dilated. This will permit the return of the parts, if they are not adherent, and, if adheſions ſhould have formed, the immediate cauſe of danger, the ſtrangulation, is removed. Two caſes, operated upon in this manner by Mr. Aſtley Cooper, are ſtrongly in favour of the plan. On Crural and Umbilical Hernia, p. 51—55.

Of the Umbilical Hernia in Children.—Young infants are often afflicted with umbilical ruptures, the protruſion taking place before the cicatrix of the navel has acquired ſufficient firmneſs. It was aſcertained by Deſault that ſuch herniæ are moſt liable to happen in the ſecond, third, and fourth months after birth. The bowels, being then puſhed againſt the aperture dilate it, and, carrying before them a proceſs of the peritoneum, produce a ſmall tumour, which by degrees becomes larger, and poſſeſſes the ordinary characters of a rupture. The protruded parts generally prevent the umbilicus from contracting and cloſing, although, in conſequence of the ſtrong tendency of this aperture to become obliterated, the proceſs of contraction occaſionally overcomes the reſiſtance of the prolapſed viſcera, and a ſpontaneous cure of the hernia is the reſult. Two caſes, proving this fact, are recorded in Œuvres Chirurgicales de Deſault par Bichat, tom. ii. p. 318. It is not to be ſuppoſed, however, that this is the common courſe of things. In almoſt all caſes, unaſſiſted nature is incapable of accompliſhing a cure; the tumour grows larger and larger, and the opening, as the child increaſes in years, loſes all diſpoſition to contract.

In very young children a radical cure of the umbilical hernia may be eaſily effected, while in adults this deſirable object is nearly impoſſible. In infants, indeed, a cure may be brought about by merely preventing the viſcera, for a time, from being protruded, and from reſiſting the natural tendency of the opening to become ſhut up.

Compreſſion and the ligature are the only two effectual and rational methods of curing the umbilical herniæ of young ſubjects. The laſt of theſe plans is the moſt ancient, having been firſt practiſed by the Greeks, and afterwards by the immortal Celſus. Mr. Pott has ſtrongly expreſſed his diſapprobation of the ligature, as a means of curing the exomphalos. But we ſhall find, in the writings of Deſault, many weighty facts and obſervations in its favour. Every one, however, muſt allow that the practice is unjuſtifiable on adults, who muſt be content with the compreſſion of a truſs. Compreſſion was what Pott recommended even for young ſubjects, in whom a cure may, in this way, be often accompliſhed when the tumour is ſmall, and the bandage is worn a ſufficient length of time. Should this mode of treatment be preferred, the ſurgeon, after reducing the viſcera, is to apply to the opening a piece of cork or ivory, or any other convex ſolid body adapted to the aperture. The ſubſtance employed is then to be maintained in its place by a round bit of adheſive plaſter, and a belt or bandage round the trunk. The belt ought to be broader in front, and quilted, in order that it may not wrinkle nor ſlip about. It is always to be well remembered, that, if a radical cure be aimed at, it is eſſential that an occaſional protruſion of the viſcera be never ſuffered; and therefore, whenever the bandage is ſhifted, the parts muſt be carefully kept up at the time with the finger. We ſhall not enter into the ſeveral objections urged by Deſault againſt the treatment by compreſſion. Such practitioners as wiſh to conſider them will find them detailed by Bichat, and they are undoubtedly not of a trivial nature. On one ſide, we ſhall find that the beneficial effects of compreſſion have alone been taken into the ſcale, while its failures and inconveniencies have been totally loſt ſight of. If we look the other way, it will quickly be diſcovered that the ligature, which is employed at the Hôtel-Dieu, preſents an uninterrupted ſeries of well authenticated cures, which, in Deſault's practice, amounted to the number of fifty. In the latter years of his practice, you might ſee many perſons bringing to his public conſultations their children, which were immediately operated on without any preparation, carried home immediately afterwards, and brought the next, and every following day, to be dreſſed, till the cure was complete.

To theſe conſiderations are to be added other motives, which are perhaps not immaterial. The children of the poor may be cured in an hoſpital, by the ligature, in the ſpace of a few days; but when compreſſion is adopted, the parents are frequently put to repeated expence, as the bandage wears out, and to additional loſs from the time conſumed in paying the neceſſary attentions.

The ancients had different modes of applying the ligature, but what they have tranſmitted to us may be referred to two different proceſſes. One conſiſted in reducing the parts, and afterwards tying the integuments and ſac, without opening the latter at all. In the other, an inciſion was made in the ſac, either before or after tying it, for the purpoſe of being ſure that no piece of inteſtine was, or could become ſtrangulated in the ligature. Celſus adopted the firſt plan. Paulus Ægineta preferred the ſecond, and was imitated by all the Arabian phyſicians, and their ſucceſſors. Avicenna, Albucaſis, and Guy de Chauliac, give us proofs of this in their ſeveral works.

Experience ſoon decides which of theſe modes of operating ought to be choſen. One is leſs painful, and equally ſafe; for one ſoon becomes habituated to aſcertaining whether there is ſtill any inteſtine in the ſac by rubbing the oppoſite ſides of this bag againſt each other. The other, which is unneceſſarily cruel, increaſes the pain, without making the method at all more certainly ſucceſsful. The latter has been uſually adopted, and Paré, who has deſcribed it, does not even mention the former. Latterly, ſome variations in the plan of operating were made. Some ſimply tied the baſe of the tumour; others paſſed through it one or two needles, armed with ligatures, for the purpoſe of fixing ſuch ligatures in a better manner, and even making, for this purpoſe, a circular inciſion for the lodgment of them. It is chiefly in the Arabian practice that we meet with this cruel proceeding, which was alſo uſeleſs, as the ligature was never known to fail when properly applied. Paré alſo deſcribes it; but Saviard, the only modern who has practiſed the ligature, rejected it, and followed the plan long ago adviſed by Celſus. Sabatier ſeems to recommend, in his work on the operations, both plans indifferently, with the exception of the circular inciſion. Deſault's method, which much reſembles that of Saviard, is ſimple, and attended with little pain. In ſhort, it is the following:

The child, on whom the operation is to be done, muſt be placed on its back, with its thighs a little bent, and its head inclined towards the cheſt. The ſurgeon is to reduce the protruded parts forming the tumour, and to hold them ſo with his finger at the ſame time that he raiſes the hernial ſac, and rubs its ſides between his fingers, ſo as to be ſure that there is nothing contained in it. Being certain that the parts which he lifts up are only the ſkin and ſac, he is to direct an aſſiſtant to ſurround their baſe ſeveral times with a waxed ligature of middling ſize, each turn being tied with a double knot, in ſuch a manner as only to occaſion little pain. The tumour, thus tied, is to be covered with lint, which is to be ſupported with one or two compreſſes, and a circular bandage, ſecured with a ſcapulary. A ſlight ſwelling commonly takes place in the conſtricted parts by the following day, juſt as a polypus ſwells after its baſe has been tied.

No pain accompanies this tumefaction, which is itſelf often ſcarcely perceptible, as may be ſeen by referring to the firſt caſe of this operation, related in the Pariſian Journal. On the ſecond or third day the parts ſhrink, and then the ligature becomes looſe, ſo that a freſh one muſt now be applied in the ſame manner as the firſt, taking care to draw it a little more tightly. The ſenſibility of the parts, increaſed by the inflammation which the conſtriction of the ligature has already produced, uſually renders this ſecond ligature more painful. After the operation the ſame dreſſings as before are to be applied. The tumour ſoon becomes diſcoloured, livid, and ſmaller. A third ligature, put on in the ſame way as the preceding ones, entirely obſtructs the circulation in it. The part turns black and flaccid, and commonly falls off on the eighth or tenth day. A ſmall ulcer is left, which, being properly dreſſed, very ſoon heals, and leaves a cicatrix ſufficiently ſtrong to reſiſt the impulſe occaſioned by coughing, or other efforts of the abdominal muſcles. For two or three months, however, after the operation, the child ſhould wear a circular bandage, in order to prevent, with ſtill more certainty, the viſcera from being propelled againſt the cicatrix, ſo as to interrupt the proceſs of nature, which is now producing a gradual cloſure of the umbilical opening. Numerous caſes might here be adduced in confirmation of the above practice; but ſeveral (nine) are already publiſhed in the Pariſian Surgical Journal. The relation of others here would only prolong our obſervations in a fruitleſs manner. Suffice it to remark, that ſince thoſe alluded to were publiſhed, Deſault has practiſed an infinite number of operations of this ſort with equal ſucceſs; that, every week, many children were brought by their mothers into the amphitheatre, where he publicly delivered his lectures; that here the ligature was applied in the preſence of all his pupils; and that children, thus operated upon, were carried home, and brought back every day to be dreſſed till the cure was completed.

But one may doubt (ſays Sabatier) quoting the article in the journal, where Deſault treats of the preſent diſeaſe, whether the infants got rid of the hernia, as it might have returned ſome time afterwards. Numerous facts remove this doubt; for ſeveral of the ſubjects were brought to Deſault's public conſultation for other diſeaſes a long while after they had been operated upon, and the great number of ſtudents, who examined them, all acknowledgedthat the ring was completely obliterated, and there was no impulſe of the viſcera in coughing, ſneezing, &c. Other children, in the knowledge of the ſurgeons of the Hôtel-Dieu, have remained perfectly cured of their umbilical herniæ, by the operation which Deſault has revived. Bichat is acquainted with two young ſubjects, who were operated on four years ago, and have ſince had no relapſe

The operation is almoſt certainly ſucceſsful in young infants; but it becomes leſs ſo in proportion as their age increaſes. Bichat relates three caſes, which tend to ſhew that ſucceſs may be completely obtained at the age of a year and a half; that the cure is difficult when the child is four years old, and impoſſible when it is nine. Several other operations, done too late, have had the ſame reſult. See Œuvres Chirurgicales de Deſault par Bichat, Mémoire ſur la Herniæ Ombilicale des Enfans, tom. 2.

Of the Congenital Umbilical Hernia.—Under this head authors comprehend caſes in which the funis umbilicalis ends in a bag, containing ſome of the abdominal viſcera and communicating with the cavity of the belly by an opening at the navel. The term *congenital* is here employed with ſtrict propriety, as the diſeaſe actually exiſts at the time of birth; but, as Mr. Lawrence obſerves, this form of the complaint ought not, ſtrictly ſpeaking, to be called a rupture, as it happens from an original deficiency in the formation of the part, the ſituation of the fœtus in the uterus, and the abſence of reſpiration making the ſuppoſition, that a hernia could happen before birth, altogether abſurd. The diſtention of the funis ſometimes renders its external coat ſo tranſparent that the folds of the ſmall inteſtines can be clearly diſcerned through it.

In one example, where the tumour was of the bulk of a hen's egg, Mr. Hey reduced the inteſtine, and deſired an aſſiſtant to hold the funis compreſſed ſo near to the abdomen that the bowel could not ſlip into the hernial ſac. He procured ſome plaiſter ſpread upon leather, which was cut into circular pieces, and theſe were laid upon one another in a conical form. This compreſs was put over the navel, after the ſkin on each ſide of the aperture had been brought into contact, and one lip placed a little over the other. He then put round the child's abdomen a linen belt, and laid upon the navel a thick, circular, quilted part.

This bandage kept the inteſtine ſecurely within the abdomen, and was occaſionally renewed. The funis was detached about a week after birth, and, at the expiration of a fortnight from that time, the aperture at the navel was ſo far contracted, that the crying of the child, when the bandage was removed, did not cauſe the leaſt protruſion. The uſe of the bandage, however, was continued a little longer.

When the quantity of protruded bowels is very great, not much hope of a cure can be indulged; but, in every inſtance, it is the duty of the ſurgeon to reduce the parts, and do his utmoſt for the infant's preſervation. Mr. Hey relates two caſes, in which he found enormous portions of the inteſtinal canal thus protruded. Although he ſucceeded in reducing the viſcera, the children did not ſurvive the complaint.

In the ſecond part of Mr. Aſtley Cooper's valuable work on hernia, we are informed that Dr. Hamilton has uſually met with about two caſes of the hernia congenita umbilicalis annually, during the ſpace of ſeventeen years. This laſt gentleman, after reducing the contents of the ſwelling, and applying a tight ligature round its baſe, brought the edges of the parietes of the abdomen together, by means of two ſilver pins, and ſtrips of ſticking-plaſter. In this way, a complete cure was accompliſhed in a few days.

As we have never had an opportunity of ſeeing this diſeaſe treated, we cannot offer any decided opinion upon the comparative merit of the two plans above deſcribed. But we are inclined to think moſt favourably of Mr. Hey's, as being moſt ſimple, and attended with no pain.

Ventral Herniæ.—The term *ventral* is extended to all ſuch ruptures as happen at any other parts of the abdomen beſides the abdominal ring, under the crural arch, and at the navel. Their moſt frequent ſituation is in the courſe of the linea alba, ſomewhere between the enſiform cartilage and the ſymphyſis of the os pubis. They more commonly occur below than above the umbilicus, in conſequence of the interſpace of the recti muſcles being more conſiderable below this cicatrix. The weight of the abdominal viſcera operates chiefly at the lower part, in which ſituation, alſo, the aponeuroſis of the recti muſcles is ſaid to be weakeſt, and moſt apt to give way. But, ventral ruptures are not confined to the linea alba; ſometimes they happen in the linea ſemi-lunaris, or between the falſe ribs and the os ilium.

When the hernia happens in the linea alba, a ſoft and compreſſible tumour makes its appearance at the middle of the forepart of the belly. Its ſhape is in general oblong; its ſize various. When the diſeaſe acquires an exceedingly large ſize, it might receive the appellation, ſo much uſed by the French, of "eventration," though this term is perhaps more properly reſerved for herniæ which depend upon a relaxation of a large portion of the anterior parietes of the abdomen, caſes where the greater part of the viſcera are protruded.

In certain inſtances, theſe eventrations are the conſequence of repeated pregnancies. In this way, the forepart of the abdomen has been obſerved to be ſo completely weakened (the effect of reiterated diſtention), as to form a bag, which deſcended over the thighs, and contained not only the omentum and maſs of inteſtines, but even the gravid uterus itſelf.

It is obvious, that the radical cure of this ſort of rupture muſt be difficult, ſince it is almoſt impoſſible to reſtore to the abdominal parietes the tone which they have loſt. The treatment is reſtricted to adviſing the patient to wear broad, elaſtic belts, or a wide ſuſpenſory, in the event of the ſwelling hanging down over the thighs. When a common ventral rupture happens in the linea alba, it ſhould be reduced, and then kept up with the ſame ſort of truſs as is employed for the exomphalos. See Truss.

Eventrations can hardly become ſtrangulated, though bad and fatal ſymptoms may be occaſioned by an accumulation of inteſtinal matter, and by obſtruction in ſome part of the protruded viſcera. This ſtate has been called by the French "engouement." See Richeraud's Noſographie Chirurg. tom. iii. p. 405.

The occurrence of what is ordinarily underſtood by ventral ruptures, has been referred to apertures exiſting in the parietes of the abdomen for the tranſmiſſion of blood-veſſels and nerves. Mr. Lawrence, however, has regarded this explanation as, at beſt, but very doubtful. He notices, that ventral herniæ ſometimes take place ſuddenly, from a conſiderable bodily exertion, and with a ſenſe of laceration. He conceives, that in making efforts, ſome part may often be actually torn, ſo as to give riſe to the rupture.

Penetrating wounds of the abdomen are ſtated to be generally followed by herniæ. A caſe of this kind was obſerved by Mr. Wardrop. (See Cooper, part 2. p. 60.) Ventral ruptures are likewiſe ſaid to be ſometimes a conſequence of abſceſſes of the belly, blows on this part, &c.

The ventral herniæ, occaſionally obſerved near the ſcrobiculus cordis, have been called by the French herniæ of the ſtomach, from an opinion that a portion of this organ was contained in them. They are uſually attended with ſtomachic complaints; but Mr. Lawrence believes that the ſtomach has never been ſeen in ſuch a rupture.

Ventral ruptures are to be treated on the principles applicable to herniæ in general. They ſhould always be reduced, if poſſible, and kept up with a truſs. They are ſeldom ſtrangulated, though ſometimes attended with nauſea, indigeſtion, &c. Should they become incarcerated, the treatment ought to be like what has been adviſed for other ruptures, and, when reduction cannot be accompliſhed without an operation, this muſt be performed much in the ſame manner as is done in caſes of exomphalos. Suppoſing the hernia to be ſituated in the courſe of the linea alba, the ſtricture may be divided directly upwards.

Hernia of the Bladder, or Cyſtocele.—A hernia of this kind differs materially from ordinary caſes, ſince there is no hernial ſac, and the diſeaſe rather conſiſts of an elongation, than a diſplacement of the bladder. The impoſſibility of a complete diſplacement muſt, indeed, be immediately obvious, on reflecting how firmly this organ is fixed to the perineum and os pubis.

When, in a perſon ſubject to retentions of urine, the bladder is much dilated, riſing above the pubes, it acquires a ſituation behind the abdominal ring, without any interpoſition of the peritoneum. In this ſtate, the leaſt effort may bring on an elongation of the diſtended bladder through that opening. Thus, a kind of appendage to this organ is formed, which may reach more or leſs downwards. In moſt inſtances it deſcends no lower than the groin; occaſionally it paſſes into the ſcrotum. When a conſiderable portion of the urinary bladder is protruded, its fundus and poſterior ſurface are dragged towards the ring, and even paſs through this aperture, together with the peritoneum, which covers them.

The portion of this membrane, which is thus drawn out by the protruded part of the bladder, and follows it, compoſes a pouch, into which the omentum and bowels eſcape, ſo that a cyſtocele is very commonly complicated with an ordinary inguinal hernia.

A hernia of the bladder is characterized by a ſoft, oblong, fluctuating tumour, ſituated in the bend of the groin; it makes its firſt appearance near the abdominal ring, and gradually increaſes in ſize by deſcending more and more towards the ſcrotum. The ſwelling is made to diſappear by compreſſion; it becomes larger when the patient holds his water; but diminiſhes and entirely ſubſides when he makes ſuch evacuation. The laſt circumſtance unequivocally diſtinguiſhes the diſeaſe from the encyſted hydrocele of the ſpermatic cord, while the feel of fluctuation exhibits its difference from an enterocele. It is alſo to be remembered that cyſtocele ſeldom afflicts perſons unleſs they have been often troubled with retentions of urine. The patient in general makes water more frequently than natural.

Beſides this ſort of hernia of the bladder, there are caſes on record, where portions of this viſcus have been protruded under the crural arch, and in the perineum and vagina.

Were a ſurgeon called to a cyſtocele in a very recent ſtate, he ſhould endeavour to reduce the protruded part, and keep it up with a truſs. In almoſt all caſes, however, the caſe is irreducible, in conſequence of the prolapſed part being firmly adherent in its unnatural poſition. The fluid which it contains can alone be made to return. In this circumſtance Richeraud and other writers ſpeak of deſtroying all communication between the cavity of the pouch and that of the reſt of the bladder by compreſſion. But the propriety and advantage of this project ſeem very queſtionable, and it appears to us, that all that can be rationally done is to adviſe the patient to wear a ſuſpenſory bandage, which will ſerve to reſtrain the increaſe of the ſwelling.

A cyſtocele cannot be attended with ſtrangulation, except when complicated with an inteſtinal or omental hernia. In ſuch a caſe, great care ſhould be taken to avoid making an opening unneceſſarily into the bladder.

The hernia of the bladder is exceedingly uncommon under the crural arch. Verdier has recorded an inſtance in the Mém. de l'Acad. de Chirurgie, tom. ii. p. 23.

Calculi have often been obſerved in the protruded portion of the bladder. They may be ſafely extracted through an inciſion made for the purpoſe. Acad. de Chirurg. tom. ii. p. 11—13.

It is aſſerted that protruſions of the bladder may happen between the fibres of the elevatores ani, when torn by a violent abduction of the lower extremities. The caſe could only be treated by compreſſion.

Perineal Hernia.—The records of ſurgery furniſh us with examples of herniæ, which have occurred at the lower aperture of the pelvis. In men, the viſcera are protruded between the bladder and rectum; in women, between the rectum and vagina. As the part, where the peritoneum is reflected from the rectum to the vagina, or bladder, is at a conſiderable diſtance from the peritoneum, it is not difficult to comprehend, that a protruſion may exiſt, without forming any external ſwelling. When this is the caſe, the hernia can only be diſtinguiſhed in men by examining within the rectum; in women, the diſeaſe may be detected both in this way, and by feeling within the vagina.

The contents of perineal herniæ have been inteſtine, or a part of the urinary bladder. The ſwelling becomes larger and more tenſe in the erect poſition, or when the patient holds his breath; ſmaller or ſofter when he lies down, and diſappears entirely on preſſure. It produces various inteſtinal complaints. In men, it muſt conſtantly irritate and preſs upon the bladder. When this laſt viſcus is protruded, the ſymptoms peculiar to cyſtocele will prevail.

The reduction of the perineal hernia is beſt accompliſhed with the aid of a finger introduced into the rectum or vagina. The parts are to be prevented from deſcending again by means of the T bandage, which is to be applied over a ſuitable compreſs of ivory, or ſofter materials, placed on the perineum. In females, a protruſion may be hindered by diſtending the vagina with a peſſary.

Were a ſurgeon called to a ſtrangulated perineal hernia, and the urgent ſymptoms reſiſted the uſual methods, it would be his duty to endeavour to afford relief by an operation. Both this kind of rupture and that of the vagina may prove a ſource of great danger in caſes of parturition, as we may convince ourſelves of, by referring to ſome facts related in Smellie's Midwifery.

An inſtance of perineal hernia is deſcribed by Mr. Aſtley Cooper, in his inſtructive work upon the ſubject before us. See part ii. p. 67. And plate II. fig. 3.

Caſes which were probably protruſions of a part of the bladder towards the perineum, are recorded by Mery, Verdier, and Pipelet, in the Memoirs of the Academy of Sciences for 1713, and thoſe of the Royal Academy of Surgery in France.

Hernia of the Vagina.—The ſituation in which the protruſion begins is the ſame as in the perineal rupture; but in the latter caſe, the vagina reſiſts, and does not give way. In the rupture now under conſideration, the ſwelling projects into the vagina, and is covered by the membrane of that canal. Women who have borne children are more ſubject to this diſeaſe than other females. The tumour is moſtly formed by the ſmall inteſtines. When the protruſion is occaſioned by the bladder, the ſwelling is ſituated on the anterior and upper ſurface of the vagina. This ſpecies of hernia is generally brought on by a violent exertion. Its contents may be readily puſhed up by the hand, but they deſcend again if the patient coughs or ſtrains. All active and laborious purſuits are productive of a painful ſenſe of bearing down. The diſeaſe is frequently accompanied with diſorders of the alimentary canal. Very often the bladder is affected, in conſequence of the vicinity of the tumour. When this receptacle itſelf forms the protruſion, preſſure on the ſwelling will cauſe a diſcharge of urine from the meatus urinarius.

In this diſeaſe the firſt indication is to reduce the parts by the preſſure of the hand, care being taken to effect a complete reduction, and not allow any portion of the protruded viſcera to continue in the long track, through which they may have deſcended. Therefore they muſt be preſſed up as far as the os uteri. They are to be prevented from deſcending again by the uſe of a peſſary, which muſt be ſhaped either like a globe, or hollow cylinder.

The vaginal hernia might be attended with much danger and inconvenience, were it to be down at the time of parturition. Hence, during the labour pains, it behoves the practitioner to maintain the viſcera reduced by preſſure, until the child's head has paſſed down into the pelvis. Should the head have deſcended, while the rupture is down, delivery ſhould be expedited as much as poſſible.

The following account of a vaginal cyſtocele, which is recorded by Sandifort in his Obſ. Anat. Pathol. l. i. cap. 3, is extracted from Mr. Lawrence's treatiſe. "Retention of urine, and difficulty of introducing the catheter, followed a violent cough. A large tumour occupied the whole cavity of the vagina. Fluctuation could be felt in this, but no urine was evacuated on preſſure, unleſs the catheter was introduced at the ſame time; then a plentiful evacuation enſued, but the contents were not entirely diſcharged, unleſs the compreſſion was continued. When all the urine had been drawn off, the catheter could be eaſily introduced; the tumour diſappeared; the ſuperior part of the vagina felt lax and flaccid; and the finger could be puſhed up to the mouth of the uterus, till the ſwelling began again to increaſe by the urine collecting in the bladder. The uſe of a peſſary produced a perfect cure. Three other caſes of large ſwellings in the vagina, reduced by the employment of the catheter, and again increaſing, were communicated to Sandifort by a very ſkilful phyſician, who practiſed midwifery." P. 471, 472. edit. 2.

Pudendal Hernia.—This name has been applied by Mr. Aſtley Cooper to the caſe, where the viſcera are protruded between the vagina and ramus iſchii, forming an oblong tumour in the labium traceable within the pelvis, as far as the os uteri. The diſeaſe bears a conſiderable reſemblance to the vaginal hernia; the parts deſcend along the ſurface of the vagina; but inſtead of making a protruſion into that canal, they paſs between it and the levator ani, and form a ſwelling in the middle of the labium pudendi. Mr. Aſtley Cooper ſuſpects that this caſe has ſometimes been miſtaken for a hernia of the foramen ovale. Its ſituation alſo renders it liable to be thought a bubonocele, though the circumſtance of the upper part of the labium being free from the tumour is ſufficient to afford a plain mark of diſtinction.

When the pudendal hernia admits of reduction, a common female bandage, or the truſs, ſometimes employed for the prolapſus ani, ſhould be worn. A peſſary, unleſs immoderately large, could not very well keep the parts from deſcending, as the protruſion happens ſo far from the vagina. Mr. Aſtley Cooper believes, that when this hernia is ſtrangulated, it may, in general, in conſequence of the yielding nature of the parts, be reduced, by preſſing the protruded viſcera, with gentle and regular force, againſt the inſide of the ramus iſchii. Should this plan prove unavailing, the effect of the warm bath, bleeding, and tobacco clyſters ought to be tried. Were an operation neceſſary to ſave the patient's life, Mr. Aſtley Cooper adviſes the inciſion to be made in the labium. Then the lower part of the ſac is to be cautiouſly opened, and the ſtricture divided inwards, towards the vagina, with a concealed biſtoury, guided by a finger introduced into that canal. It will be right to deſire the patient to empty her bladder, either before trying to reduce the tumour, or undertaking the operation. A caſe of the pudendal hernia is recorded by the preceding gentleman. See his work on the Crural and Umbilical Hernia.

Thyroideal Hernia, or Hernia of the Foramen Ovale of the Pelvis.—It is well known to every body verſed in anatomical ſtudies, that the foramen ovale is ſhut up by a ligament, in which, however, an opening is left at the upper and anterior part for the paſſage of the obturator artery, vein, and nerve. This opening is obſerved to be larger than would ſuffice for the tranſmiſſion of theſe parts. Its margin is partly formed by the ligament, and partly by a conſiderable oblique notch in the under ſurface of the horizontal branch of the os pubis.

Protruſions of the viſcera through ſuch opening conſtitute thyroideal herniæ, a diſeaſe, whoſe occaſional exiſtence has now been put out of all doubt, though the caſe may be deemed uncommon.

Henermann found a piece of ileum, equal in length to a finger and a half, protruded at the foramen ovale. The ſac was covered by the firſt and ſecond heads of the triceps and the pectinalis. (Chirurgiſche Operationen, b. i. p. 578.) An entero-epiplocele has been ſeen in the ſame ſituation in a young man ſeventeen years of age. (Klinkoſch in Diſſertat. Med. Pragens, vol. i. p. 185.) Camper met with protruſions of the peritoneum at the obturator foramen in the dead ſubject. (Demonſtrat. Anatomico-patholog. lib. ii. p. 17.) Our countrymen, Mr. Aſtley Cooper and Mr. W. Lawrence, have witneſſed the ſame fact. Therefore, whatever doubts may prevail reſpecting the reality of Garengeot's caſes of thyroideal hernia, in the Mém. de l'Acad. de Chirurgie, which have been ſuppoſed by Richeraud and others to be only femoral ruptures, there is now ſufficient evidence to prove that the diſeaſe ſometimes occurs.

In ſhort, Mr. Aſtley Cooper has diſſected ſuch a caſe. The hernia deſcended above the obturatores muſcles. The os pubis was before the neck of the ſac; three-fourths of it were ſurrounded by the obturator ligament; and the fundus of the ſac lay beneath the pectineus and adductor brevis muſcles. The obturator nerve and artery were ſituated behind the neck of the ſac, a little towards its inner ſide. On Crural Hernia, &c. p. 70.

In conſequence of the hernia of the foramen ovale being covered by thoſe large muſcles, the pectinalis and triceps, it cannot well form an external ſwelling, and of courſe has generally eſcaped obſervation till after death. However, if one of Garengeot's caſes be correct, the diſeaſe, which was ſtrangulated, not only made an external ſwelling, but was reduced and went up with a guggling noiſe.

Were a ſurgeon to meet with this ſpecies of rupture, the ſame treatment would be required as is applicable to herniæ in general. The hernia, if poſſible, ſhould be reduced, and kept up with a ſuitable truſs. Should it become ſtrangulated, and not be relieved by the uſual means, the ſurgeon would be called upon to perform an operation, inconvenient as it would be, to cut through ſuch a thickneſs of parts. We need ſcarcely lay down the caution to avoid injuring the crural veſſels and nerves. The diviſion of the obturator ligament and mouth of the hernial ſac is to be made inwards. ſo as not to endanger the obturator artery. However, in the event of its ariſing in common with the epigaſtric artery, it would not be quite out of all hazard in this mode of operating.

Iſchiatic Hernia.—This diſeaſe is rare; but that it may happen is completely proved by well authenticated facts. The caſe has ſeldom or never been aſcertained till after death, in conſequence of the tumour being ſmall, and lying under the gluteus maximus muſcle. An inſtance, which was ſtrangulated and undiſcovered till after the patient's deceaſe, is recorded in the ſecond part of Mr. Aſtley Cooper's work on hernia. The particulars were communicated to this gentleman by Dr. Jones, ſo well known for his accurate and able elucidations of the ſubject of hemorrhage. The diſeaſe happened in a young man twenty-ſeven years of age. On opening the abdomen, the ilium was found to have deſcended on the right ſide of the rectum into the pelvis, and a fold of it was protruded into a ſmall ſac, which paſſed out of the pelvis at the iſchiatic notch. The inteſtine was adherent to the ſac at two points; the ſtrangulated part, and about three inches on each ſide, were very black. The inteſtines towards the ſtomach were very much diſtended with air, and here and there had a livid ſpot upon them. A dark ſpot was even found upon the ſtomach itſelf, juſt above the pylorus. The colon was exceedingly contracted, as far as its ſigmoid flexure. A ſmall orifice was found in the ſide of the pelvis, in front of, but a little above the ſciatic nerve, and on the forepart of the pyriform muſcle. The ſac lay under the gluteus maximus muſcle, and its orifice was before the internal iliac artery, below the obturator artery, but above the vein. It is remarked by Mr. Aſtley Cooper, that a reducible caſe might be kept up with a ſpring truſs, and that, were a ſurgeon to be under the neceſſity of operating, the orifice of the ſac ought to be divided directly forwards.

The ſwelling was ſmall, and its exiſtence not ſuſpected during the patient's life.

Although it would appear, that the iſchiatic hernia is in general ſo ſmall as to eſcape detection till after death, an example of a very oppoſite nature is recorded in Papen's Epiſtola de Stupenda Hernia Dorſali. A woman was afflicted with an enormous tumour, which hung down from her buttock as low as her knee. She was compelled to lie on her left ſide, to ſuſpend the tumour from her back when at work, and to raiſe and compreſs it in order to promote the evacuation of the feces. The woman died ſuddenly at harveſt-work. The hernial ſac was formed by the peritoneum, and was found to contain moſt of the ſmall inteſtines, and a portion of the colon, beſides omentum. The poſition of the ſtomach appeared to be perpendicular, the pylorus lying at the entrance of the ſac.

Some doubts have been entertained concerning this caſe being an iſchiatic hernia, a particular deſcription of the opening, at which the parts were protruded not being given, and the tumour attaining ſuch a magnitude as ſeems almoſt impoſſible, conſidering the nature and ſituation of a real iſchiatic hernia.

Phrenic Hernia.—The abdominal viſcera are occaſionally protruded through apertures or lacerations in the diaphragm, and when this ſpecies of hernia becomes ſtrangulated, the patient cannot poſſibly be ſerved by any ſurgical operation, nor, indeed, can the nature of his affliction be aſcertained till an examination is made after death.

A common cauſe of ſuch protruſions is a mal-formation of the diaphragm, which has a preternatural deficiency in it, forming a communication between the cavities of the cheſt and abdomen. In other inſtances, a portion of inteſtine has been forced between the muſcular fibres, ſo as to lie in a hernial ſac compoſed of the peritoneum and pleura. In ſome caſes, a part of the abdominal viſcera has paſſed into the thorax through accidental wounds of the diaphragm. In other examples, the protruſion happens through one of the natural apertures in this muſcular partition.

The caſes of phrenic herniæ on record are extremely numerous. In Mr. Lawrence's treatiſe on ruptures, the following references are given to caſes where the viſcera have been protruded through preternatural openings in the diaphragm.

Holt in Philoſ. Tranſ. abridged, v. iv. p. 630. Fothergill in Philoſ. Tranſ. N° 468, or in his Works, vol. i. Macaulay in Medical Obſervations and Inquiries, vol. i. N 4. Morgagni, De Cauſis et Sedibus Morborum, ep. 54, art. 12 and 13. Lieutaud Hiſtor. Anatomico-Med. t. i. obſ. 212, &c. Klinkoſch, Diſſertat. Med. Select. Pragens, t. i. p. 187. Bonn Deſcriptio Theſauri Hoviani. Le Blanc Operations de Chirurgie, tom. ii. p. 414. Petit Traité des Mal. Chirurgicales, tom. ii. p. 261, &c. Chauvet, Hiſt. de l'Acad. des Sciences, 1729, p. 11. Vicq d'Azyr, ibid. 1772, p. 2. Clark in Tranſact. of a Society for promoting Medical and Chirurgical Knowledge, vol. ii. p. 118. Medical Records and Reſearches, art. 1. Monro on Crural Hernia, p. 10. Cooper on Crural and Umbilical Hernia, p. 76, et ſeq.

For caſes where the protruſion has happened between the muſcular fibres, Mr. Lawrence refers us to Petit, Traité des Mal. Chirurg. tom. ii. p. 266, Bowles in Medical Records and Reſearches. p. 15.

For examples in which the protruſion has occurred through wounds of the diaphragm, we are referred by Mr. Lawrence to Fabricius Hildanus, cent. 2. obſ. 33. Blancard, Anat. Pract. Rational. Muys, Prax. Med. Chirurg. dec. 5, obſ. 2. Plenk Sammlung von Beſbachtungen, 1 theil. Derrecagaix in the Pariſian Chirurgical Journal. Cooper, part. 2. p. 80.

Meſenteric Hernia.—It is well known that the meſentery is a double membrane, conſiſting of two layers. When one of theſe layers is torn, while the other remains in its natural ſtate, the inteſtines may inſinuate themſelves into the aperture, and form a kind of hernia. The ſame conſequence may ariſe from an imperfect formation of one of the layers. A caſe of this laſt kind is recorded by Mr. Aſtley Cooper, in his work on Crural Hernia, p. 82.

Meſocolic Hernia.—The bowels may inſinuate themſelves between the layers of the meſocolon, as well as between thoſe of the meſentery, as is proved by a ſpecimen of the diſeaſe preſerved in the muſeum of St. Thomas's hoſpital. In ſhort, the viſcera may glide into any preternatural opening which may exiſt in any of the peritoneal proceſſes, which are compoſed of two layers. The bowels have thus become entangled in the ligamentum latum uteri, omentum, &c.

We ſhall conclude the ſubject of ruptures with enjoining the practitioner never to forget, that beſides the common forms of ſtrangulation, there are others which may happen within the abdomen, and cauſe conſiderable embarraſſment. Theſe may be caſes of the deſcription juſt now given; or they may be inſtances where adheſions leave an opening, in which the bowel becomes confined; or, laſtly, the bowel may be ſurrounded at the mouth of the hernial ſac with membranous bands, which being reduced with the inteſtine, may conſtrict it within the belly, and bring on a ſtate of incarceration.

HERNIA *Cerebri.* See FUNGUS *Cerebri.*

HERNIA *Humoralis* is a term commonly applied to an acute inflammation of the teſticle. The inflammatory affection of this organ cannot be miſtaken. It is evinced by the pain and ſwelling of the part, and by the redneſs and tenſion of the ſcrotum, which becomes ſmooth and uncorrugated. The pain ſhoots up the ſpermatic cord towards the loins, and unleſs a ſuſpenſory bandage be worn, the leaſt motion cauſes an aggravation of the uneaſy ſenſations. At firſt the body of the teſticle is affected with a ſoft pulpy fulneſs, the part being exceedingly tender when handled. This fulneſs increaſes to a hard ſwelling, accompanied with conſiderable pain. The hardeſt part is in general at the lower portion of the epididymis, as may be plainly felt. Very frequently, the ſpermatic cord is affected, eſpecially the vas deferens, which is thickened, and exceedingly painful when touched. The complaint is attended with inflammatory fever; the pulſe is hard, ſtrong, and frequent; the urine high-coloured, and in little quantity, &c.

Inflammation of the teſticle may be brought on by cauſes ſimilar to thoſe which induce this affection in other parts. A contuſion of the ſcrotum may occaſion a hernia humoralis; we ſee it purpoſely cauſed by the ſurgeon, when he undertakes the radical cure of a hydrocele. But the moſt common cauſe of this complaint is irritation in the urethra. Hence, it more frequently ariſes in conſequence of a gonorrhœa than any other cauſe; and perſons with very bad ſtrictures, for which they are uſing bougies, are much expoſed to its attack. When hernia humoralis is the conſequence of a gonorrhœa, it moſtly happens that, juſt about the time when the teſticle begins to ſwell, the diſcharge from the urethra either ſtops entirely, or undergoes a ſudden and remarkable diminution. On this account, the generality of ſurgical writers impute the hernia humoralis to the ſtoppage of the clap, while it ſeems quite as likely that the change in the latter complaint may depend upon the acceſs of the other. However, ſince an inflammation of the teſticle does not uſually originate when a clap is ſuddenly checked or ſtopped; and, further, ſince the caſe of hernia humoralis is not conſtantly attended, at its commencement, with an abatement, or ceſſation of the diſcharge from the urethra, we do not feel warranted in believing that there is any certain and incontrovertible theory on the ſubject. With the believers in the doctrine of metaſtaſis, the hernia humoralis has always been a favourite illuſtration, the tranſition of a diſeaſe from the urethra to the teſticle appearing to them to be here ſo evident and unqueſtionable. We cannot pretend to offer any other explanation of the cauſe of the hernia humoralis, in conſequence of a gonorrhœa, than that it proceeds from irritation in the urethra. It is alſo certain, that when a patient is affected with pain in making water, a diſcharge of matter from the urethra, &c. the teſticles are particularly tender and ſuſceptible of inflammation. And we find, that the latter complaint is more apt to come on under certain circumſtances, which ſeem all to operate on the principle, either of increaſing the irritation in the urethra, or of manifeſtly extending it to the teſticle.

Thus, it is remarked by writers on ſurgery, that, in caſes of gonorrhœa, hernia humoralis is moſt liable to occur when the patient neglects himſelf and is guilty of exceſſes; when, notwithſtanding the ſeverity of the clap, he does not ſupport the ſcrotum in a bag-truſs, but takes violent exerciſe, and does not rigorouſly abſtain from wine and women. Many authors are inclined to the opinion, that employing aſtringent injections, or bougies, in caſes of gonorrhœa, renders the patient diſpoſed to hernia humoralis.

Not only does the diſcharge from the urethra in general ſtop, or diminiſh, upon the acceſs of hernia humoralis; the pain in making water alſo ſuddenly ſubſides. In almoſt all inſtances the patient has not the good fortune to be permanently freed from the gonorrhœa; nor can it be ſaid that this is exchanged for the ſwelling of the teſticle; for as ſoon as the hernia humoralis begins to get better, the ſtrangury and diſcharge from the urethra uſually return again.

With regard to the treatment of the preſent diſeaſe, the patient is to be adviſed to keep himſelf quiet in bed, and to abſtain from meat and ſpirits. When he is young, or ſufficiently ſtrong, and when the ſwelling is great, and the pain ſhooting up to the loins, ſevere veneſection ought to be practiſed. It may be ſet down, that topical bleeding with leeches is invariably proper, and ſhould be at firſt repeated from day to day. Febrifuge medicines and ſaline purgatives are alſo indicated.

The pain in the loins will be relieved by quietude and bleeding; but when it is exceſſively ſevere, the practitioner will be juſtified in preſcribing opiates. But, ſuſpending the ſcrotum in a bag-truſs, ſo as to prevent the teſticle from hanging by the ſpermatic cord, will have more effect than any other meaſure, in leſſening the ſevere pain which patients moſtly experience in the lumbar region. Perhaps, indeed, a ſuſpenſory bandage, in caſes of hernia humoralis, is of more conſequence than all the reſt of the treatment together; and ſo immediately convinced is the patient of the great relief he derives from it, that, when once he has put it on, there is little danger of his neglecting to perſiſt in its uſe. Before applying the bag-truſs, the opportunity is to be taken to uſe leeches, and, on theſe being removed, the whole ſcrotum is to be covered with a ſoft linſeed poultice. There are practitioners, who prefer the ſaturnine lotion, and other cold applications; and we believe caſes do occur, where ſuch means afford moſt eaſe and comfort. The choice, we think, ſhould be principally regulated by the feelings and evidence of the patient himſelf.

After all active inflammation in the teſticle is obviated, the epididymis frequently remains conſiderably hardened. Such induration generally admits of being in part diſperſed by frictions with camphorated mercurial ointment, though it often happens that a degree of hardneſs will remain for life, notwithſtanding the fulleſt trial of diſcutient remedies. Since, however, it is unattended with any pain or uneaſineſs, it is of little importance, unleſs Mr. Hunter's conjecture be true, that many teſticles which continue thus indurated, cannot execute the functions for which they are deſigned in the animal economy, in conſequence of the epididymis being, perhaps, impervious.

The ſuppoſition, that in caſes of gonorrhœa the hernia humoralis ariſes altogether from the ſtopping of the diſcharge, has led to the abſurd practice of endeavouring to renew the ſecretion of matter from the urethra, by irritating the paſſage with bougies, applying emollients to the penis, &c. The truth is, that ſuch methods are neither ſupported by any accurate theory, nor are they productive of real benefit in practice; conſequently, they are not followed by any eminent ſurgeons in this country, nor can a ſerious comment on the abſurdity of the practice be neceſſary.

HERNIARIA, in *Botany*, is ſo called from *hernia*, a *rupture*, this plant having been very abſurdly ſuppoſed to be beneficial in that complaint, though it is ſcarcely poſſible to conceive that ſo fooliſh an idea ſhould ever have obtained, becauſe any mode of relief for that diſeaſe muſt, from the nature of it, be purely mechanical.—Linn. Gen. 121. Schreb. 170. Willd. Sp. Pl. 1296. Mart. Mill. Dict. v. 2. Sm. Fl. Brit. 271. Juſſ. 89. Lamarck Dict. v. 3. 124. Illuſtr. t. 180.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Holoraceæ*, Linn. *Amaranthi*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, five-cleft, acute, ſpreading, coloured internally, perſiſtent. *Cor.* none. *Stam.* Filaments five, awl-ſhaped, minute, withinſide of the ſegments of the calyx; anthers ſimple (there are alſo five barren filaments alternating with the ſegments of the calyx). *Piſt.* Germen ovate; ſtyle ſcarcely perceptible; ſtigmas two, acute, about the length of the ſtyle. *Peric.* Capſule ſmall, in the bottom of the calyx, covered, ſcarcely burſting. *Seed* ſolitary, ovate-acuminate, ſhining.

Eſſ. Ch. Cal. in five ſegments, inferior. Cor. none. Stamens with five thread-ſhaped ſcales between them. Capſ. with one ſeed, covered with the calyx.

1. *H. glabra.* Linn. Sp. Pl. 317. Engl. Bot. t. 206. Fl. Dan. t. 529.—"Whole plant herbaceous and ſmooth."—Native of gravelly ſoil in various parts of Europe, flowering about July and Auguſt.—*Root* perennial, ſpindle-ſhaped. *Stems* proſtrate, round, leafy. *Leaves* ovate, entire, ſomewhat fringed at the margin; lower ones oppoſite; upper ones alternate. *Stipulas* membranaceous. *Flowers* ſeſſile, heaped together in cluſters, yellowiſh-green. *Calyx* cloſed after flowering, and embracing the ripe capſule.

2. *H. hirſuta.* Linn. Sp. Pl. 317. Engl. Bot. t. 1379. Pet. H. Brit. t. 10. f. 10.—"Whole plant herbaceous and hairy."—Found in a ſandy ſoil, though leſs commonly than the laſt, flowering in July and Auguſt.—This is alſo a perennial, and is generally conſidered as a mere variety of *H. glabra*, differing only in being clothed all over with ſhort,

minute, rigid briſtles or hairs, with which the leaves are alſo ſtrongly fringed. A Swiſs ſpecimen of *H. glabra* has been diſcovered with pubeſcence on its ſtem, which evidently betrays an approach to the plant before us.

3. *H. alpina.* Willd. n. 3. Villars Dauph. v. 2. 556.—"Leaves obovate, acute, fringed at the margin. Flowers denſely cluſtered, five-cleft, hairy."—Native of the hills of Dauphiny, and gathered in great luxuriance, by Dr. Smith on Mount Cenis, in Auguſt 1787. This is remarkable for its extremely long, ſimple *root*, bearing a very wide-ſpreading depreſſed tuft, compoſed of innumerable matted ſtems and branches. The whole is ſometimes a foot wide, but more commonly four or five inches. The obovate ſhape of its leaves diſtinguiſhes it from either of the foregoing, and the hairs, which more or leſs clothe every part, are much more long, lax, and ſpreading than even in *H. hirſuta.*

4. *H. macrocarpa.* Sm. Prod. Fl. Græc. v. 1. 167.—"Leaves obovato-lanceolate, hairy on both ſides as well as the calyx. Stems clothed with recurved hairs."—Found by Dr. Sibthorp on the road ſide between Smyrna and Burſa, as well as in Laconia. We have alſo a ſpecimen from the Balearic iſlands.—It has a great reſemblance to the laſt ſpecies, but the leaves are narrower, the fruit larger, the pubeſcence much finer and more denſe in general, and that of the ſtem is reflexed or recurved.

5. *H. fruticoſa.* Linn. Sp. Pl. 317; (Polygonum Herniariæ foliis et facie, perampla radice Aſtragaliti; Lob. Ic. v. 2. 85. Ger. em. 1594.)—Stem ſhrubby, downy. Leaves obovate, fleſhy, keeled, almoſt naked. Stipulas fringed with long hairs. Flowers four-cleft.—Gathered in Spain by Lœfling.—Very curious for the thick woody ſtem and branches, altogether three or four inches high, and widely ſpreading. The minute, thick, cluſtered leaves form, as it were, little balls, and are for the moſt part ſmooth, or nearly ſo, but are accompanied by ſuch very long, white, deeply-fringed ſtipulas, that each tuft has the appearance of being hairy. The *flowers* we have not examined, but Linnæus deſcribes them four-cleft.

6. *H. polygonoides.* Cavan. Ic. v. 2. 27. t. 131. (Illecebrum ſuffruticoſum; Linn. Sp. Pl. 298.)—Stem ſomewhat ſhrubby, upright. Leaves ovate, acute, with a terminal briſtle, naked.—Native of riſing ground in various parts of Spain, flowering in May and June.—The figure of Cavanilles agrees with the Linnæan ſpecimen, which removes his doubts, and he has unqueſtionably done right in removing it to this genus. The *flowers* are extremely minute at the tops of the branches and from the boſoms of the upper leaves.

Theſe are all the ſpecies of *Herniaria* known to us. *H. lenticulata* of Linnæus has always been a puzzling plant to botaniſts. His original ſpecimen, undoubtedly what he intended, is no other than *Creſſa cretica,* to which the ſynonym he quotes of Buxbaum, Cent. 1. t. 28. belongs; but the *Polygonum maritimum longius radicatum noſtras,* of Dillenius in Ray's Synopſis, 161. Pluk. t. 53. f. 3, figured alſo in Petiver's Engliſh Plants, t. 10. f. 6. is moſt unqueſtionably only *Glaux maritima,* as indicated under *Herniaria glabra,* H. Brit. 272.

H. lenticulata, therefore, may be preſumed a non-entity. What *Polygonum minus lentifolium,* Bauh. Prod. 131. may be, which ſeems to have ſuggeſted to Linnæus the ſpecific name, we do not recollect that we have ever had an opportunity of aſcertaining.

HERNICI, in *Ancient Geography,* a people of Italy, of Sabine origin, eſtabliſhed in Latium. They inhabited the mountains which extended themſelves from thoſe of Præneſte to Sora. Their principal towns were Anagnia, Alatrium, Ferentum, Pitalum, Hernicum, and Verulum. Theſe people, being naturally warlike, and advantageouſly occupying theſe mountains, fought for ſome time againſt the Romans, but they afterwards ſubmitted, and were comprehended among the Latin people.

HERNOSAND, or Hernosund, in *Geography,* a ſea-port town of Sweden, in the province of Angermania, built in 1584 by John III. on an iſland in the gulf of Bothnia, ſeparated from the continent by a narrow channel, over which was thrown a bridge. On the N. ſide of the harbour, the water is of ſufficient depth for the largeſt veſſels to unload at the warehouſes. Hernoſand was formerly a ſtaple town, and ſtill carries on a conſiderable trade, particularly in linen. N. lat. 62° 38′. E. long. 17° 43′.

HERNSHAW, or Hernary, a place where herons breed.

HERO, in the *Ancient Theology,* and *Mythology,* a great and illuſtrious perſon, of mortal nature, though by the populace ſuppoſed to partake of immortality, and after his death, placed by them among the number of the gods. The word is formed of the Latin *heros,* and that of the Greek ηρως, *ſemideus, demi-god.* St. Auguſtine, De Civit. Dei, lib. x. obſerves, that it is highly probable, that ſome one of Juno's ſons was originally called by this name; that goddeſs being called in Greek Ἡρη; or it may be, that great men were diſtinguiſhed by this appellation; in alluſion to the opinion of the ancients, that virtuous perſons, after their deaths, inhabit the wide expanſe of the air, which is Juno's province. Iſidore inclines to think, that heroes were thus called *quaſi aeroes, aerei,* perſons of ſuperior merit and worthy of heaven. Plato derives the word from the Greek ερος, *love;* as intimating the heroes to have riſen from the copulation of a god with a mortal woman; or of a goddeſs with a man. Others derive the name from the Greek ειρειν, *dicere, to ſpeak;* the heroes being perſons who, by their eloquence, led the people at their pleaſure. Others, laſtly, derive it from the Greek ερα, *terra, earth;* the heroes, on their principle, being the *dii terreſtres,* or *gods of the earth.*

Heroes were, properly, perſons partly of divine, and partly of human extraction; being produced between the deity and a mortal; as Achilles, who was the ſon of the goddeſs Thetis, by Peleus; and Hercules, who was the ſon of Jupiter, by Alcmena.

A hero, then, coincides with what we otherwiſe call a *demi-god;* accordingly, Lucian defines a hero to be a medium between a god and a man; or rather, a compoſition of both.

The Greeks erected columns and other monuments over the tombs of their heroes, and eſtabliſhed a kind of worſhip in honour of the manes both of their heroes and heroines. The Romans alſo raiſed ſtatues in honour of their heroes; but there were ſix of their heroes of a ſuperior order, and who were ſuppoſed to be admitted into the community of the twelve great gods; theſe were Hercules, Bacchus, Eſculapius, Romulus, Caſtor, and Pollux. Writers have diſtinguiſhed between the worſhip which the ancients paid to their heroes, and that offered to their gods. The latter, it is ſaid, conſiſted of ſacrifices and libations; the former was only a kind of funeral honour, in which they celebrated their exploits, concluding the rehearſal with feaſts.

Hero is alſo uſed in a more extenſive ſenſe, for a great, illuſtrious, and extraordinary perſonage; particularly in reſpect of valour, courage, intrepidity, and other military virtues.

F. Bohours makes this diſtinction between a great man and a hero, that the latter is more daring, fierce, and enterpriſing; and the former more prudent, thoughtful, and reſerved.

ſerved. In this ſenſe we properly ſay, Alexander was a hero, Julius Cæſar a great man.

Hero *of a poem,* or *romance,* is the principal perſonage, or he who has the chief part in it.

Thus the hero of the Iliad is Achilles; of the Odyſſey, Ulyſſes; of the Æneid, Æneas; of the Pharſalia of Lucan, Pompey; of Taſſo's Jeruſalem, Godfrey of Bulloign, or, as Blair thinks, Rinaldo, copied in part after Homer's Achilles; of the Luſiad of Camoens, Vaſco; of Milton's Paradiſe Loſt, Adam; though Mr. Dryden will have the devil to be Milton's hero, becauſe he gets the better of Adam, and drives him out of Paradiſe.

The character of Achilles is the inexorable wrath of a haughty, valiant, unjuſt, and revengeful prince. Homer has been blamed for making his hero of too brutal and unamiable a character. But injuſtice, ſays Blair, is commonly done to Achilles, upon the credit of two lines of Horace, who has certainly overloaded his character:

> "Impiger, iracundus, inexorabilis, acer,
> Jura neget ſibi nata; nihil non arroget armis."

Although Achilles is paſſionate to a great degree, he is far from being a contemner of laws and juſtice. Beſides his wonderful bravery and contempt of death, he has ſeveral other qualities of a hero. He is open and ſincere, he loves his ſubjects, and reſpects the gods. He is diſtinguiſhed by ſtrong friendſhips and attachments; he is, throughout, high-ſpirited, gallant, and honourable; and allowing for a degree of ferocity which belonged to the times, and enters into the characters of moſt of Homer's heroes, he is, upon the whole, abundantly fitted to raiſe high admiration, though not pure eſteem. (See Iliad.) The character of Ulyſſes, is the wiſe and prudent diſſimulation of a courageous king, whoſe conſtancy nothing could ſhake. (See Odyssey.) The character of Æneas is piety, goodneſs, gentleneſs, good nature, and humanity, ſuſtained, like the others, with an invincible courage.

Many of the critics find fault with the hero of the Æneid; they ſay he is too ſenſible and delicate; and wants the fire, firmneſs, and uncontrolable ſpirit, remarkable in the hero of the Iliad. Piety, tenderneſs, and ſubmiſſion to the gods, are the virtues of the middle claſs of mankind; they do not ſtrike and command enough for a hero, who is to be the inſtrument of ſuch notable exploits. St. Evremond looks on Æneas as fitter to have been the founder of a religious order than of an empire. F. Boſſu defends Virgil's hero, or at leaſt Virgil, with admirable addreſs. Æneas's character, he obſerves, was not to be formed on the model, either of Achilles, or Ulyſſes, nor to be of the ſame kind with them; as the fable and the deſign of the Æneid was very different from thoſe of the Iliad and Odyſſey.

What Virgil had in view was, in the opinion of this author, to make the Romans receive a new kind of government, and a new maſter; this maſter, then, muſt have all the qualities requiſite for the founder of a ſtate, and all the virtues which make a prince beloved. The violence of Achilles was, of conſequence, precluded; and ſo was the diſſimulation of Ulyſſes; that being a quality which renders a man ſuſpected, not beloved.

Virgil was reſtrained in his choice; his hero was to be of the genius of Auguſtus; and the poet was in the condition of a painter, who is obliged to accommodate a piece of hiſtory to the model of a face that is given him. But that the Æneid bears conſtant reference to the character and reign of Auguſtus, though it be an opinion maintained by ſome critics, has been denied by others. (See Æneid.) The character of Homer's two heroes, as being directly oppoſite to his deſign, he has thrown upon Turnus and Mezentius, who are the counterparts to his hero.

It is diſputed among the critics, whether it be neceſſarily required, that the hero of an epic poem be a good and virtuous man? F. Boſſu maintains the negative; between a hero in morality, and a hero in poetry, the ſame diſtinction is to be made, as between moral and poetical goodneſs. Hence as the manners of Achilles and Mezentius are poetically as good as thoſe of Ulyſſes and Æneas, ſo thoſe two cruel and unjuſt men are as regular poetical heroes, as theſe two juſt, wiſe, and good men.

Ariſtotle, indeed, repreſents the heroic virtue, as a virtue more than human: and of conſequence, heroes, as divine perſons, whom the excellency of their nature raiſes above our claſs; but this he ſays only in his books of morality: in his Poetics he ſpeaks another language. The prime perſon of a poem, whom he calls the hero, he there obſerves, muſt neither be good nor bad, but between both: he muſt not be either ſuperior to the generality of mankind, by his virtue and juſtice; nor inferior to them, by his crimes and wickedneſs: the moral and epic heroes, therefore, even on Ariſtotle's principles, have nothing in common with each other; the one muſt be raiſed above mankind, and the other muſt not be on a level with the moſt perfect of men.

In effect, reaſon, the nature of the poem, which is to be a fable, the practice of Homer, and the rules of Ariſtotle and Horace, all agree that ſo far is it from being neceſſary that the hero of an epopea be a perfect, faultleſs man, that it is not neceſſary he be an honeſt man: and that it is no ways irregular to make him as perfidious as Ixion, as unnatural as Medea, or as brutal as Achilles.

It is another ſubject of controverſy among the critics, whether the cataſtrophe or concluſion of the action, is neceſſarily to leave the hero happy, and at eaſe; or whether it be allowable to leave him unhappy?

The general practice of the heroic poets ſtands for the firſt. We have ſcarce an example of a hero who is overcome, and remains unhappy; excepting Adam in Milton. In tragedy, the caſe is different: unhappy cataſtrophes, according to Ariſtotle, are preferable to happy ones, and were always much better received among the ancients. The tragic ſcene is the throne of the paſſions; and terror and pity are there to rule in a peculiar manner: now theſe paſſions ariſe the moſt naturally from unhappy events: and the audience, quitting the theatre full of the misfortunes wherewith the piece was cloſed, preſerve their concern much longer, and feel more forcible effects from it, than if their tears had been wiped away, and their ſighs ſmothered, in the ſatisfaction of a more happy peripetia.

But theſe reaſons have no place in the epopea; which is not intended ſo much to affect the paſſions, as to remove ill habitudes. But it is true, withal, that the epopea does not exclude all unhappy concluſions; the nature of epic fable is ſuch as admits equally of good and bad perſons for the prime parts; the unhappy adventure of a lamb unjuſtly devoured by a wolf, is a ſubject every way as inſtructive, and as regular, as the generoſity of a lion, who lets himſelf be diſarmed of his rage by the innocence of the lamb.

It is true, if the poet propoſed his hero as a pattern of perfection for imitation, the misfortunes falling on him would ſuit very ill with the deſign: but this was, doubtleſs, the fartheſt thing from the intentions of the great maſters of the epopea above-mentioned. The only reaſon, perhaps, that can be given for the uniform practice of the poets in this reſpect, is, that an epic poem containing an action of much more extent than that of a tragic poem, the reader would not be ſo well ſatisfied, if, after ſo many labours and difficulties as the hero is brought to ſtruggle with, he ſhould not at laſt be brought off, but periſh miſerably. There is ſomething, no doubt, great and good in the hero, which in the courſe of the poem, make us concerned for him; ſo that, after ſo long an acquaintance, we cannot leave him miſerable without ſome anxiety: which is not the final buſineſs of the poet to raiſe. See Epic *poem*.

Hero, in *Biography*. There were two celebrated mathematicians of antiquity of this name, who are uſually diſtinguiſhed by the epithets, Hero the *elder*, and Hero the *younger*. The firſt was a native of Alexandria, and the diſciple of Cteſias, who flouriſhed in the reigns of Ptolemy Philadelphus, and Euergetes I. He was diſtinguiſhed by his great ſkill in mechanics, and particularly in the conſtruction of machinery; as a moraliſt he was inclined to the tenets of Epicurus. He was author of a treatiſe "De Conſtructione et Menſura Manubaliſtæ," of which a fragment was publiſhed in Greek by Bernardino Baldi: "De Telis conficiendis jaculandiſque Liber," publiſhed with notes by Baldi: "Spiralia," publiſhed in 1575 by Frederic Commandine; and "De Automatorum Fabrica." Theſe are all to be found in the Grand Louvre edition of the "Ancient Mathematicians." The younger Hero is ſuppoſed to have flouriſhed under the reign of the emperor Heraclius. He was author of "De Machinis Bellicis:" "Geodœſia:" "Liber de Obſidione Repellenda et Toleranda;" and "De Vocabulis Geometricis et Stereometricis." Moreri.

Hero, *North*, in *Geography*, an iſland in lake Champlain, which is a townſhip annexed to Chittenden county, in Vermont, 13 miles long and 2 broad, and contained, in 1790, 125 inhabitants.

Hero, *South*, an iſland in the ſame lake, belonging to the ſame county, which is a townſhip and port of entry, and contains 678 inhabitants; it is 14 miles long, and 3½ broad The Heros are ſurrounded by ſeveral ſmall iſles. This iſland produces good crops of wheat and other grain. In it is a quarry of blueiſh grey marble, which has the appearance of being a petrifaction of ſcollops, a ſpecies of ſhell abounding in the vicinity of the lake, together with the common earth of the ſhore, which is of a marley ſubſtance. South Hero was divided, in 1798, into two townſhips, the ſouthernmoſt retaining its original name, and the northernmoſt that of "Middle Hero," and containing 621 inhabitants.

Hero, in *Fabulous Hiſtory*, a prieſteſs of Venus, who lived at Abydus, in a tower ſituated on the banks of the Helleſpont. Her lover Leander, who lived at Seſtus, on the other ſide of the ſtrait, at the oblique diſtance of 30 ſtadia, ſwam over every night to viſit her, guided by a light fixed on the tower. But in a ſtormy night the light was extinguiſhed, and the youth miſſing his way, was drowned; upon which Hero threw herſelf into the ſea and periſhed. This improbable tale is expoſed by M Mahudel, but is defended on the authority of poets and medals by M. de la Nauze. Acad. des Inſcript. tom. vii. Hiſt. p. 74. Mem. 240.

HEROD, in *Biography*, ſurnamed the *Great*, king of the Jews, ſecond ſon of Antipater the Idumæan, was born in the year before Chriſt, 71. At the age of 25 he was made by his father governor of Galilee, and diſtinguiſhed himſelf by the ſuppreſſion of a band of robbers, with the execution of their leader Hezekiah, and ſeveral of his comrades. As he had performed this act of heroiſm by his own authority, and had executed the culprits without the form of trial, he was ſummoned before the Sanhedrim, but through the ſtrength of his party and zeal of his friends, he eſcaped any cenſure. In the civil war between the republican and Cæſarian parties, Herod joined Caſſius, and was made governor of Cœleſyria, and when Mark Antony arrived victorious in Syria, Herod and his brother found means to ingratiate themſelves with him, and were appointed as tetrarchs in Judea, but in a ſhort time an invaſion of Antigonus, who was aided by the Jews, obliged Herod to make his eſcape from Jeruſalem, and retire firſt to Idumæa, and then to Egypt. He at length arrived at Rome, and obtained the crown of Judea upon occaſion of a difference between the two branches of the Aſmodean family. Hyrcanus had been for a conſiderable time prince and high prieſt of the Jewiſh nation; but whilſt the Roman empire was in an unſettled ſtate, after the death of Julius Cæſar, Antigonus, ſon of Ariſtobulus, brother of Hyrcanus, made himſelf maſter of the city and all Judea. In this ſtate Herod found things when he came to Rome, and the moſt that he then aimed at was to obtain the kingdom for Ariſtobulus, his wife's brother, but the ſenate of Rome, moved by the recommendations of Mark Antony, conferred the kingdom of Judea upon Herod himſelf. Having met with this unexpected ſucceſs at Rome, he returned without delay to Judea, and in about three years got poſſeſſion of the whole country. He had, however, to fight his way to the throne, which, as we have ſeen, was in the poſſeſſion of Antigonus; though aided by the Roman army, he was obliged to lay ſiege to Jeruſalem, which held out for ſix months, when it was carried by aſſault, and a vaſt ſlaughter was made of the inhabitants, till the interceſſion and bribes of Herod put an end to it. Antigonus was taken priſoner and put to death, which opened the way to Herod's quiet poſſeſſion of the kingdom. His firſt cares were to repleniſh his coffers, and to repreſs the faction ſtill attached to the Aſmodean race, and which regarded him as an uſurper. He was guilty of many extortions and cruelties in the purſuit of theſe objects. Shortly after this an accuſation was lodged againſt Herod before Mark Antony by Cleopatra, who had been influenced to the deed by his mother-in-law Alexandra. He was ſummoned to anſwer to the charges exhibited againſt him before the triumvir, and on this occaſion he gave a moſt remarkable diſplay of the conflict of oppoſite paſſions in a ferocious heart. Doatingly fond of his wife Mariamne, and not being able to bear the thought of her falling into the hands of another, he exacted a ſolemn promiſe from Joſeph, whom he appointed to govern in his abſence, that ſhould the accuſation prove fatal to him, he would put the queen to death. Joſeph diſcloſed the ſecret to Mariamne, who, abhorring ſuch a ſavage proof of his love, from that moment conceived the deepeſt and moſt ſettled averſion to her huſband. Herod, by great pecuniary ſacrifices, made his peace with Antony, and returned in high credit. Some hints were thrown out reſpecting Joſeph's familiarity with Mariamne during his abſence; he communicated his ſuſpicions to his wife, who, recriminating, upbraided him with his cruel order concerning her. His rage was unbounded; he put Joſeph to death for communicating the ſecret entruſted to him alone, and he threw his mother-in-law, Alexandra, into priſon. Soon after this he received a viſit from Cleopatra, who is ſaid to have entertained amorous inclinations with regard to him. Theſe Herod diſappointed, but glutted her avarice with profuſe donations. In the war between Antony and Octavius, Herod raiſed an army for the purpoſe of joining the former, but he was obliged firſt to engage Malchus, king of Arabia, whom he defeated and obliged to ſue for peace. After the battle of Actium his great object was to make terms with the conqueror, and, as a preliminary ſtep, he put to death Hyrcan, the only ſurviving male of the Aſmodeans; and having ſecured his family he embarked for Rhodes, where Auguſtus at that time was. He appeared before the maſter of the Roman world in all the regal ornaments, excepting his diadem, and with a noble confidence related the faithful ſervices he had performed for his benefactor Antony, concluding that he was ready to transfer the ſame gratitude to a new patron, from whom he ſhould hold his crown and kingdom. Auguſtus was ſtruck with the magnanimity of the defence, and replaced the diadem on the head of Herod, who remained the moſt favoured of the tributary ſovereigns. When the emperor afterwards travelled through Syria, in his way to and from Egypt, he was entertained with the utmoſt magnificence by Herod, in recompence for which he reſtored to him all his revenues and dominions, and even conſiderably augmented them. His good fortune, as a prince, was poiſoned by domeſtic broils, and eſpecially by the inſuperable averſion of Mariamne; whom at length he brought to trial, convicted, and executed. She ſubmitted to her fate with all the intripidity of innocence, and was ſufficiently avenged by the remorſe of her huſband, who ſeems never after to have enjoyed a tranquil hour. In the way to her execution ſhe was accoſted by her vile mother Alexandra, who, to make her peace with the tyrant, accuſed her own daughter, at the moment when conſolation, rather than unkind uſage, might have been looked for, of ingratitude to an affectionate huſband, and exclaiming, that ſhe juſtly merited her fate. Mariamne, in return, expreſſed only emotions of pity for a mother who could ſo miſbehave herſelf, and ſhe met the fatal blow without even changing colour. "She died," ſays the learned Prideaux, "as ſhe lived, great, firm, and fearleſs, to the laſt. Thus ended the life of this virtuous and excellent princeſs. In the beauty and other charms and graces of her perſon, ſhe excelled all the women of her time, and would have been a lady without exception, could ſhe have carried it with ſome better temper and compliance towards her huſband; but conſidering that he had built his fortune upon the ruins of her family, that he had uſurped from them the crown which he wore, that he had cauſed her father, her grandfather, her brother, and her uncle, to be put to death, for the ſerving of his deſigns, and had twice ordered her death in caſe of his own, it would put difficulties upon the moſt patient and beſt tempered woman in the world, how to bear ſuch a huſband with any affection or complaiſance." His rage being quenched, Herod endeavoured to baniſh the memory of his evil acts from his mind by ſcenes of diſſipation, but the charms of his once loved Mariamne haunted him wherever he went: he would frequently call aloud upon her name, and inſiſt upon his attendants bringing her into his preſence, as if willing to forget that ſhe was no longer among the living. At times he would fly from the ſight of men, and on his return from ſolitude, which was ill ſuited to a mind conſcious of the moſt ferocious deeds, he became more brutal than ever, and in fits of fury ſpared neither foes nor friends. Alexandra, whoſe malignity towards her daughter has been noticed, was an unpitied victim to his rage. At length he recovered ſome portion of ſelf-poſſeſſion, and employed himſelf in projects of regal magnificence. He built at Jeruſalem a ſtately theatre and amphitheatre, in which he celebrated games in honour of Auguſtus, to the great diſpleaſure of the zealous Jews, who diſcovered Gentile profanation in the theatrical ornaments and ſpectacles. Nothing, it is ſaid, gave them ſo much offence as ſome trophies which he had ſet round his theatre in honour of Auguſtus, and in commemoration of his victories, but which the Jews regarded as images devoted to the purpoſes of idol worſhip. For this and other acts of the king a moſt ſerious conſpiracy was formed againſt him, which he fortunately for himſelf diſcovered, and he exerciſed the moſt brutal revenge on all the parties concerned in it. He next built Samaria, which he named Sebaſte, and adorned it with the moſt ſumptuous edifices, and for his ſecurity he built ſeveral fortreſſes throughout the whole of Judea, of which the principal was called Cæſarea, in honour of the emperor. In his own palace, near the temple of Jeruſalem, he laviſhed the moſt coſtly materials and curious workmanſhip, and his palace Herodion, at ſome miles diſtance from the capital, by the beauty of its ſituation and other apropriate advantages, drew around it the population of a conſiderable city. To ſupply the place of his loſt Mariamne he married a new wife of the ſame name, the beautiful daughter of a prieſt, whom he raiſed to the high rank of the ſupreme pontificate. He ſent his two ſons, by the firſt Mariamne, to be educated at Rome, and ſo ingratiated himſelf with Auguſtus and his miniſters, that he was appointed imperial procurator for Syria. To acquire popularity among the Jews, and to exhibit an attachment to their religion, he undertook the vaſt enterprize of rebuilding the temple of Jeruſalem, which he finiſhed in a noble ſtyle of magnificence in about a year and a half. During the progreſs of this work he viſited Rome, and brought back his ſons, who had attained to man's eſtate. Theſe at length conſpired againſt their father's perſon and government, and were tried, convicted, and executed. Another act, deſerving of notice, performed by Herod, was the dedication of his new city of Cæſarea, at which time he diſplayed ſuch profuſe magnificence, that Auguſtus ſaid "his ſoul was too great for his kingdom." Notwithſtanding the execution of his ſons, he was ſtill the ſlave to conſpiracies from his other near relations. In the 33d year of Herod's reign, which, according to the vulgar era, was the fifth B. C., our Saviour was born. This event was followed, according to the goſpel by St. Matthew, by the maſſacre of the children at Bethlehem. It ought, however, to be obſerved, that ſome modern writers do not admit this fact as ſtanding upon undeniable teſtimony, and it is certain that Joſephus, who was no friend to Herod, makes not the ſlighteſt alluſion to it whatever; nevertheleſs the candid Lardner, after carefully examining the evidences, thinks the fact deſerving of credit. (See vol. i. Part. Credibility, p. 330—9. 8vo. edit. 1788.) About this time Antipater, returning from Rome, was arreſted by his father's orders, and charged with treaſonable practices: he was found guilty of conſpiring againſt the life of the king. This and other calamities, joined to a guilty conſcience, preying upon a broken conſtitution, threw the wretched monarch into a mortal diſeaſe, which has been repreſented by Euſebius, Joſephus, and others, as a juſt judgment of heaven on the many foul enormities and impieties of which he had been guilty. His diſorder was attended with the moſt loathſome circumſtances that can be imagined. A premature report of his death cauſed a tumult in Jeruſalem, excited by the zealots, who were impatient to demoliſh a golden eagle which he had placed over the gate of the temple. The perpetrators of this imprudent act were ſeized, and, by order of the dying king, put to death. He alſo cauſed his ſon Antipater to be ſlain in priſon, and his remains to be treated with every ſpecies of ignominy. He bequeathed his kingdom to his ſon Archelaus, with tetrarchies to his two other ſons. Herod, on his dying bed, had planned a ſcene of the moſt horrible cruelty that could be deviſed, and which was to take place at the inſtant of his own death. He had ſummoned the chief perſons among the Jews to Jericho, and cauſed them to be ſhut up in the hippodrome, or circus, and gave ſtrict orders to his ſiſter Salome to have them all maſſacred as ſoon as he ſhould have drawn his laſt breath. For this, ſaid he, will provide mourners for my funeral all over the land, and make the

Jews in every family lament my death, who would otherwiſe exhibit no ſigns of concern. Salome and her huſband Alexas choſe rather to break their oath, extorted by the tyrant, than be implicated in ſo cruel a deed: and accordingly, as ſoon as Herod was dead, they opened the doors of the circus, and permitted every one to return to his own home. Herod died in the thirty-fourth year of his reign, and the ſixty-eighth of his age. His memory has been conſigned to merited deteſtation, while his great talents, and the glories of his reign, have placed him high in the rank of ſovereigns. Joſephus, Antiq. lib. xvii. Prideaux. Lardner, Univer. Hiſt.

HEROD ANTIPAS, or the tetrarch, ſon of the preceding, by his wife Malthace, ſucceeded, at the death of his father, to the poſſeſſion of a great part of Galilee, and the countries beyond Jordan. This is the perſon alluded to by St. Luke, who ſays, ch. iii., "that when the word of God came to John in the fifteenth year of Tiberius, Herod was tetrarch of Galilee, and his brother Philip tetrarch of Iturea," that is, they were in poſſeſſion of the ſame territories and titles which were aſſigned them by their father's will and Auguſtus's decree. It was this ſame Herod, tetrarch of Galilee, to whom our Saviour was ſent by Pilate, when accuſed before him. He had married, as his firſt wife, a daughter of Aretas, an Arabian king, whom he put away, in order that he might marry Herodias, the wife of his brother Philip. This involved him in a war that was carried on to his diſadvantage full four years; it alſo, on account of the inceſtuous nature of his ſecond marriage, diſguſted his own ſubjects, and drew upon him the reproaches of John the Baptiſt, which were the occaſion of that excellent man's impriſonment. The loſs of his liberty was not deemed puniſhment ſufficient to ſatisfy the revengeful paſſions of Herodias; but ſhe laid a ſnare for the life of the Baptiſt. She inſiſted upon her daughter Salome aſking of Herod the head of John, in reward for her fine dancing, with which he had been ſo highly delighted, as to promiſe her whatever ſhe ſhould demand. John was beheaded; but the ambition of Herodias was not ſatiated. Their relation, Herod AGRIPPA, (ſee the article,) had obtained regal honours from Caligula; ſhe was deſirous of the ſame diſtinction for her huſband, and perſuaded him, much againſt his inclination, to take a journey to Rome for the purpoſe. Here, however, he was accuſed of being concerned in a conſpiracy with Sejanus, and inſtead of returning home a king, he was ſtript of his dominions, and ſent, with his wife, into exile at Lyons, where he probably died, having poſſeſſed his tetrarchy forty-three years. Joſephus, Lardner, New Teſtament.

HERODIAN, a Greek hiſtorian, who flouriſhed from the reign of Commodus to that of the third Gordian, was born at Alexandria, and employed among the officers of the Roman emperors. He wrote a hiſtory of Rome, in eight books, from the death of Marcus Aurelius to Maximinus, and he aſſerts that he had either ſeen or been perſonally acquainted with all that he relates. His ſtyle is ſimple and elegant, but he diſplays, with a capacity and penetration ſuited to his ſubject, no elevation of mind, or general erudition, and a conſiderable want of geographical knowledge. He has been accuſed of being too partial towards Maximinus, and ſevere with regard to Alexander Severus. But Mr. Gibbon paſſed a different judgment on him. "The life of Alexander," ſays he, "in the Auguſtan hiſtory, is the mere idea of a perfect prince, an awkward imitation of the Cyropedia. The account of his reign, as given by Herodian, is rational and moderate, conſiſtent with the general hiſtory of the age, and, in ſome of the moſt invidious particulars, confirmed by the deciſive fragments of Dion. Yet, from a paltry prejudice, the greater number of our modern writers abuſe Herodian, and copy the Auguſtan hiſtory." His book comprehends the hiſtory of nearly 70 years. The beſt edition of this author is "Herodiani Hiſtoria," 4to. Gr. Politiani, Lovan. 1525. This edition is mentioned by Dr. Harwood as exceedingly ſcarce, correct, and truly valuable. Politian publiſhed an elegant tranſlation of this hiſtorian, which was firſt publiſhed in a fol. volume in 1493, and is contained in the Aldine edition, Venet. The Oxford editions of 1699 and 1704, are correct and very beautiful. The moſt erudite and elaborate edition extant is that projected by Leiſner, and after his death in 1767, completed by Irſmich, Lipſ. 8vo. 1789, 1805. Gr. and Lat. 5 vols. Gibbon. Harwood. Dibdin.

HERODIANS, a ſect among the Jews, at the time of Jeſus Chriſt, mentioned by St. Matthew, xxii. 16. and St. Mark, iii. 6. viii. 15, and xii. 13. but paſſed over in ſilence both by Joſephus and Philo.

The critics and commentators on the New Teſtament are very much divided with regard to the Herodians; ſome making them to be a political party, and others a religious ſect. The former opinion is favoured by the author of the Syriac verſion, who calls them the domeſtics of Herod, and alſo by Joſephus's having paſſed them over in ſilence, though he profeſſes to give an account of the ſeveral religious ſects of the Jews. The latter opinion is countenanced by our Lord's caution againſt the leaven of Herod, which implies, that the Herodians were diſtinguiſhed from the other Jews by ſome doctrinal tenets. Mr. Baſnage ſuppoſes, that one thing meant by the leaven of the Herodians might be a conformity to Roman cuſtoms in ſome points which were forbidden the Jews: if this was the caſe, it is not ſtrange that they are not particularly mentioned by Joſephus among the Jewiſh ſects.

St. Jerom, in his Dialogue againſt the Luciferians, takes the name to have been given to ſuch as owned Herod for the Meſſiah: and Tertullian, Epiphanius, Chryſoſtom, and Theophylact, among the ancients; and Grotius, and other moderns, are of the ſame ſentiment. But the ſame St. Jerom, in his comment on St. Matthew, treats this opinion as ridiculous; and indeed it muſt be highly improbable, whether we underſtand it of Herod the Great, who died ſoon after our Saviour was born, or of Herod Antipas, who reigned at the time of his perſonal miniſtry; ſince they were not native Iſraelites; and it cannot be well ſuppoſed, that any Jews were ſo ignorant as to take a foreigner for the Meſſiah, who had been ſo expreſsly promiſed them to be raiſed up among themſelves, of the tribe of Judah, and of the houſe of David. The wicked and odious adminiſtration, and alſo the death of Herod the Great, muſt have convinced the moſt ſtupid of their miſtake; as they perceived that he had been very far from accompliſhing the deliverance of Iſrael from all oppreſſion, which they expected from the Meſſiah. And as for the ſecond Herod, his dominions were ſmall, and his power little, in compariſon with the former; Judea being reduced into the form of a Roman province, ſo that he was little more than the procurator of Galilee, with merely the title of king. It is altogether inconceivable that any ſhould take him for the Meſſiah. St. Jerom maintains, that the Phariſees gave this appellation, by way of deriſion, to Herod's ſoldiers, who paid tribute to the Romans; agreeably to which the Syriac interpreters render the word by the *domeſtics of Herod*: *i. e.* his courtiers.

M. Simon, in his notes on the twenty-ſecond chapter of Matthew, advances a more probable opinion. The name

Herodian he imagines to have been given to ſuch as adhered to Herod's party and intereſt, and were for preſerving the government in his family; about which there were, at that time, great diviſions among the Jews.

F. Hardouin will have the Herodians and Sadducees to have been the ſame: nor is it at all improbable, that the Herodians were chiefly of the ſect of the Sadducees; ſince that which is called by St. Mark (viii. 15.) the leaven of Herod, is by St. Matthew (xvi. 6.) ſtyled the leaven of the Sadducees.

Mr. Baſnage, and ſome others, ſuppoſe that they were certain officers of Herod, tetrarch of Galilee, who came up to Jeruſalem at the feaſts, and who were more devoted to the intereſts of the emperor than ſome of the Jews; and, therefore, the Phariſees perſuaded ſome of them to go along with their own diſciples, when they ſent them to our Saviour with the queſtion concerning the lawfulneſs of tribute. The learned Albert Fabricius ſuppoſed, that they were the courtiers and ſoldiers of Herod Antipas, tetrarch of Galilee; and that the name Herodians no more denotes a ſect, than Cæſareans and Pompeians, or any ſuch like name, would do.

Dr. Prideaux is of opinion that they derived their name from Herod the Great, and that they were diſtinguiſhed from the other Jews by their concurrence with Herod's ſcheme of ſubjecting himſelf and his dominions to the Romans, and likewiſe by complying with many of their heathen uſages and cuſtoms.

In their zeal for the Roman authority they were diametrically oppoſite to the Phariſees, who eſteemed it unlawful to ſubmit, or pay taxes, to the Roman emperor; an opinion which they grounded on their being forbidden by the law to ſet a ſtranger over them, who was not one of their own nation, as their king. The conjunction of the Herodians, therefore, with the Phariſees againſt Chriſt, is a memorable proof of the keenneſs of their reſentment and malice againſt him; eſpecially, when we conſider that they united together in propoſing to him an enſnaring queſtion, on a ſubject which was the ground of their mutual diſſenſion; namely, whether it was lawful to pay tribute to Cæſar? And provided he anſwered in the negative, the Herodians would accuſe him of treaſon againſt the ſtate; and ſhould he reply in the affirmative, the Phariſees were as ready to excite the people againſt him, as an enemy to their civil liberties and privileges. Herod had introduced ſeveral heathen idolatrous uſages; for, as Joſephus ſays, (Antiq. lib. xv.) he built a temple to Cæſar, near the head of the river Jordan; he erected a magnificent theatre at Jeruſalem, inſtituted Pagan games, and placed a golden eagle over the gate of the temple of Jehovah (De Bell. Jud. l. i. c. 33.): and as Joſephus elſewhere ſays, (Antiq. l. xv. c. 9.) he furniſhed the temples, which he reared in ſeveral places out of Judea, with images for idolatrous worſhip, in order to ingratiate himſelf with the emperor and the people of Rome; though to the Jews he pretended that he did it againſt his will, and in obedience to the imperial command. The Herodians probably complied with, acquieſced in, or approved theſe idolatrous uſages. This ſymbolizing with idolatry upon views of intereſt and worldly policy, was probably that leaven of Herod, againſt which our Saviour cautioned his diſciples. Prid. Conn. part ii. book v. ſub fin.

HERODICUS, in *Biography*, an ancient phyſician, chiefly celebrated as the inventor of what has been called the gymnaſtic medicine, is ſaid by Plutarch to have been a native of Selymbria, a city of Thrace; but ſome aſſert that he was born in Sicily. He was maſter of a ſchool of exerciſe, or *gymnaſium*, to which the youth reſorted for the purpoſes of learning the military and athletic exerciſes, and obſerving the great improvement of the health connected with them, he turned his attention to the invention of exerciſes for the cure of diſeaſes. Galen conſiders Eſculapius as the author of the gymnaſtic medicine, becauſe he preſcribed the exerciſe of riding on horſeback, and directed certain modes of it for invalids: but Herodicus appears to have been more ſyſtematic in his methods; and deſiſted from teaching the military exerciſes, in order to devote himſelf excluſively to the gymnaſtic medicine, and to aſcertain the regulations of it moſt conducive to its proper end, according to the difference of age, conſtitution, and diſorder of the patient, and to the climate, ſeaſon, &c. Theſe precepts likewiſe included regulations relative to diet and abſtinence; but as the works of Herodicus are loſt, the nature of theſe regulations and precepts is not accurately known. Hippocrates, indeed, has given an opinion reſpecting the practice of Herodicus, which is not very complimentary to his ſkill, "Herodicus," he ſays, "pretending to counteract the fatigue occaſioned by diſeaſe by a fatigue of a different nature, ſometimes brought on inflammations, and ſometimes pains in the ſide, &c. in his patients, and rendered them pale and thin." Plato has alſo ſpoken of Herodicus and his ſyſtem in a ſimilar manner. After ſtating, in one paſſage, that "Herodicus, being of a ſickly habit of body, combined gymnaſtics with medicine, and haraſſed, firſt himſelf, and afterwards many others by the immoderate uſe of exerciſe;" (De Republica, lib. iii.) he expatiates, in another place, upon the dangers and inconveniencies of this plan of treatment, and ſhews to what an abſurd extreme it was often carried by its inventor. To one of his patients, for example, Herodicus preſcribed a pedeſtrian excurſion from Athens to Megara, a diſtance of 180 ſtadia, or upwards of twenty Engliſh miles, but with this expreſs injunction, that when he reached the walls of Megara he ſhould ſtraightway return to Athens. (Plat. Phædr.) In many caſes, however, Hippocrates reſorted to the gymnaſtic medicine; and ſucceeding phyſicians, among whom were Diocles, Praxagoras, Eraſiſtratus, Aſclepiades, &c. have treated of it in a manner which evinces the eſtimation in which it was held by the ancients. Le Clerc. Hiſt. de la Medecine, liv. ii. cap. 8. See Exercise.

HERODORUS, the trumpeter of Megara, who, according to Athenæus, had the power of animating the troops of Demetrius ſo much, by ſounding two trumpets at a time, during the ſiege of Argos, as to enable them to move a machine towards the ramparts, which they had in vain attempted to do for ſeveral days before, on account of its enormous weight. Now the whole miraculous part of this exploit may ſafely be conſtrued into a ſignal given by the muſician to the ſoldiers for working in concert at the battering ram, or other military engines; for want of which ſignal, in former attempts, their efforts had never been united, and conſequently were ineffectual.

The ſame writer informs us, that Herodorus was victor in the whole circle of ſacred games, having been crowned at the Olympian, Pythian, Nemean, and Iſthmian, by turns.

Theſe performers on the trumpet appear to have been heralds and public cryers; who not only gave the ſignals at the games for the combatants to engage, and announced their ſucceſs, but proclaimed peace and war, and ſounded ſignals of ſacrifice and ſilence, at religious ceremonies.

As Herodorus is allowed to have been cotemporary with Demetrius Poliorcetes, he may be placed about the 120 Olymp. 300 B. C. According to the authors already cited, he was as remarkable for his gigantic figure and enormous appetite, as for the ſtrength of his lungs, which were ſo powerful in blowing the trumpet, that he could not be heard with ſafety unleſs at a great diſtance.

HERODOTUS, the oldeſt of all the Greek hiſtorians whoſe works are extant, and who is called by Cicero "The Father of Hiſtory," was born at Halicarnaſſus, in Caria, in the firſt year of the ſeventy-fourth Olympiad, anſwering to the year 484 B. C. He fled to Samos when his country laboured under the oppreſſions and tyranny exerciſed by Lygdamis, and travelled, in the acquiſition of knowledge, over Greece, Egypt, and Italy, collecting every where all the information he could obtain concerning the hiſtory and origin of nations. He is ſuppoſed to have retired to the iſle of Samos for the compoſition of his work; he afterwards re-viſited his native place, and was chiefly inſtrumental in overthrowing the tyrannical government, a deed, which of itſelf alone ought to have immortalized his name, but ſo far from gaining the eſteem and admiration of the people, it diſpleaſed and irritated them, and Herodotus was obliged to fly from Greece to avoid public reſentment. When he had attained to his thirty-ninth year, a generous deſire of fame led him publicly to recite his hiſtory to the people aſſembled at the Olympic games. It was received with univerſal applauſe, and gave him a laſting celebrity through all the Grecian ſtates. So highly was the hiſtory eſteemed by his contemporaries, that the names of the nine muſes were given unanimouſly to the nine books of which it is compoſed. This celebrated compoſition is written in the Ionic dialect, and Herodotus is among hiſtorians, what Homer is among poets, and Demoſthenes among the orators. His hiſtory comprehends a period of 240 years, from Cyrus the Great to Xerxes, or, if we date its commencement about 713 years B. C. and its termination at the year 479 B. C. it includes a period of about 234 years, and it contains, beſides the tranſactions between Perſia and Greece, a ſketch of the affairs of other nations, as the Lydians, Ionians, Lycians, Egyptians, and Macedonians. Herodotus had written a hiſtory of Aſſyria and Arabia, which is loſt. The life of Homer, generally attributed to him, is ſuppoſed by ſome able critics not to have been written by his pen. Herodotus, as an hiſtorian, is generally thought to be too fond of the marvellous. Many fabulous things are inſerted in his hiſtory, though not without ſufficient intimations of his own diſbelief, or ſuſpicion of them. And it is an argument greatly in favour of this ancient writer, that his chronology requires leſs correction, according to Newton's canons, than that of any ſubſequent Greek hiſtorians. The greateſt inconvenience attending the peruſal of his hiſtory reſults from his method, which is the moſt irregular and diſcurſive that can be conceived; ſome entire hiſtories being introduced, as it were, by way of parentheſis in the bodies of others. Notwithſtanding all his faults, he is a moſt pleaſing writer. The two beſt editions of this work are that of Weſſeling, fol. Amſterdam, 1763, which is now become ſcarce and dear, and that of Glaſgow in 9 vols. 12mo. 1761. The editio princeps is that of Aldus, Venet. fol. 1502, Græc. which, in the opinion of Weſſeling, is very faithful and accurate. It has been tranſlated into moſt modern languages; the Engliſh verſions are thoſe by Littlebury and Beloe. "The ſtyle of Herodotus," ſays one of his biographers, "has always been admired for its flowing eaſe and ſweetneſs. Cicero compared its courſe to that of the waters of a ſtill river. It excels chiefly in narration, and wants force and conciſeneſs for ſentiment and remark. With reſpect to the matter of this hiſtorian, it has been the ſubject of diſcuſſion almoſt ever ſince the firſt appearance of his work, ſome have placed great confidence in his authority, and others regarded him altogether as fabulous. It is certain that he relates many things reſpecting remote times and countries which have all the air of fable; but there is reaſon to believe, according to his own aſſertions, that he gives the narrations as he heard them. With reſpect to thoſe great tranſactions which took place in Greece after his own birth, he is generally thought to be deſerving of credit, and the publication of his work, at a general aſſembly of the nation, is conſidered as a voucher for his veracity. Nevertheleſs, he has been ſuſpected of partiality in particular inſtances, and Plutarch has compoſed an expreſs treatiſe "On the Malignity of Herodotus," in which he taxes him with injuſtice towards the Thebans and Corinthians, and, indeed, towards the Greeks in general. Juvenal alſo alludes to him in his "Velificatus Athos et quicquid Græcia mendax Audet in Hiſtoria." Still his work is juſtly accounted one of the moſt precious relics of antiquity." Gibbon. Lempriere. Gen. Biog. Moreri.

HEROIC, ſomething belonging to a hero or heroine.

Thus we ſay, heroic actions, heroic virtue, heroic ſtyle, heroic verſe, heroic poet, heroic age, &c.

Heroic *Age* is that age or period of the world, wherein the heroes, or thoſe called by the poets the *children of the gods*, are ſuppoſed to have lived.

The heroic age coincides with the fabulous age. See Age.

Heroic *Poem* is that which undertakes to deſcribe ſome extraordinary action, or enterpriſe.

Homer, Virgil, Statius, Lucan, Taſſo, Camoens, Milton, and Voltaire, have compoſed heroic poems.

In this ſenſe, heroic poem coincides with epic poem. See Epic *Poem* and Hero.

Heroic *Verſe* is that wherein heroic poems are uſually compoſed; or, it is that proper for ſuch poems. In the Greek and Latin, hexameter verſes are peculiarly denominated heroic verſes, as being alone uſed by Homer, Virgil, &c. Alexandrine verſes of twelve ſyllables were formerly called heroic verſes, as being ſuppoſed the only verſes proper for heroic poetry; but later writers uſe verſes of ten ſyllables.

HEROINE, Heroina, or *Herois*, a woman that has the qualities and virtue of a hero, or that has done ſome heroic action.

HERON, in *Geography*, a town of France, in the department of the Ourte, and chief place of a canton, in the diſtrict of Huy. The place contains 698, and the canton 7654 inhabitants, on a territory of 137½ kiliometres, in 19 communes.

Heron, in *Ornithology*, a tribe, family, or genus of the Grallæ order, being variouſly applied by different authorities. In a general ſenſe the term heron includes the whole of the ardea genus, the character of which conſiſts in having the bill ſtraight, pointed, long, ſub-compreſſed, with a furrow from the noſtrils towards the tip; and the noſtrils linear; tongue ſharp; feet four-toed and cleft; and the toes connected at the baſe. Theſe are divided by Gmelin into four families, the firſt compriſing thoſe with the head creſted, and the bill hardly longer than the head; the ſecond have the head bald, and are the grues or cranes; the third have the orbits naked, and are the ſtorks; and the laſt, which is by far the moſt extenſive family, comprehends the herons, or thoſe birds of the ardea tribe which have the middle toe ſerrated.

The French adopt the word heron in the ſame manner; they conſider it as including the whole of the ardea genus, which they divide into four families; the *hérons*, properly ſo called, *heron-butors*, *bihoreaux*, and *crabiers*. Their true herons compriſe the *aigrettes*, a family diſtinguiſhed by having a very large tuft of fine pendent feathers ariſing from the poſterior part of the body, beneath the tail; but is not confined to that family, as Buffon applies the ſame term to moſt of the ardea genus. The family of butor, or as ſome French authors denominate them *heron-butors*, are the bitterns, which differ from the herons in having the body thicker, the legs not ſo long, and the tail ſhorter. Thoſe of the *bihoreaux* family are leſs than the bitterns, their tail ſhorter, and have two or three long appendices placed in the nape of the neck, which ſufficiently diſtinguiſh them from the other families; the bill in theſe is ſlightly arched above. The *crabiers* form a ſubaltern family, including thoſe of a ſmall ſize, and hence are ſometimes called the little herons; it is chiefly from their diminutiveneſs they have obtained this appellation.

The manners of the heron tribe are well known; they frequent the fens, and other watery places; and feed on fiſhes, reptiles, and the ſmaller kinds of quadrupeds. They are diſtributed by Gmelin in the following order.

Species.

* *Creſted; Bill hardly longer than the Head.*

PAVONIA. Creſt briſtly, erect, temples with two naked wattles. Gmel. *Pavo marinus*, Cluſ. *Balearica*, Aldr. *Balearic crane*, Ray. *Crowned heron.*

Length two feet nine inches. This ſpecies feeds on worms and vegetables; runs and flies well, and ſleeps on one leg. It inhabits Africa and Guinea.

VIRGO. Behind each eye a tuft of long, white, pendent feathers. Gmel. *Numidian crane*, Albin. *Demoiſelle heron.*

Native of Africa and Aſia. An elegant bird, about three feet three inches in height, with the bill yellowiſh, the baſe greeniſh, and the tip red; the head and primary quill-feathers are black, the latter long and pendulous; creſt pendent backward over the eyes; and the head, neck, throat, breaſt, and legs black.

** *Cranes.* See GRUES.

*** *Storks. Orbits naked.*

CICONIA. White; orbits and quill-feathers black; bill, legs, and ſkin red. Linn. &c. *La cicogne blanche*, Briſſ. *White ſtork*, Ray. Donov. Br. Birds, &c.

A general inhabitant of Europe, Aſia, and Africa; feeds on reptiles and fiſh, and is held ſacred in many countries for its great utility in deſtroying ſerpents; it migrates at particular ſeaſons from one part to another in vaſt flocks, and in the moſt orderly manner. The female makes a large neſt compoſed of ſticks, and lays three or four eggs of a dirty yellowiſh white colour, in ſize like thoſe of the gooſe, but rather more elongated. The ſtork ſleeps on one leg, and ſnaps with its bill in a very ſingular manner, in doing which the head is turned back, and the upper part of the bill placed on the rump. The fleſh of the ſtork is indifferent, and this, in addition to the benefits derived from its inveterate animoſity towards the reptile race, may in ſome meaſure account for its being allowed to live and even breed unmoleſted in the moſt populous eaſtern cities; the ſame veneration is alſo ſhewn for the ſtork in Holland. In England it is a rare bird, and ſeen only in ſevere winters. The height of this ſpecies is about three feet three inches.

MAGUARI. White; orbits and legs red; bill cinereous; upper part of the tail, and greater wing-coverts, quill-feathers, and ſcapulars black. Gmel. *Le maguari*, Buff. *La cigogne d'Amerique*, Briſſ. *Ciconia Americana*, *American ſtork*, Ray.

Size of the laſt, and inhabits the Brazils, and other warm parts of America.

NIGRA. Brown; breaſt and belly white. Linn. *La cicogne brune*, Briſſ. *Black ſtork*, Ray.

Length two feet nine inches, and inhabits many parts of Europe, but is leſs common than the white ſtork, and migrates to the ſouth in autumn; its haunts are thick foreſts and marſhes in the moſt ſecluded ſituations. Like the white ſtork it feeds on fiſh and reptiles, and the fleſh is equally unpalatable.

*** *Herons, middle Claw ſerrated inwardly.*

DUBIA. Glaucous, beneath dirty-white; bill a little triangular. Gmel. *Argill* or *hargill*, Ives. *Boorong cambing, or Booring-volar*, Marſd. *Gigantic crane*, Lath.

The extraordinary magnitude of this bird renders it the moſt conſpicuous of the heron genus, the tribe to which it appears at leaſt the neareſt allied, if we can form a correct opinion from the deſcriptions Marſden, Ives, and other authors afford us. The height of this bird, when ſtanding erect, is about ſeven feet and a half, and the expanſion from tip to tip of the wing above fourteen feet; the bill is ſixteen inches round at the baſe, of various colours, and nearly triangular; the feathers of the back very ſtrong and of an iron colour; thoſe of the breaſt long; over the belly a great deal of down of a dirty white; the legs and half the thighs naked; and the naked parts full three feet in length. This monſter, as Mr. Ives terms it, inhabits Bengal, and is alſo found at Calcutta, at which latter place it is called hargill, or argill. It ſtalks, he ſays, majeſtically along before one, and appears at firſt like a naked Indian. The common opinion is, that the ſouls of the Bramins poſſeſs theſe birds. On opening one of theſe, a terapin, or land tortoiſe, ten inches long, was found in its craw, and a male black cat was found entire in its ſtomach.

A gigantic bird of this kind, and ſuppoſed to be of the ſame ſpecies, is mentioned by Mr. Smeathman as an inhabitant of Africa; he deſcribes the height of an adult bird, when ſtanding erect, at about ſeven feet; the plumage, according to this writer, agrees with the deſcription of the argill given by Mr. Ives; to which is added that the gape is monſtrouſly wide; the head covered with white down, thinly diſperſed, appearing not unlike a grey-headed man; on the middle of the neck before, a long conic membrane, like a bladder, ſprinkled very thinly with ſhort down riſing or falling as the animal moves the beak, and always appearing inflated. Theſe birds are met with in companies; and when ſeen at a diſtance, near the mouths of rivers, coming towards an obſerver, which they do with their wings extended, may be miſtaken for canoes upon the ſurface of a ſmooth ſea; or, if walking on the ſands, for human beings. One of theſe, a young bird about five feet in height, was brought up tame, and preſented to the chief of the Bananas, where Mr. Smeathman lived; and being accuſtomed to be fed in the great hall, ſoon became familiar, duly attending that place at dinner-time, placing itſelf behind its maſter's chair frequently before any of the gueſts entered. The ſervants were obliged to watch it narrowly, and to defend the proviſions with ſwitches in their hands; but notwithſtanding this, it would frequently ſnatch off ſome part of the proviſions, and was once known to have purloined a whole boiled fowl, which it ſwallowed in an inſtant. Its courage is not equal to its voracity; for a child of eight or ten years old could ſoon put it to flight with a ſwitch; though at firſt it ſeems to ſtand on its defence by threatening with its enormous bill, widely extended, and crying out with a loud hoarſe voice, like a bear or tiger. It is an enemy to ſmall quadrupeds as well as birds and reptiles, and deſtroys fowls and chickens, though it dare not attack a hen with her young openly; it preys alſo on rats, young chickens, and the like, and has been known to ſwallow a cat whole; a ſhin bone of beef being broken aſunder, ſerved it but for two morſels. The individual above-mentioned uſed to fly about the iſland, and rooſt very high among the ſilk cotton trees; from whence, at two or three yards diſtance, it could ſpy the ſervants carrying the dinner acroſs the yard; when darting from its ſtation it would enter promiſcuouſly with the women who carried in the diſhes. In ſitting it was obſerved to reſt itſelf upon the whole length of the hind part of the leg. It ſometimes ſtood near for half an hour after dinner, with the head turning alternately; as if liſtening to the converſation; and during this time would every three or four minutes mute firſt on one leg, and then on the other; obſerving invariably, that if he had muted on the left leg laſt, he would be ſure to do the ſame on the right the next time, never making any miſtake.

TORQUATA. Hind head black, creſted; back brown; neck and belly dirty white; breaſt black; with yellowiſh lunules. Gmel. *Wreathed heron.*

Native of South America.

NYCTICORAX. Creſt on the hind head white, horizontal, and conſiſting of three feathers; back black; abdomen yellowiſh, Scop. male. *Ardea griſea.* Head ſmooth, brown; belly browniſh, beneath white; firſt quill-feathers with a white ſpot at the tip. Linn. female. *Ardea varia,* Klein. *Nitticorace,* Cetti. *Le Bihoreau,* Buff. *Night heron,* Ray. Donov. Br. Birds, &c.

The length of this elegant ſpecies is about twenty inches, the male being about the ſame ſize as the female. The bill is ſtout, about three inches and three quarters long, the baſe yellow, and the extremity black. The prevailing colour of the plumage in the male is grey above, beneath pure white; the head, as far as the middle of the back, dark gloſſy green; the creſt of three long diſtinct pendent feathers; and the legs greeniſh. In the female, (which Linnæus conſidered a different ſpecies,) the crown is brown, and without creſt; the body grey-brown; the neck beneath with a ruſty line; lores white; tail feathers edged with white, and the legs brown. The ſpecies is an inhabitant of ſome parts of Europe and America. "It is recorded by Dr. Latham, and later writers, as a native of Britain, upon the authority of an individual example of the male bird ſhot near London in the month of May 1782, and which at this time is in our poſſeſſion." Donov. Br. Birds.—The Germans call it Nachtrab, or Night Raven; and the Ruſſians Kwaka, from its cry, which reſembles that word uncouthly expreſſed.

JAMAICENSIS. Brown, beneath white; head ſomewhat creſted; breaſt and belly with browniſh ſtreaks. Gmel. *Jamaica night heron,* Lath.

About the ſize of the laſt, or ſcarcely larger; the bill duſky; lores and orbits greeniſh; chin and vent white; primary quill-feathers black at the tip; legs brown. This kind is known by the name of the Clucking Hen in the Weſt Indies, where, contrary to the uſual manners of the heron tribe, it frequents woods. In Ind. Orn. (Lath.) it is conſidered, not, perhaps, diſtinct from the female of the former.

CALEDONICA. Ferruginous, beneath white; creſt on the hind head of three feathers; frontlet black; eye-brows white. Gmel. *Caledonian white heron,* Lath. Cook's Voyage, &c.

Native of New South Wales. Length twenty-two inches; bill ſtraight and black; creſt feathers white; area of the eyes green; legs yellow.

OBSCURA. Creſt on the hind head one feather; body above greeniſh, beneath cheſnut, longitudinally ſtriped, with white and ferruginous; quill feathers with a white ſpot at the tip. It. Poſeg. *Duſky heron.*

Size of the common bittern; the bill recurved, greeniſh-black; feathers of the creſt white; front, crown, and nape duſky cheſnut; back and wing-coverts duſky cheſnut and golden green; legs ſhort and greeniſh. Inhabits Sclavonia.

CAYANENSIS. Cinereous; head black; crown white; creſt unequal, of ſix feathers, half white, the remainder black. Gmel. *Le bihoreau de Cayenne,* Buff. *Cayenne night heron,* Lath.

Length twenty-one inches; the bill black; lores pale-green; a white line from the noſtrils beneath the eyes to the hind head; body blueiſh-aſh; quill-feathers black; legs yellowiſh and long, the thighs bare high up. This ſpecies inhabits Cayenne.

PURPUREA. Hind head black; creſt pendent, of two long feathers; body olive; beneath purpliſh. Gmel. *Ardea criſtata, purpuraſcens,* Briſſ. *Heron pourpré,* Buff. *Creſted purple heron,* Lath.

Rather leſs than the common heron; the length two feet ten inches and a half; bill ſix inches long, brown, with a duſky point, and yellowiſh beneath; head furniſhed with a black creſt; orbits naked, and yellowiſh; chin white; upper half of the neck rufous, with three black lines diſpoſed longitudinally, the colour behind olive, at the ſides rufous, and in front reddiſh; from the breaſt in the middle, to the vent a black band; lower tail-coverts white varied with rufous, and tipped with black; angles of the wings rufous; quill-feathers dark; tail cinereous olive; legs greeniſh with duſky claws. This ſpecies inhabits Aſia, frequenting the lakes of the Caſpian and Black ſeas, and thoſe of Great Tartary, but is not found farther eaſt in Siberia than the river Irtiſh.

PURPURATA. Head without creſt, and with the neck blackiſh cinereous; body above purple-cheſnut, beneath cinereous. *Ardea purpurata,* Gmel. *A. purpuraſcens,* Briſſ. *Heron pourpré,* Buff. *Purple heron,* Lath.

Size of the common heron. The upper mandible yellowiſh-green, lower yellowiſh; face naked and yellowiſh; neck lineated above with black; quill-feathers blackiſh-brown; legs brown. Inhabits the banks of the Danube. Some late ornithologiſts, according with Buffon, believe this to be the female of the former; others are perſuaded it is ſpecifically different.

CASPICA. Creſted; body cinereous; neck, breaſt, and belly ferruginous; chin white; neck with three black lines. Lath. Ind. Orn. *Ardea caſpica,* Gmel. Reiſe. *Ardea ritula,* Lath. Suppl. *African heron.*

This beautiful ſpecies is the ſize of the common heron; the length being nearly three feet; the bill ſeven inches long, of a yellowiſh colour, with the tip black; the creſt long, and conſiſting of three feathers; the legs are dull yellow, with the anterior part of the toes, together with the claws, black.—"A bird of this very rare kind was ſhot ſome years ago in Aſhdown park, near Lambourn, Berks; and it is on the authority of this ſpecimen the ſpecies is arranged among the birds of this country. The ſpecimen is deſcribed by Dr. Latham in the ſupplement of his Ornithology, under the ſpecific name of ritula, and afterwards in his "Index Ornithologicus," with the obſervation "rariſſima in Anglia," under that of Caſpica. The original bird depoſited formerly in the Leverian collection, is now in the muſeum of the author." Vide Donov. Br. Birds. Whether this be really a diſtinct ſpecies from the former (ardea purpurea), or only a variety, admits of ſome diſpute. Dr. Latham, in the lateſt of the works laſt mentioned, deſcribes it a diſtinct bird, with a ſuggeſtion of doubt, "vix a præcedente ſatis diſtincta. Nonne avis annotina?" Monſ. Viellot, author of the continuation of Audebert's "Hiſtoire des Oiſeaux," without, however, appearing to have conſulted the original, offers a more poſitive opinion, and conſidered it the ſame as the purple heron; at the ſame time blaming the author beforementioned for his ſeeming contradiction, in deſcribing it as a ſpecies, while he ſtill eſteemed it only a young bird of the former kind. "L'Ornithologiſte Anglais, (ſays Viellot,) qui a décrit *le heron de la mer Caſpienne,* attribue au jeune âge les foibles différences qui exiſtent entre lui et le *heron pourpré;* cependant il le donne comme eſpèce diſtincte; mais on doit le rapporter a celle du heron pourpré." This interpretation of Dr. Latham's remarks is more abſolute than the paſſages to which he alludes will juſtify, for theſe expreſs only a moderate ſhare of doubt; nor can we refrain from adding, that from a ſubſequent attentive examination of the ſpecimen in our poſſeſſion, we are inclined to think the concluſion drawn by Viellot is erroneous, for we really conceive it to be an adult bird, and very probably a diſtinct ſpecies.

Major. Hind head with a long pendent creſt; body cinereous; line on the neck beneath, and pectoral bar black. Male.—Hind head ſmooth, black; back blueiſh, beneath whitiſh; breaſt with oblong black ſpots. Female.

Mas *Ardea major,* Linn. *Ardea criſtata,* Briſ. *Garza cinerizia groſſa,* Zinnen. *Le heron huppé,* Buff. *Creſted heron,* Alb. *Common heron* (male), Donov. Br. Birds.

Femina. *Ardea cinerea,* Linn. *Ardea rhenana,* Naturf. *Heron,* Buff. *Common heron* (female), Donov. Br. Birds.

The length of this bird is about three feet; its breadth, when the wings are expanded, above five feet; and the weight exceeding three pounds. The heron is very common in Britain, and is ſo generally diffuſed, that there is ſcarcely any part of the globe that has been viſited by travellers, in which it has not been noticed. Its haunts, like moſt of its tribe, are fenny places, where it preys on fiſhes and reptiles, and from the voracity of its appetite is highly deſtructive in fiſh-ponds. In flying the heron ſoars to a vaſt height, having the head crouched in between the ſhoulders, and the legs pendulous. During the breeding ſeaſon the herons unite in large ſocieties; the neſt is compoſed of ſticks lined with ruſhes, wool, feathers, and other light ſubſtances, and generally contains from four to ſix eggs, which are of a pale-greeniſh blue colour. The neſts of theſe birds, which they deſert in the winter, are often found drifted upon the banks of rivers at that ſeaſon of the year. In Britain the heron was formerly held in high eſtimation, its fleſh being accounted a delicacy at the tables of the nobility, and bearing a price equal to that of the pheaſant and the curlew. Heron hawking was alſo a favourite diverſion, inſomuch that laws were enacted for the preſervation of the ſpecies; and any perſon found guilty even of deſtroying their eggs, was condemned to pay the penalty of twenty ſhillings each, a heavy ſum in the times when thoſe laws were in force.

Egretta. Somewhat creſted; white; legs black; feathers of the back and breaſt lax, narrow, and very long. Gmel. *Guiratinga,* Ray. *Great egret.* Arct. Zool.

Length two feet, the creſt ſcarcely viſible; bill black, or dirty yellow, and duſky at the back and tip. A native of South America. It is a ſhy and ſolitary bird, and frequents marſhes, where it ſecretes itſelf among the reeds in the day time, and feeds at night.

Garzetta. Hind-head creſted; body white; bill black; lores and legs greeniſh, Kramer. *Ardea alba minor,* Aldr. *Garzetta,* Geſn. *Egretta,* Belon, &c. *Aigrette,* Buff. *Little egret,* Donov. Br. Birds.

The creſt of this elegant bird conſiſts of ſeveral ſhort and two longer feathers; the face is naked, and green; and the claws black. The ſpecies inhabits marſhes in temperate regions. Formerly the egret appears to have been common in Britain; at this time it is very rare. The ſize of this kind is half that of the great egret, or about twelve inches.

Leucogaster. Blueiſh-black, beneath white; creſt on the hind-head of two feathers; bill, naked face and legs yellow. Gmel. *Demi-aigrette,* Buff. *Demi-egret.*

Length not quite two feet; lower part of the back with ſome pendulous feathers, of an elongated form and rufous colour. Native of Cayenne.

Rufescens. Blackiſh grey; lores and orbits green; feathers of the head and neck, and longer narrow ones of the back ferruginous rufous, Gmel. *Aigrette rouſſe,* Buff. *Reddiſh aigrette,* Arct. Zool.

Native of Louiſiana. Length two feet; bill yellowiſh, with duſky tip; legs black.

Agami. Black-blue, beneath rufous; hind head creſted; orbits and chin white. Gmel. *Agami,* Buff. *Agami heron.*

Length two feet ſeven inches; the bill duſky; cap and creſt blue, the latter compoſed of ſix feathers; lower part of the neck and back with ſix long pendulous feathers. This ſpecies inhabits Cayenne.

Cocoi. Hind head, pendent creſt, and back cinereous; neck beneath ſpotted with black; ſides of the head black. Gmel. *Ardea cayanenſis criſtata,* Briſſ. *Ardea ſecunda,* Tetr. *Cocoi,* Marcgr. *Blue heron,* Albin. *Cocoi heron.*

Inhabits Brazil and Cayenne. The length of this bird is three feet; the bill greeniſh-yellow; body cinereous; creſt five inches and a half long; cheeks, chin, and crown white; neck and back with very long pendulous feathers. This ſpecies is ſaid to be fat and tolerably good eating in the rainy ſeaſon.

Johanna. Above cinereous, beneath white; pendent creſt, and quill-feathers black; feathers of the throat long, lax, and ſpotted with black. Gmel. *Johanna heron,* Lath.

Size uncertain; the bill yellowiſh; face naked, yellowiſh-green; legs browniſh. Deſcribed by Dr. Latham from ſome Chineſe drawings formerly in the poſſeſſion of Dr. Fothergill.

Fusca. Creſt blackiſh; body blackiſh-brown, beneath white; breaſt with long brown ſpots. Lath. *Le heron brun,* Buff.

Length two feet and a half; the bill brown; legs yellow. The ſpecies inhabits Cayenne.

Hoactli. Creſted; head and body above black; beneath white; face naked and yellowiſh; front between the eyes white; wings and tail cinereous. Gmel. *Ardea mexicana criſtata,* Briſſ. *Hocti,* Buff. *Hoactli,* or *Dry bird,* Ray. *Hoacton,* Will. *Dry heron,* Lath. *Hoactli heron.*

Inhabits Mexico, where it frequents lakes, and breeds among the ruſhes. The Spaniards call it *Martinete Peſcador,* as it is imagined from its catching fiſh; its voice is loud and flat, the bite hard. It is a large bird, being three feet three inches long: the bill black with the ſides yellow. The plumage of the female differs from the male in being brown mixed with whitiſh above; beneath white tinged with brown.

Hohu. Head purple and creſted; body cinereous; angles of the wing-coverts white; front varied black and white; wing-coverts blue and cinereous. Gmel. *Ardea mexicana cinerea,* Briſſ. *Xoxouhqui hoactli,* Ray. *Houhou,* Buff. *Hohou heron.*

A rare ſpecies, ſometimes found in the fens of Mexico. Buffon calls it houhou from its cry reſembling the pronunciation of that word. The bill is black; legs variegated with brown, black and yellowiſh; creſt purple and compoſed of ſeven feathers.

INDICA. Varied with brown and green; ſecondary quill-feathers green; tail black; wing-coverts, primary quill-feathers and body beneath white. Lath. *Lohaujung heron.*

Length three feet; the bill black; legs fleſh-colour; crown, neck, and poſterior part of the back with green ſpots. Sometimes the back white. An Indian ſpecies.

FLAVICOLLIS. Creſt on the hind head and body black; neck yellowiſh at the ſides, in front cheſnut, the feathers edged with black and white. Lath. *Yellow-necked heron.*

Native of India; the length two feet.

NOVÆ HOLLANDIÆ. Somewhat creſted; lead-colour cinereous; beneath ferruginous rufous; face beyond the eyes, with the chin and throat, white. Lath. *White fronted heron,* Phillips.

Length twenty-eight inches; the bill black, at the baſe beneath yellowiſh; legs yellow brown. Native of New Holland.

LUDOVICIANA. Head and neck rufous; front white, ſpotted with rufous; crown creſted; wing-coverts and tail green; back cinereous, tinged with purple. Gmel. *Crabrier de la Louiſiane,* Buff. *Louiſiana heron,* Arct. Zool.

Inhabits Louiſiana; length ſixteen inches; bill duſky; legs yellow; claws black.

VIOLACEA. Hind head pale yellow; creſt white; body ſtreaked black and white; beneath blueiſh; legs pale yellow. Gmel. *Ardea cærulea,* Rai. *Cancrophagus bahamenſis,* Briſſ. *Crabrier gris-de-fer,* Buff. *Grey creſted gaulding,* Brown. *Creſted bittern,* Cateſby. *Yellow-crowned heron,* Arct. Zool.

Length fifteen inches and a half; the bill black; face naked and green; creſt in general about ſix inches long; head violet: from the angle of the mouth each ſide to the hind head a white ſtreak; quill-feathers blueiſh-brown; tail brown. This ſpecies inhabits the Bahama iſlands, where it breeds in the buſhes among the rocks, and being conſidered good eating, the birds are caught in great numbers for the table; in the rainy ſeaſon they viſit Carolina.

CÆRULEA. Hind head creſted; body blue. Gmel. *Cancrophagus cæruleus,* Briſſ. *Black* or *blue gaulding,* Ray. *Blue bittern,* Cateſby. *Blue heron,* Arct. Zool.

Size of the crow; in the male the bill and lores are blue, and the legs green; in the female the head and neck are duſky purple; chin and middle of the throat white; and the back lead-colour, It is found in Carolina during ſpring after paſſing the winter in Jamaica, and other Weſt Indian iſlands; the ſpecies extends to Otaheite and other iſlands in the South Seas, where the inhabitants treat it with reſpect. Another variety inhabits Queen Charlotte's ſound, where it is called Matook; the head of this is ſomewhat creſted, blue-green, and the chin and throat white; the length eighteen inches. There are other ſuppoſed varieties, the moſt diſtinct of which has the plumage varied with brown, yellow, and cinereous; the colour above ſteel black, beneath white; wings and tail greeniſh. This laſt kind inhabits South America.

CÆRULESCENS. Creſted; body duſky blue; head and neck rufous brown; hind part of the head with two long feathers. Lath. *Le crabier bleu a cou brun,* Buff. *Heron bleuatre de Cayenne,* ib. *Blueiſh heron.*

Conſidered by ſome a variety of the former; the length nineteen inches; bill pale yellow; lores red; legs brown. Native of Cayenne.

RUBIGINOSA. Ferruginous, beneath whitiſh with black ſtreaks; head ſomewhat creſted; chin white; back with a few black ſpots. Lath. *Ruſty crowned heron,* Arct. Zool.

Size of the common bittern; the bill ſlender; irides and legs yellow; front and quill-feathers duſky; throat with four black ſtreaks; feathers of the breaſt long and looſe; from the breaſt to the upper part of the neck a black line; tail ſhort and lead-coloured. Native of North America.

HERODIAS. Hind-head creſted; body brown; thighs rufous; breaſt with oblong black ſpots. Gmel. *Ardea virginiana criſtata,* Briſſ. *Larger creſted heron,* Cateſby. *Great heron,* Arct. Zool.

Inhabits the lakes and rivers of Virginia, and feeds on lizards, frogs, and fiſhes; the bill brown; face yellowiſh; creſt and quill-feathers black; neck and breaſt rufous. Length five feet.

HUDSONIAS. Crown creſted and black; body browniſh, beneath whitiſh; neck ſpotted with reddiſh black. Gmel. *Ardea freti Hudſonis,* Briſſ. *Heron de la Baye de Hudſon,* Buff. *Aſh-coloured heron from North America,* Edw. *Red ſhouldered heron,* Arct. Zool.

Suppoſed by ſome writers to be the female of the laſt ſpecies. Frequents North America from New York to Hudſon's bay, and reſorts to the inland lakes of the latter during ſummer.

COMATA. Ferruginous, beneath white; hind head with a long, white, pendent creſt, edged with black. Pallas. *Cancrophagus luteus,* Briſſ. *Guacco,* Buff. *Crabrier de Mahon,* Buff. *Squacco,* Ray.

Native of Aſia and Europe, and has been once ſhot in England. (Linn. Tranſ.) There are ſeveral varieties of this ſpecies.

ERYTHROCEPHALA. Hind head with a red pendent creſt; body white. Molina.

Inhabits Chili.

CYANOCEPHALA. Hind head creſted, and with the back blue; wings black, edged with white. Molina. *Blue-headed heron.*

Native of Chili; the bill black; belly yellowiſh green; tail green; legs yellow.

THULA. Hind head creſted, and with the reſt of the body white. Molina. *Thula heron.*

Found in Chili.

CANDIDISSIMA. Snowy-white; bill and legs blackiſh; eyes and toes yellow; creſt very long, and ſhading the hind head, neck, breaſt, and back. Jacquin. *Snowy heron.*

Inhabits near Carthagena in America; ſize leſs than the common bittern.

CASTANEA. Cheſnut, beneath white; face and eyebrows green; pouched chin and rump white; head creſted. Gmel. *Ardea ralloides,* Scop. *Cheſnut heron.*

Length twenty inches; the bill livid at the baſe and brown at the tip; ſides of the head yellowiſh; neck yellowiſh-bay, beneath varied yellow and whitiſh; quill and tail-feathers ſnowy; wing-coverts ochrey; legs ſaffron; claws black. Inhabits near the Tanais, extending thence from the Black ſea and Arabia. It builds in trees, and is by ſome conſidered as a variety, or perhaps a ſexual difference of the ſquacco heron, Ardea comata.

SQUAJOTTA. Bay; creſt on the head black, the middle feathers white; ſcapulars long, narrow, and white at the baſe. Gmel. *Cancrophagus,* Briſſ. *Crabrier caiot,* Buff. *Squajotta,* Ray.

Native of Italy, about Bologna, where it is called ſquajotta; the length is 18 inches; bill yellow, tipped with black; face yellow and naked; creſt with thirty feathers; legs green.

GALEATA. Hind-head ſomewhat creſted; body milk-white; bill pale yellow; legs ſcarlet. Molina. *Galeated heron.*

Height two feet ſeven inches; bill four inches long. A native of Chili.

FERRUGINEA. Head ſomewhat creſted; body blackiſh, the feathers ferruginous at the tips; beneath varied with ferruginous, whitiſh, brown, and cinereous. Gmel.

Native of Aſia and Europe, and is moſt frequent about the river Don in ſummer, paſſing the winter in the neighbourhood of the Black ſea. The ſpecies feeds on fiſhes and inſects, and builds on the top branches of trees. The bill is brown above; beneath reddiſh-green; face naked and green; chin pale ochre; quill-feathers black brown, at the tip white; legs greeniſh.

ERYTHROPUS. Head creſted; body cheſnut-ſaffron, beneath deeper; bill blue; legs red. Lath. *Cancroſagus rufus*, Briſſ. *Ardea hæmatopus, ſeu cirris*, Ray. *Le crabier marron*, Buff. *Red-legged heron.*

Inhabits about Bologna in Italy; the bill black; head varied with yellow and black. Size of the green heron. A ſuppoſed variety has the ſides of the neck ſpotted, and the legs pale yellowiſh.

STRIATA. Hind-head ſomewhat creſted; back hoary and ſtreaked; neck beneath ferruginous; ſecondary quill-feathers white at the tip. Gmel. *Heron of Guiana*, Bancroft. *Striated heron.*

Deſcribed by Bancroft as a native of Guiana; its ſize equal to that of the common heron; the bill ſtraight, compreſſed, and furrowed on the ſides. The ſpecies alſo inhabits Surinam; and is ſaid to be ſeen at Aſtrachan about March.

VIRESCENS. Hind head ſomewhat creſted; back ſhining green; breaſt reddiſh; lores pale yellow; tail-feathers gold-green (male). Brown gold-green, beneath whitiſh; neck reddiſh, ſtreaked with white; wing-coverts and quill-feathers ſpotted with white (female). *Ardea vireſcens*, Linn. *Cancroſagus viridis*, Briſſ. *Le crabier verd*, Buff. *Small bittern*, Cateſby. *Green bittern.*

Size of the common hen, the length 18 inches; bill greeniſh brown; legs greeniſh. It inhabits New York and other pars of North America, extending thence to the iſlands in the Weſt Indian ſeas. The ſpecies is ſuppoſed to breed in Carolina, where it is found only in the ſummer. It feeds on fiſhes of the ſmaller ſize, and alſo on reptiles and crabs; and, in alluſion to the latter, is ſometimes called the crab-catcher.

They differ a little in ſize, and there appear to be two or three very diſtinct varieties. One of theſe, *le crabier de Cayenne* of Buffon, has the plumage cinereous; the head creſted; anterior part of the neck white, with rufous ſtreaks; wing-coverts greeniſh, edged with rufous; and the crown and tail black. Its ſize and habits like the former. Another, called by Klein Ardea fuſca, and by Latham the brown bittern, is rather larger, being 20 inches in length; the general plumage is brown, beneath paler; the wings dotted with white; and the quill and tail-feathers blueiſh-aſh.

BOTAURUS. Head creſted, body cinereous brown above, beneath rufous; crown black; chin and throat white, ſtriated with black and reddiſh. *Ardea botaurus*, Gmel. *Botaurus major*, Briſſ. *Ardea ſtellaris major, ſeu rubra*, Ray. *Grand butor*, Buff. *Greater bittern*, Lath.

Native of Italy. The length three feet nine inches. The lores and naked orbits yellowiſh; feathers of the head and neck long and flowing.

STELLARIS. Head rather ſmooth; body above teſtaceous, with tranverſe ſpots, beneath pale, with oblong brown ſpots. Linn. *Ardea ſtellaris minor*, Bell. *Botaurus*, Briſſ. *Butor*, Buff. *Bittour* or *bittern*, Ray, &c. *Common bittern*, Donov. Br. Birds.

Rather leſs than the common heron; the bill brown, beneath inclining to green; the plumage ferruginous yellow, very beautifully variegated with numerous bars, ſtreaks, and zig-zag lines of black; the legs pale green; claws long and ſlender. The bittern is an inhabitant of the temperate parts of Europe, Aſia, and America, migrating northerly in the ſummer, but in ſome countries, as in Britain, remaining throughout the year. Its haunts are fens and marſhy places, where it conceals itſelf among the reeds in the day time. About ſunſet it quits its hiding-place, and commences its flight, ſoaring, with a prodigious noiſe, to a vaſt height, in a ſpiral direction. The food of the bittern conſiſts principally of fiſhes, reptiles, and the ſmaller kind of quadrupeds, particularly mice; and in general it ſwallows its prey entire. It builds its neſt in April among the reeds; the female lays four or five eggs of a pale greeniſh aſh-colour; and the young are hatched in 25 days. The fleſh was formerly eſteemed equally with that of the pheaſant. A ſmaller bird of this kind occurs in Hudſon's bay, the bill of which is longer, and the colour of the plumage in general darker. The natives, by whom it is conſidered delicious, call it *Makohoſue.*

SOLONNIENSIS. Crown black; head ſmooth, and, with the neck, ferruginous; body above blackiſh, beneath reddiſh Gmel. *Botaurus rufus*, Briſſ. *Butor roux*, Buff. *Rufous bittern.*

Native of Italy; the bill blackiſh, beneath horny; wing-coverts varied with ferruginous and white; greater quill-feathers blackiſh, leſſer ferruginous; legs brown. Leſs than the common bittern.

MARSIGLI. Rufous ſtreaked with brown; head ſmooth, throat white; quill-feathers browniſh with duſky bars; tail whitiſh. Gmel. *Botaurus minor*, Briſſ. *Petit butor*, Buff. *Swabian bittern.*

Rather ſmaller than the laſt, and inhabits the Danube.

DANUBIALIS. Brown, with black and reddiſh lines; head ſmooth; lores naked, yellow; throat and breaſt whitiſh. Gmel. *Botaurus ſtriatus*, Briſſ. *Butor brunrayé*, Buff. *Rayed bittern.*

Size of the laſt, and inhabits the ſame places; the bill is brown, beneath yellowiſh; and the legs and claws grey.

BRASILIENSIS. Head ſmooth; body blackiſh, dotted with yellow; quill and tail-feathers, with the bill and legs, blackiſh. Gmel. *Ardea Braſilienſis*, Briſſ. *Soco*, Marcgr. *Onoré des bois*, Buff. *Clucking hen*, Brown. *Braſilian bittern*, Brown.

Native of Brazil; the length two feet three inches; head and neck brown, with a few black ſpots; throat white, with black and brown longitudinal ſpots.

UNDULATA. Reddiſh-grey; cap black; body above with black waves, beneath with angular ſtreaks. Gmel. *Petit butor de Cayenne*, Buff. *Zig-zag bittern*, Lath.

Length 13 inches; the bill brown; lores blueiſh; neck tumid; legs yellow. Native of Cayenne.

TIGRINA. Head ſmooth; crown and tail black, with white bands; body black, ſpotted above with rufous, beneath with pale ochre; chin and vent white. Gmel. *Onoré*, Buff. *Heron tigré*, Fermin. *Tiger bittern*, Lath.

Native of South America; length two feet and a half; the bill greeniſh; chin and ſides of the neck reddiſh with black ſpots; tail with four bands; legs green. This ſpecies is not very unfrequent; it lays ſeven or eight rounded eggs, of a whitiſh colour ſpotted with green, on the ground, without making a neſt. Like the common bittern it frequents marſhes, and ſecretes itſelf among the reeds in the day-time.

Lineata. Head ſmooth; bill and lores blue; wings and tail black; body above waved with rufous, yellowiſh, and brown lines; beneath dirty white. Gmel. *Onoré raye,* Buff. *Lineated bittern,* Lath.

Inhabits South America; the length two feet and a quarter; head and neck rufous, with numerous brown lines croſſing each other; on the anterior part of the neck a white line, each ſide edged with black ſpots; legs yellow. This ſpecies frequents the banks of rivers, where it preys on fiſhes and reptiles. It is ſaid, like the common bittern, to make a vigorous defence when wounded, and to ſtrike its enemy with advantage, eſpecially aiming at the eyes. One of theſe kept tame, as is related, was of ſingular utility in deſtroying rats, watching them with all the attention of the houſe-cat, and even with better ſucceſs.

Flava. Streaked; above brown, beneath white; head and neck reddiſh; tail-feathers with tranſverſe white ſtreaks. Gmel. *Butor jaune du Breſil,* Buff. *Braſilian bittern, with a ſerrated bill,* Will. *Yellow bittern.*

Size of a duck, the length two feet three inches; bill ſerrated near the tip, brown, and at the baſe greeniſh; irides golden; feathers of the belly edged with yellow; tail lineated with white; legs duſky-grey. The ſpecies inhabits Braſil, and is eſteemed good eating

Bononiensis Black; collar white; legs with two ſpots on the yellow bill black. Gmel. *Ardea nigra torquata,* Briſſ. *Ardeæ congener,* Raj. *Collared heron.*

Size of the curlew; inhabits Bononia.

Alba. Head ſmooth; body white; bill tawny; legs black. Linn. *Ardea alba,* Geſn. *Ardea alba major,* Marſd. *Great white gaulding,* Sloane. *Great white heron.*

Length three feet ſix inches; the bill ſix inches long; irides yellowiſh; and lores green. Plumage in general white. Inhabits Europe, Aſia, and America.

Pileata. Hind-head creſted; body white; crown black. Lath. *Le heron blanc à calotte noire.* Buff. *Ardea braſilienſis candida,* Briſſ. *Black creſted white heron.*

Size of the laſt, and inhabits marſhes in Guiana; the bill brown; legs pale yellow; lores grey green. This is a rare ſpecies.

Nivea. Head ſmooth; bill and legs black; body ſnowy; feathers of the neck and back flowing. Gmel. *Snowy heron.*

Builds in high trees in Aſia; found about the river Don in ſummer, and paſſing the winter near the Black ſea. The bird, called by Gmelin Ardea xanthedactylos, is ſuppoſed to be a variety. The ſize of theſe herons is about two feet, the male rather exceeding the female; the feathers on the neck and breaſt are rather ſhorter.

Helias. Head ferruginous; body above black, waved with tranſverſe ferruginous lines; beneath whitiſh; quill and tail-feathers with ferruginous bars. Pallas. *Petit paon des roſeaux de Cayenne,* Rozier. *Oiſeau du ſoleil,* Fermin. *Caurale ou petit paon des roſes,* Buff. *Caurale ſnipe.*

Length ſixteen inches; the bill blackiſh; tongue very narrow and grooved; head and beginning of the neck black with white ſtreaks; rump with tranſverſe lines of white; the ſeven tail-coverts with a large ſpot each at the tip; tail blackiſh, ſtreaked with white, and two ferruginous bands. This curious ſpecies lives on fiſhes and inſects, inhabits the marſhes of South America, and expands the tail like a peacock.

Sacra. Head ſmooth; body white; inner wing-coverts and tail-feathers with black lines; dorſal feathers jagged and white. Lath. *Sacred heron.*

Inhabits Otaheite and the neighbouring iſles, where it is held ſacred. The length is about two feet three inches; the general colour of the plumage white; the bill four inches long and browniſh. On the middle of the crown a few duſky feathers; the legs pale yellow. A ſuppoſed variety of this bird has the crown white, the body variegated white and black; dorſal feathers jagged and black, and the legs black.

Atra. Entirely black; face naked; head ſmooth. Gmel. *Ardea nigra,* Briſſ. *Héron noir,* Buff. *Black heron.*

Size of the common heron, and inhabits Sileſia.

Purpurata. Head ſmooth; crown and neck blackiſh-aſh; body above purple-bay; beneath cinereous; face naked and yellowiſh.

Spadicea. Purple-bay; wings, tail, and ſmooth head bay; crown black. Gmel. *Ardea mexicana purpuraſcens,* Briſſ. *Mexican heron.*

Length twelve inches. This kind inhabits New Spain.

Æquinoctialis. Head ſmooth; body white; two firſt quill-feathers brown on the outer edge. Gmel. *Ardea Carolinenſis candida,* Briſſ. *Crabier blanc à bec rouge,* Buff. *Little white heron.*

Native of America; length eighteen inches, the bill and lores red; irides yellow; legs green. A variety is found in Italy, the crown and breaſt of which are ſaffron; and the lores and legs pale yellowiſh. Another occurs in Mexico, the lores of which are pale yellow; the bill purple; and the legs pale purple.

Cracra. Head ſmooth; body variegated with reddiſh; above bluiſh-aſh; beneath cinereous; neck beneath and breaſt white. Gmel. *Cancrophagus Americanus,* Briſſ. *Cracra,* Buff.

Inhabits near the banks of rivers in Chili and other parts of South America. By ſome it is called cra-cra from its cry when in flight; the natives call it Jaboutra. The bill is black, beneath yellowiſh brown; orbits naked and yellowiſh; hind head and neck above brown, mixed with yellowiſh; leſſer wing-coverts green, edged with rufous, the greater and quill-feathers edged with white; legs yellowiſh.

Leucocephala. Black-violet; crown ſmooth and black; reſt of the head, neck, and vent white. Gmel. *Violet heron.*

Length thirty-three inches. Inhabits Coromandel.

Rufa. Black; head ſmooth; temples ferruginous; breaſt rufous; lower part of the neck whitiſh, with longitudinal browniſh ſpots; upper part, back, and wings brown-aſh. Scopoli. *Rufous heron.*

Native of Auſtria. Size of the common heron; from each eye to the hind head a black ſtreak; legs brown.

Sinensis. Brown with pale bars; head ſmooth; wings and tail black. Gmel. *Chineſe heron.*

A ſmall ſpecies found in China.

Virgata. Blackiſh-brown; neck beneath white; throat ſtreaked with black; wing-coverts ſtreaked with yellowiſh, Gmel. *Streaked heron,* Arct. Zool.

Length ſeventeen inches; legs greeniſh. Inhabits North America.

Variegata. Ferruginous ſpotted with brown, beneath paler; front black; chin white. Scopoli. *Variegated heron.*

The thighs in this ſpecies are rufous, the legs brown. Size uncertain.

Cana. Cinereous; neck brown-aſh; belly, cheeks, and chin white. Gmel. *Aſh-coloured heron,* Arct. Zool.

Length twenty-five inches; the bill black; feathers of the flanks long and broad; legs yellowiſh.

CARUNCULATA. Back, wings, legs, and crown black-blue; ſmooth head, and neck white; body beneath black; bill and chin carunculated. Lath. *Wattled heron.*

Size of the common ſtork, and inhabits Africa. This ſpecies is not common; the bill is black, with a red baſe; orbits naked and red; irides reddiſh; and the two wattles hanging from the chin covered with white feathers.

MALACCENSIS. Brown; beneath, wings, and tail white; ſmooth head, and neck ſtreaked with brown and white; face naked and cinereous. Gmel. *Crabier de Malac*, Buff.

Length nineteen inches; the bill black, with the baſe at the ſides yellow; feathers of the head and neck long, narrow and looſe; legs yellow. Native of Malacca.

CINNAMOMEA. Cinnamon colour; head ſmooth; chin and vent white; throat ſtreaked with brown; a white ſtripe on each ſide the chin. Gmel. *Cinnamon heron.*

Native of China.

PUMILA. Smooth head and neck, varied with yellowiſh, cheſnut, and white; body above cheſnut, beneath whitiſh; tail ſnowy. Lepechin. *Dwarf heron.*

Length nineteen inches; the upper mandible black, with a yellowiſh edge; lower pale ochre with yellowiſh baſe; face ochre; chin, and band reaching as far as the breaſt white; rump ſnowy; legs dirty-aſh. Found about the Caſpian ſea.

BADIA. Cheſnut, beneath whitiſh, with a longitudinal ſnowy ſtripe down the middle; quill-feathers black; wing-coverts blueiſh. Gmel. *Cancrophagus caſtaneus*, Briſſ. *Crabier roux*, Buff. *Cheſnut heron.*

Size of a crow; the bill brown, irides yellowiſh; tail cheſnut, and legs red. The ſpecies builds in trees, and inhabits Sileſia.

PHILIPPENSIS. Beneath white; ſmooth crown, and neck above reddiſh-brown; back with tranſverſe brown and rufous lines; wings and tail black; throat reddiſh dirty white. Gmel. *Cancrophagus Phillippenſis*, Briſſ. *Petit crabier*, Buff. *Philippine heron.*

Length eleven inches; the bill greeniſh-yellow; face naked and green; wings edged with reddiſh white; legs yellow. Inhabits the Philippine iſlands.

NOVÆ GUINEÆ. Black; head ſmooth; face naked and greeniſh. Gmel. *Crabier noir*, Buff. *New Guinea heron.*

Inhabits New Guinea; the length ten inches; irides yellow.

CYANOPUS. Cinereous, beneath white; head ſmooth; face blue; quill-feathers partly white, partly black. Gmel. *Ardea Americana cinerea*, Briſſ. *Crabier cendré*, Buff. *Cinereous heron.*

Rather larger than a crow; the bill blue, with black tip; wing-coverts cinereous mixed with black; legs blueiſh.

MACULATA. Brown; neck above, and upper part of the back, ſpotted with white; head ſmooth; lores naked and greeniſh. Gmel. *Botaurus nævius*, Briſſ. *Butor tacheté ou Pouacre*, Buff. *Schwarzer Reiger*, Friſch. *Spotted heron.*

Inhabits the fens of Europe; the length about eighteen inches; bill black; beneath greeniſh yellow; quill-feathers with a black ſpot at the tip; legs greeniſh-brown.

GARDENI. Brown; head ſmooth; back blackiſh: throat and breaſt whitiſh, ſpotted with brown. Gmel. *Pouacre de Cayenne*, Buff. *Gardenian heron*, Arct. Zool.

Native of Cayenne and Carolina. A bird of this kind has been once taken in England.

EXILIS. Smooth head and body above reddiſh-bay, beneath white; ſides of the neck rufous; wings and tail black. Lath.

Size of the thruſh, the length eleven inches and a half; bill greeniſh; lateral and lower feathers of the neck long and looſe; breaſt browniſh-black; middle wing-coverts ferruginous; ſome of the quill-feathers tipped with cheſnut; legs green. A rare ſpecies found in Jamaica.

MINUTA. Head ſmooth; body brown, beneath reddiſh; tail-feathers greeniſh black; lores yellowiſh (male). Body brown, edges of the feathers reddiſh, beneath reddiſh; crown, back, wings, and tail black (female). Cramer, &c. *Ardeola*, Briſſ. *Blongios de Suiſſe*, Buff. *Little bittern*, Donov. Br. Birds.

This elegant ſpecies is about fifteen inches in length, the bill yellowiſh-green; irides ſaffron, and the legs green-brown. The little bittern is a native of Aſia and Europe, and is rarely met with in Britain.

PONDICERIANA. Greyiſh-aſh; quill-feathers long and black; middle claw not ſerrated. Gmel. *Bec ouvert*, Buff. *Pondicherry heron.*

Native of India; the bill yellow, thick at the baſe, pointed at the tip, and a little bent in gaping in the middle; ſpace between the bill and eyes feathered; and the legs yellow. Length fourteen inches and a half.

COROMANDELIANA. White; back, wings, and tail black; upper mandible ſerrated from the middle to the tip. Gmel. *Bec ouvert des Indes*, Sonner. *Coromandel heron.*

Haunts marſhy places on the coaſt of Coromandel from September to November, and feeds on fiſhes and reptiles. The bill and legs are reddiſh-yellow; upper part of the head lineated with black; lores and chin naked and black; irides red; toes connected at the baſe.

SCOLOPACEA. Brown; throat and breaſt ſtreaked with white; chin and legs white; wings and tail ſhining braſſy. *Coorlan ou courliri*, Buff. *Scolopaceous heron.*

Inhabits Cayenne; the bill browniſh-red, the tip blueiſh, and bent a little in; noſtrils a ſmall narrow ſent in the furrow of the bill; orbits naked and tawny; middle toe connected at the baſe, and pectinated on the inner edge; legs whitiſh. Length twenty-five inches. Allied to the genus, Scolopax.

The heron is a very great devourer of fiſh, and does more miſchief to a pond than even an otter. People who have kept herons, have had the curioſity to number the fiſh they fed them with into a tub of water, and counting them again afterwards, it has been found that they will eat fifty moderate ſize dace and roaches in a day. It has been found that in carp ponds, viſited by this bird, one heron will eat up a thouſand ſtore carp in a year, and will hunt them ſo cloſe as to let very few eſcape. The readieſt method of deſtroying this miſchievous bird, is by fiſhing for him in the manner of pike, with a baited hook. When the haunt of the heron is found out, three or four ſmall roach or dace are to be procured, and each of them is to be baited on a wire, with a ſtrong hook at the end, entering the wire juſt under the gills, and letting it run juſt under the ſkin to the tail, the fiſh will live in this manner five or ſix days, which is a very eſſential thing; for if it be dead, the heron will not touch it. A ſtrong line is then to be prepared of ſilk and wire twiſted together, and is to be about two yards long; tie this to the wire that holds the hook, and to the other end of it there is to be tied a ſtone of about a pound weight; let three or four of theſe baits be ſunk in different ſhallow parts of the pond, and in a night or two's time, the heron will not fail of being taken by one or other of them.

When hawking was more in uſe, and laws were enacted for the preſervation of the ſpecies, the heron afforded a great deal of ſport to the people who loved that diverſion.

ſion. There is but very little art in this flight of the hawk; but as both the birds are large and courageous, the fight is finer than in the flight of ſmaller birds that make no reſiſtance. At the beginning of March the herons begin to make their paſſage; if, therefore, you will adapt your hawks to the heron, they muſt at this time be uſed to fly at the rivers and about waters; and they muſt be fed with light meats; then the hawk is to be entered at the game by getting a living heron and cutting its wings, or diſabling it in ſuch a manner that it cannot fly; then it is to be ſet on the ground and the hawk unhooded and let go at her. If the hawk ſeize the heron, the falconer muſt run to her aſſiſtance and kill the heron, giving the hawk her reward, the heart, and letting her ſtand over the opened breaſt, and feed on other parts of the entrails; then let her be hooded, and afterwards the bird is to be ſwung about the head, and the hawk taught to come and feed on it out of the falconer's hand.

When the hawk is thus fairly entered, another live heron is to be procured, and let off in an open field undiſabled. As ſoon as ſhe is riſen to a conſiderable height in the air, the hawk is to be let out after her; if the hawk cloſe with her, and bring her down, the falconer is to run up to her aſſiſtance, and ſticking the heron's bill in the ground, and breaking her wings and legs, the hawk is to be left to feed and plume upon her. When ſhe is thus well managed, ſhe may be taken to the waters, and let at a wild heron in the following manner:

When a heron is found, the falconer is to get as nigh her as he can, going under the wind with his hawk, which muſt be a gerfalcon, or jerkin, with a haggard falcon for the driver. Thus having the hoods looſe as ſoon as ever the heron is up, let off the driver, which makes up to her, and cauſes her to work in the wind; then let go the hawks that are to fly at her; but when they have worked above the heron, that they come through her, they will make her come to ſiege. When they have got her down, the falconer muſt make up to them as quick as poſſible, and aſſiſt them by breaking her legs and wings, and thruſting her bill into the ground. For this flight of the hawk there ſhould always be a dog trained up to the ſport, whoſe buſineſs it is to come up and kill the heron the moment that he ſees her fall.

If the hawk cannot bring her down, or gives over the flight, then give her a train heron or two in a proper place, before ſhe is truſted at a wild heron again, otherwiſe ſhe will be diſheartened and ſpoiled.

A heron at ſiege, is one ſtanding at the water-ſide watching for prey.

HERON *Iſland*, in *Geography*, a ſmall iſland in the gulf of Mexico, near the coaſt of Florida. N. lat. 30° 17′. W. long. 88° 8′.

HERONA, in *Ancient Geography*, a town of Dalmatia, ſituated in the interior part of the country, according to Ptolemy.

HERONE, a promontory of India, on this ſide of the Ganges, according to Arrian.

HEROOPOLIS, a town of Egypt, at the lower extremity of the Arabic gulf; and a promontory of Egypt in the ſame gulf is called "Heroopoliticum Promontorium."

HEROPHILUS, in *Biography*, a celebrated phyſician among the ancients, was probably a native of Chalcedon, on the Boſphorus, and was a diſciple of Praxagoras. Galen, indeed, has called him a Carthaginian (De Uſu Part. lib. i. cap. 8.); but in the book entiled "Introduction," which is attributed to Galen, he is ſaid to be of Chalcedon. The learned Le Clerc conſiders the epithet of Galen as a miſtake of the copyiſts, who, by the change of one letter, and the tranſpoſition of another, wrote Καρχηδόνιος for χαλκηδόνιος. Herophilus lived under Ptolemy Soter, and was contemporary with the philoſopher Diodorus, and with the celebrared phyſician Eraſiſtratus, with whoſe name his own is commonly aſſociated in the hiſtory of anatomical ſcience. (See ERASISTRATUS.) An anecdote is related by Sextus Empiricus of this great dialectician, Diodorus, who maintained, by a ſophiſm, that there was no ſuch thing as motion: if a body moves, he ſaid, it moves either in the place where it is, or where it is not; but in the place where it is, it neceſſarily remains; and in the place where it is not, it can neither act nor be acted upon; conſequently, there is no ſuch thing as motion. Herophilus ſoon had an opportunity of refuting this ſophiſm practically; for Diodorus, having diſlocated his ſhoulder, applied to Herophilus in order to have it replaced. But, ſaid the phyſician, either your limb has been diſplaced where it was, or where it was not; now, according to your own principles, neither the one nor the other could happen; conſequently, your arm has not been diſlocated. The poor philoſopher, however, deprecated both his ridicule and his dialectics, and begged that he would apply the rules of his own art to the reſtoration of the diſlocated limb. As a phyſician, Herophilus is mentioned with praiſe, both by the ancient and the early modern writers, as by Cicero, Plutarch, Pliny, &c.; the laſt of whom calls him "clarus medicinâ," and mentions him as the founder of an ingenious ſect. (Nat. Hiſt. lib. xxv. et xxvi. cap. 2.) Scribonius Largus eſteems him as one of the greateſt phyſicians; and Galen affirms, that he was as much diſtinguiſhed by his anatomical knowledge, as Cratevas and Dioſcorides by their ſkill in medicaments. Veſalius again even preferred him to Galen; and Fallopius affirmed, that his authority in anatomy was equal to that of the Goſpel;—"contradicere Herophilo in anatomicis, eſt contradicere evangelium." We have a very imperfect opportunity, however, of judging of the correctneſs of theſe praiſes, as his works are loſt.

Herophilus and Eraſiſtratus were probably the firſt who diſſected human bodies, under the permiſſion of the firſt Ptolemies, at Alexandria; although it would appear that the ſucceeding ſovereigns of that name either imbibed the prejudices of the people on that ſubject, or did not think proper to oppoſe them; for the diſſection of human bodies, even in the time of Galen, was ſcarcely permitted. Theſe two anatomiſts are ſaid to have diſſected even living men, certain criminals being awarded them for that purpoſe. (See Celſus, De Med. Præf.) Tertullian affirms, that Herophilus, whom he calls a butcher rather than a phyſician, had cut up many hundreds, although he juſtly obſerves with Celſus, that they could not thus inveſtigate the motions of the living body, but thoſe occaſioned by death, and that of the moſt torturing kind. "Herophilus ille medicus, aut lanius, qui ſexcentos exſecuit ut naturam ſcrutaretur, qui hominem odiit ut noſſet, neſcio an omnia interna ejus liquidò explorarit, ipſa morte mutante quæ vixerant; et morte non ſimplici, ſed ipſa inter artificia exſectionis, &c." (Tertullian, unum eſſe ſpirit. et animum.) This may be true, but Le Clerc is diſpoſed to believe, that the ſame fabulous diſpoſition which repreſented Medea, who firſt employed the warm bath, as boiling men alive, likewiſe deſcribed the firſt anatomiſts of the human body as the butchers of men.

The extent to which diſſection was purſued by Herophilus is manifeſt, both from the teſtimony of Galen and others, and from the preſent nomenclature of anatomiſts, who ſtill employ ſeveral of the denominations by which he and Eraſiſtratus deſignated different parts of the body; for it is not eaſy to point out the reſpective diſcoveries of theſe two anatomiſts. They were the firſt who inveſtigated the brain and nervous ſyſtem. Herophilus, according to Rufus the Epheſian, diſtinctly marked the difference between three ſorts of nerves (the word nerve being common alſo to *tendon* and *ligament*), the firſt of which (now excluſively called nerves) were "ſubſervient to ſenſation and voluntary motion, and originated partly from the brain and partly from the ſpinal marrow." It would ſeem that a diſcovery, that has been conſidered as peculiarly modern, was partly made by Herophilus and Eraſiſtratus, namely, that of the *lacteal* abſorbents. For Galen quotes the following ſentence from the writings of the latter. "If we lay open the abdomen, we diſtinctly obſerve arteries in the meſentery; in young kids theſe are filled with milk, but not in the adult animals." (Galen, an ſanguis in arter.) And in another place, he ſpeaks of certain veins obſerved in the meſentery, and "intended for the nouriſhment of the inteſtines, according to Herophilus, who remarked, that they did not paſs to the liver, like the reſt of the abdominal veſſels, but terminated in certain glandular bodies." (Galen, De Uſu Partium, lib. iv. cap. 19) Herophilus firſt named the upper part of the inteſtines *duodenum*, or rather δωδεκαδάκτυλον, implying its length to be about twelve inches. From accurate obſervation of the pulmonary veſſels, he gave the name of "arterial vein" to the pulmonary artery, and that of "venous artery" to the pulmonary vein; he alſo uſed the term *retina* for the internal coat of the eye; and the term ληνὸς, or wine-preſs, for the fourth ſinus in the brain, which retains the denomination at this day, with the addition of his name, being now called *torcular Herophili*; and he firſt named the *tela choroidea*. We are altogether unacquainted with his notions reſpecting the uſes of theſe organs, except that he conſidered the ventricles of the brain as the ſeat of the rational ſoul; a ſuppoſition at leaſt as plauſible as the more modern ſituation provided for it in the pineal gland.

Of the opinions of Herophilus in regard to diſeaſes, and of his practical precepts, nothing has deſcended to us, except a few unſatisfactory fragments preſerved by Cœlius Aurelianus. He is allowed, however, to have been the firſt of the ancients who paid accurate attention to the variations of the pulſe. Hippocrates had, indeed, occaſionally mentioned the ſtate of the pulſe in ſome of his deſcriptions of diſeaſes; but Herophilus firſt drew the attention to four qualities of the pulſation, *viz.* the magnitude or fulneſs of the artery, the frequency, the ſtrength, and the rythm or regularity of the beats; he likewiſe obſerved the equality or inequality of the pulſe, and perhaps ſome other varieties, which drew upon him the ridicule of Pliny, who ſaid that it was neceſſary to be a muſician, in order to comprehend the proper cadence and rythm of the pulſe. Nat. Hiſt. lib. xxix. cap. 1. &c.—Galen de Different Pulſ. lib. ii. cap. 3.

Herophilus, it would appear, had great faith in the powers of herbs and drugs in general, and made a more extenſive uſe of them in his practice than his predeceſſors. According to Celſus, Herophilus and his diſciples principally introduced the general uſe of medicaments in the treatment of almoſt every diſeaſe, in which the cure had formerly been effected chiefly by diet and regimen. (Præf. ad lib v.) And Pliny informs us, that Herophilus uſed to aſſert, that all herbs, even thoſe which we daily tread under our feet, are poſſeſſed of uſeful remedial properties. (Plin. lib. xxv. cap. 2.) He inſiſted, however, upon the neceſſity of ſtudying the nature of theſe properties; for he was wont to obſerve, that medicines were either nullities, or they were "the hands of the gods," according to the ſkill with which they were employed. White hellebore was held in high eſtimation by him, on account of the powerful action which it was capable of exciting in the body. Plin. loc. cit. lib. xxv.

The ſchools of Herophilus and Eraſiſtratus at Alexandria, we are aſſured by Galen, continued to flouriſh a long time after the death of their founders; and among the diſciples of Herophilus were many diſtinguiſhed phyſicians, eſpecially Zeuxis of Tarentum, Alexander Philalethes, Zenon, Andreas, Mantias, Apollonius Mus, Philinus, &c. Indeed, Ammianus Marcellinus, who lived about ſix hundred and fifty years after the ſchools were ſet up, ſays, that they were ſo famous in his time, that it was enough to ſecure credit to any phyſician, if he would ſay that he had ſtudied at Alexandria. See Le Clerc Hiſt. de la Médecine.—Goclicke Hiſtoriæ Med. Univerſ. Period. 6ta.—Barchuſen Hiſt. Medicinæ.

HEROWRA, in *Geography*, a town of Hindooſtan, in Oude; 17 miles S. of Kairabad.

HERPA, in *Ancient Geography*, a ſmall town of Aſia, ſituated in the mountains from which proceeded the river Carmalus, S. E. of Oſdara.

HERPES, in *Medicine*, from ἕρπειν, *to creep*, a term applied to ſeveral cutaneous eruptions, from their tendency to ſpread or creep from one part of the ſkin to another.

From the extreme variety of the appearances of eruptions on the ſkin, a great difficulty has occurred in deſignating them by appropriate appellations, and a great confuſion has enſued in the various acceptations in which different writers have employed the ſame words. The term *Herpes*, in particular, has been ſo variouſly applied by different phyſicians, both ancient and modern, that it is now almoſt impoſſible to diſcover the true character of the eruptions, which ſhould be claſſed together under that title. In fact, like the terms *ſcurvy* and *ſcorbutic*, the words *herpes* and *herpetic* are now ſo indiſcriminately employed, that they have ſcarcely any other or more definite meaning, than the general term *cutaneous*. We remember, indeed, to have heard a lecture from the profeſſor of materia medica at Edinburgh, in the year 1801, in which he aſſumed the word *herpes* as a generic name, and divided the whole liſt of chronic cutaneous diſeaſes into ſo many ſpecies of this genus, under the appellations of Herpes *ſquamoſus*, H. *puſtuloſus*, H. *veſiculoſus*, &c. according to the particular appearance of ſcales, puſtules, veſicles, &c. which were predominant in each caſe.

It is extremely deſirable, however, that we ſhould come to ſome common underſtanding, in regard to the nomenclature of theſe diſeaſes, and agree to employ the ſame terms in the ſame preciſe ſenſe: an object which, it is hoped, the treatiſe of Dr. Willan will go near to effect. (See CUTANEOUS *Diſeaſes.*) In the ſyſtem of this author, the term herpes is confined to an eruption, which is, in its early ſtage, *veſicular*, *i. e.* conſiſting of patches of ſmall, tranſparent *veſicles*, or *phlyctænæ*. The propriety of this limitation is ſupported, on the whole, by authority. For although the term herpes may have been originally employed to denote any ſuperficial ſpreading eruption; it has been much applied, ſince the time of Galen, to veſicular eruptions. Of the three ſpecies mentioned by Galen, the H. *miliaris* (κέγχριας), and H. *phlyctænodes* (φλυκταινώδης), are of this nature; the third, H. *exedens*, (ἐσθιόμενος), ſignifying little ulcerations affecting the ſkin, but not penetrating deeper. The conſtant habit of confounding under the term *puſtule* both thoſe elevations of the cuticle which contain *pus*, (to which the term properly belongs, quaſi *pus tulit*,) and thoſe which contain *lymph*, (the proper *veſicles*,) has led to the application of the term herpes to almoſt all puſtular and ſmall ulcerous diſorders of the ſkin. Thus, Dr. Cullen includes in his definition of herpes, both *veſicles* and *ſmall ulcers*; his words are, "phlyctænæ, vel ulcuſcula plurima, gregalia, ſerpentia, dyſepuleta." "Tumerous veſicles or little ulcers, in cluſters, ſpreading, and difficult to heal." (See his Noſol. Method. Genus cxlvi.) Sauvages has conſidered the eruption as conſiſting of *pimples* (papulæ), and not of puſtules: but it is obvious, that his definition of papula is not limited to the ſame ſenſe to which it is confined by Dr. Willan, but may include ſmall veſicles. He ſtates that the papula differs from the puſtule, "inaſmuch as it does not ſuppurate, but diſcharges a little moiſture from its apex, and then becomes ſcaly:" whereas Dr. Willan conſiders the pimple as not containing any fluid. If we take the word *papula* in this more extenſive ſenſe, the definition of Sauvages is tolerably correct. "Herpes eſt papularum congeries, ſeu effloreſcentia ex tumoribus exiguis, rubris, aggregatis, pruriginoſis, in ſquamas furfuraceas, raro cruſtaceas abeuntibus." (Sauvages Noſol. Method. Claſs 1. Ord. 2. Genus 7.) The herpetic veſicles, however, as far as we have obſerved, generally terminate in thin ſcabby cruſts.

It is deſirable, then, that we ſhould, with Dr. Willan, confine the denomination of herpes to an eruption, which is in its origin characteriſed by cluſters of veſicles, containing limpid fluid, and very thickly congregated, upon a red baſe, which is common to each cluſter, and extends around it ſo as to form a narrow areola. Theſe cluſters gradually extend, and new ones ariſe, for the ſpace of three or four days or more, and then the veſicles become gradually more opaque and puſtular, flatten, and ultimately dry into cruſts or ſcabs. The whole courſe of the diſeaſe generally compriſes about a fortnight, under whatever variety it appears; the changes in the progreſs of the eruption correſponding nearly with thoſe obſerved in the ſmall-pox. The cluſters of veſicles generally aſſume more or leſs of the circular form; and when they occur upon the limbs, the ſucceſſive cluſters ſpread in a longitudinal direction, from above downwards, or *vice verſâ*; but when they appear on the trunk of the body, their tendency is to ſpread in a lateral direction, or round the body. When theſe eruptions are numerous and extenſive, ſome degree of feveriſhneſs precedes and accompanies them; but in the ſlighter caſes, no indiſpoſition of the general habit ariſes. Dr. Willan's treatiſe is not yet ſo far publiſhed, as to include an account of this diſeaſe: but we ſtate theſe obſervations from frequent communication with him on the ſubject, and have ſeen them ſtrictly verified in many inſtances in practice. We cannot, therefore, but conſider the herpes, thus characteriſed, as a diſtinct genus of diſeaſe, and no more to be confounded with eryſipelas, than with chicken-pox or ſcarlet fever. In order that we may not be miſunderſtood, we ſhall here deſcribe the moſt frequent form of the diſeaſe, namely, the

Herpes *Zoſter*, popularly termed *the Shingles*. This eruptive diſorder has been mentioned under a variety of names, but has not been very minutely deſcribed, as far as we know, until within the laſt century. It was called ζωστὴρ, (*a belt*,) by the Greeks; *zona*, (which has the ſame meaning,) *zona ignea*, *ignis ſacer*, by the Latins, and by modern writers. Sauvages has named it, in two different parts of his work, eryſipelas zoſter, and herpes zoſter; and Dr. Cullen claſſes it with the former diſeaſe, under the title of eryſipelas phlyctænodes, at the ſame time expreſſing a doubt of the propriety of this claſſification. De Haen has given a tolerably accurate account of the diſeaſe; and Burſerius has compiled a ſummary of the deſcriptions of theſe and other writers. Tulpius, Hoffmann, Calliſen, &c. have alſo deſcribed the complaint with conſiderable accuracy. (See Burſerius. Inſtit. Med. Pract. tom. ii. cap. 3. Tulpius, Obſerv. Med. lib. iii. cap. 44. Hoffmann, Med. Syſt. Rational. tom. iv. part i. cap. 13. § 6. and obſ. vi. Calliſen, Syſt. Chirurg. Hodiern. tom. i. p. 424. De Haen, De Divis. Febr. p. 112, &c.) The diſeaſe was noticed, however, by the ancients; for it may be recogniſed in the firſt ſpecies of *ignis ſacer*, mentioned by Celſus (De Medicinâ, lib. v. cap. 28. § 4.): and Pliny alſo briefly notices it, adding that popular notion reſpecting its fatality, if it completely encircles the body. "Zoſter appellatur, et enecat ſi cinxerit. (Nat. Hiſt. lib. xxvi. cap. 11.) It was no doubt included by Galen in one of his ſpecies of herpes.

The courſe of the ſymptoms of *the ſhingles* has been tolerably uniform in all the caſes we have ſeen. The commencement of the diſeaſe has generally been marked by a ſlight feveriſhneſs, loſs of appetite, and languor, the patients at the ſame time complaining of a ſenſe of heat, and of ſhooting pains through the cheſt or epigaſtric region. Theſe ſymptoms have occaſionally, however, been conſiderable, and occaſionally altogether abſent, or ſo ſlight as not to attract the notice of the perſon. On the ſecond or third day, ſeveral red patches have appeared on the ſkin of the abdomen, breaſt, or ſhoulder, upon which were numerous elevated points, cluſtered together, and accompanied by a ſenſation of heat and itching: theſe points ſpeedily enlarged to the ſize of a ſmall pearl, and put on the appearance of veſicles, filled with a very limpid fluid, and generally ſo cloſe ſet as to leave no interſtice between them; the whole cluſter forming a circular or oval patch, of various diameter, from one inch to two or three; and ſurrounded by a red margin. During two or three days, while the firſt patches were thus enlarging, others continued to appear, with ſome degree of regularity, and nearly in a line extending from the ſternum or the linea alba of the abdomen, round one ſide of the ſpine; ſometimes like half a ſaſh, round the waiſt, and ſometimes like a ſword-belt acroſs the ſhoulder. "Hac tamen perpetua lege," ſays De Haen, "ut ab anteriore parte nunquam lineam albam, nunquam à poſtica ſpinam tranſcenderent." This obſervation, however, is not without exceptions; although the great rarity of the occurrence probably gave riſe to the popular prognoſis above mentioned from Pliny, which is ſtill very prevalent. We have ſeen the eruption extend acroſs the linea alba in front; and Turner aſſerts, that he has more than once ſeen it completely ſurround the body. (On Diſeaſes of the Skin, chap. 5. p. 80.) Dr. Ruſſell, who has given a caſe of it (De Tabe Glandulari, Hiſt. xxxiii. p. 124.) and Tulpius alſo contradict the affirmation of Pliny. But to proceed:

In the courſe of four or five days, the eruption ceaſed to extend or multiply; and, in the mean time, the veſicles, which had firſt appeared, began to loſe their tranſparency, and to aſſume more of the character of puſtules; they became ſomewhat confluent, and commonly acquired by degrees a blueiſh or livid colour, ſinking ultimately into a thin brown ſcab. Thoſe patches, which appeared later, went through the ſame courſe; and in about twelve days or a fortnight, nothing but the brown dry ſcabs remained. In a word, the duration and progreſs of this eruptive diſeaſe, as we have heard Dr. Willan juſtly remark, is very ſimilar to that of the ſmall-pox. The fever, when it has been conſiderable, ſometimes ſubſides on the appearance of the eruption; but we have ſeen ſlight febrile ſymptoms continue during the whole courſe of the diſeaſe, probably from the inceſſant irritation of the painful itching and ſmarting which is connected with the eruption. In one or two inſtances, the moſt diſtreſſing part of the diſeaſe was an intenſe darting pain, not ſuperficial,

ficial, but deep-ſeated in the cheſt, which came on at the cloſe, and which was ſcarcely to be allayed by the power of opium. Hoffmann has made a ſimilar obſervation: "Inde quidem ſymptomata remiſerunt, excepto exquiſito ardente dolore, qui tantus erat, ut nec ſomnum capere, nec locum affectum contingere poſſet." (Loc. cit. obſ. vi.) A leſs degree of this pain is commonly complained of in the ſlighter caſes.

Diagnoſis.—The herpes zoſter, or ſhingles, then, is to be conſidered as a diſtinct eruptive diſeaſe, and to be claſſed with the febrile exanthemata, as Cullen and Burſerius have arranged it; but not as a variety of eryſipelas. For the eryſipelas conſiſts of extenſively diffuſed inflammation of the ſkin, with effuſion and much ſwelling; and the elevation of the cuticle which accompanies it, is in large irregular *bullæ;* the inflammation too is liable to extend deeply into the muſcular parts. Whereas the cluſters of ſmall tranſparent veſicles, undergoing a regular progreſs of maturation and encruſtation, without affecting any part below the ſkin, and without tumefaction, are characteriſtic of this herpes; not to mention the ſeverity of the fever connected commonly with the former, and the ſlight febrile derangement, if any, attendant on the latter. It is to be diſtinguiſhed, too, from the eruptions and ulcerations of the ſkin uſually denominated *herpetic,* by the ſame regularity of its courſe and limited duration. This is obſerved by Burſerius: "Zoſter acutus et *brevis* ut plurimum morbus eſt; nam quanquam Lorryus et chronicum, et interdum epidemicum eſſe exiſtimet, (quod de igne ſacro late ſumpto fortaſſe ei concedendum eſt,) hanc ſpeciem tamen diutinam non vidi." (Loc. cit. cap. 3. § 52.) Many writers, indeed, have mentioned the ulcerations which belong to *Herpes,* and even the *Zoſter;* but we are diſpoſed to believe that, either ſuch ulcers were the reſult of diſeaſes originally *puſtular,* and belonging to the *impetigo,* or running tetter; or that the buſy hand of art has interfered, in the caſe of the zoſter, and interrupted the healing proceſs of nature. For we believe that every form of herpes (characteriſed in its commencement by cluſters of *veſicles*) follows the ſame courſe, and the little ulcers which enſue, when the ſurface is broken, are diſpoſed to heal ſpontaneouſly in about fourteen days. We ſhall illuſtrate this immediately, when ſpeaking of the cure.

Reſpecting *the cauſes of herpes,* it will be more rational to acknowledge our total ignorance, than to attempt, by any hypothetical ſpeculations, to deſcribe the nature of the morbid humours, which give riſe to the diſeaſe, or to refer the production of theſe humours to any particular mode of diet, as authors have generally done. For aſſuredly obſervation has not enabled us to deduce any ſatisfactory concluſions on the ſubject. Galen and his numerous followers, both ancient and modern, conſidered the herpetic veſicles as an effuſion of bile; but ſome of them believed that the *intemperies* was not purely bile, but an intermixture of *pituita* or phlegm. (See Sennertus, Pract. Med. lib. v. cap. 27.) The more modern chemical humouriſts conſidered the materies morbi to be a cauſtic acrid humour, partaking of the principle of putrefaction, carried outwards, and irritating the cutaneous nerves (Hoffmann, loc. cit.); and aſcribed the diſeaſe to ſalted food, to a ſcorbutic, and arthritic diatheſis, &c. But the diſorder ſeems to be independent of the diet; at leaſt we have ſeen it under very different circumſtances in that reſpect. It is not contagious, according to general obſervation of authors; and in twenty-two caſes, which we have witneſſed, it was neither traced to any contagious origin, nor was a ſecond perſon known to take the diſeaſe from any one of the individuals affected. There would ſeem to be a prediſpoſition to it in youth, eſpecially in the female ſex; for the caſes juſt mentioned occurred in females, moſtly in young females, with a very few exceptions which appeared in boys.

Some authors have deemed the herpes zoſter a malignant and dangerous diſeaſe, as Platner and Hoffmann; and Langius has deſcribed two caſes occurring in noblemen, which proved fatal. (Epiſt. Medicin. p. 110.) We have no doubt, however, from the account which he gives of theſe caſes, that he was miſtaken in referring them to the diſeaſe in queſtion. Lorry and Geoffroy more correctly conſider the ſhingles as free from danger (ſee Geoffroy, in Hiſt. de la Soc. Roy. de Med. an. 1777-8); and Burſerius aſſerts that, like them, he never ſaw a fatal caſe. Of the twenty-two inſtances which have occurred to us, not one exhibited any untoward ſymptom; the majority of the patients were not confined to the houſe; the complaint was mild and harmleſs, and ſlight debility enſued.

Of the cure of this complaint, therefore, little need be ſaid; gentle laxatives and diaphoretics, with occaſional anodynes, when the ſevere deep-ſeated pain, to which we have alluded, occurs, ſeem to be the only medicines requiſite to alleviate the ſymptoms during its courſe. (See Edin. Med. and Surg. Journal, vol. i. p. 389.) Yet moſt of the writers on the ſubject, even ſo late as Burſerius, prejudiced by the humoral doctrines, have been fearful of interrupting the ſuppoſed operation, by which the conſtitution rids itſelf of the morbid matter, and have expreſſed many cautions againſt the early and free uſe of purgatives. This, however, is contradicted by experience. But if the neglect of evacuating the alimentary canal be prejudicial, the humoral hypotheſis has led to much more pernicious practice, in reſpect to the external treatment of the eruption. We have not found it neceſſary to make any particular applications to the cluſters of veſicles, except that, when the tops are rubbed off, as they are liable to be, by the friction of the clothes, and a ſlight diſcharge of a thickiſh ſerum takes place, which occaſions the linen to adhere to the parts, a little ſimple ointment may be uſefully interpoſed to prevent that conſequence. We are diſpoſed to believe, therefore, that the ulcerations, which have been ſaid to enſue, and to be dangerous and troubleſome, were the reſult of the buſy hand of the practitioner. Thus Turner, when the eruption was "all out and ripened," uſed to "ſnip the heads of them with a pair of fine ſciſſors," and then apply a ſoft rag "to ſuck up the humours, and prevent further eroſion," and he then covered the parts with the "unguentum *Diapompholygos,*" &c. or with his own cerate. But Ruſſel, not content with this mode of clearing away the humours, when he ſaw the eruption turning livid, (in its natural decline,) he cut open the veſicles, irritated them with the red precipitate and plaſtered them over, although the patient previouſly complained of the extreme tenderneſs of the eruption, which he could not bear to be touched. "Illa autem, ut inſpicio," he ſays, "veſiculis depreſſis, et minimè tumentibus, at liveſcentibus inducta eſſe, atque acrem quendam ichorem ſubſtare cerno, proinde ſecantur veſiculæ, et præcipitato rubro, cum unguento aur. et cerato, ut medicamenta fixa atque immota remanerent, curantur." Loc. cit.

Theſe pernicious interruptions of the healing proceſs, which were called remedies, ſufficiently explain, we imagine, the appearance of ulcers, and their troubleſome duration, beyond the natural period of the diſeaſe, as well as the erroneous

roneous deſcriptions of it, which the earlier practitioners were thence led to give. We are the more diſpoſed to form this opinion, from obſerving the effect of a ſimilar practice, in another variety of herpes. This form of the herpetic eruption has not been deſcribed, we believe, except by a writer in the Med. and Phyſ. Journal for May or June 1810, where an imperfect plate of it is given. It occurs on the *prepuce*; and although unaccompanied by any conſtitutional affection, its extent being ſmall, it obſerves nearly the courſe of the eruption of the zoſter, and its regular duration is a fortnight. The attention of the patient is called to the part by an extreme itching, with ſome ſenſe of heat; and on examining the prepuce, he finds a ſmall red patch or two, upon which are cluſtered five or ſix minute tranſparent veſicles; theſe enlarge, and, in the courſe of twenty-four or thirty hours, become of a milky opacity, and on the following day look puſtular, and ſoon break, eſpecially if ſeated in the inner ſurface of the prepuce, ſo as to be conſtantly covered and kept moiſt. They then ulcerate, moſt commonly becoming confluent, ſo as to form one or two ulcers, according to the number of patches. Now if theſe ulcerations are conſtantly kept clean, or if a little dry lint is laid over them, ſo as to abſorb the matter diſcharged, they do not ſpread; but, continuing very tender and irritable, heal about the thirteenth or fourteenth day. Ointments appear to irritate them, increaſe their ſoreneſs and diſcharge, and delay their healing. We once ſaw, in an individual who has had many returns of the complaint, theſe ulcerations miſtaken for venereal chancre, and the red oxyd of mercury applied to them; the conſequence was an increaſe of the ulcerations, and of their irritability, a hardneſs ſurrounding them, and an elevation of the edges, with a very conſiderable prolongation of the duration of the complaint. It has recurred repeatedly in the ſame individual, altogether independent of any ſuſpicious connection, and has uniformly followed the courſe above deſcribed, when not interfered with.

Turner mentions a ſingular noſtrum for the cure of herpes, which was employed in a caſe, from which he was diſmiſſed as ſoon as he had pronounced the name of ſhingles, this remedy being conſidered as ſpecific; namely, the blood of a *black* cat, taken from *the tail* by cutting off the end of it, and beſmeared upon the eruption! See RING-*worm*.

HERPESTIS, in *Botany*, ἑρπηστης, *any thing which creeps*, Gærtn. fil. v. 3. 187. t. 214. Brown Prod. Nov. Holl. 441. (Moniera. Browne Jam. 269. t. 28. f. 3. Michaux Boreal-Amer. v. 2. 22.—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Perſonatæ*, Linn. *Scrophulariæ*, Juſſ.

Eſſ. Ch. Calyx inferior, in five deep ſegments, of which the two inner ones are ſmalleſt, and concealed by the others. Corolla tubular, ſomewhat two-lipped. Stamens included; lobes of the anthers divaricated. Stigma emarginate. Capſule incloſed in the generally enlarged calyx, with two cells, and two divided valves; the partition parallel, unconnected with the valves, but bearing the receptacles of the ſeeds. *Brown.*

An exotic genus of herbs with oppoſite leaves and axillary flowers, each of whoſe ſtalks bears a pair of bracteas. It contains the *Gratiola Monnieria* of Linnæus, and a few other ſpecies. The only one found by Mr. Brown in New Holland is

H. floribunda. "Smooth and upright. Leaves linear-lanceolate. Calyx of the fruit reticulated, and ſomewhat heart-ſhaped. Bracteas below the top of the flower-ſtalks."—It grows within the tropics. N.B. The reader who refers to GRATIOLA is requeſted to read *hyſſopoides* for *hyſcpoides* in the 4th paragraph, and in that after the 6th ſpecies.

HERPET, in *Geography*, a town of Hindooſtan, in the Carnatic; 20 miles N. of Bomrauzepollam.

HERPETON, in *Surgery*, a creeping puſtule, or ulcer. The term is uſed by Hippocrates, and is derived from ἕρπω, *to creep*.

HERPIDITANI, in *Ancient Geography*, a people of Africa, in Mauritania Cæſarienſis, who inhabited the Chalcorichian mountains E. of the river Malva.

HERQUI, or ERQUI, in *Geography*, a cape on the coaſt of France, in the department of the North coaſt. N. lat. 48° 35′. W. long. 2° 37′.

HERRADURA, a ſea-port of Spain, in which a fleet of gallies, under the command of general Don John de Mendoza, was loſt in 1562; between Motril and Velez Malaga.—Alſo, a town of South America, in the province of Chili; five miles S.W. of Coquimbo.—Alſo, a river of Mexico, which runs into the Pacific ocean, N. lat. 9° 30′.

HERRENBERG, a town of Wurtemberg, which, at ſeveral times, has been damaged by fire and by hoſtile attacks; 14 miles S.S.E. of Stuttgard.

HERRENBREITUNGEN, a town of Germany, in the county of Henneberg, ſituated on the Werra; 20 miles W. of Smalkelden.

HERRERA TORDESILLAS, ANTHONY, in *Biography*, born in 1565, was ſon of Roderic de Tordeſillas, and Agnes de Herrera, and, according to the cuſtom of his country, he bore his mother's name. He was, as a public character, firſt ſecretary to Veſpaſian de Gonzaga, the viceroy of Navarre and Valentia, after whoſe death, Philip II. appointed him hiſtoriographer for the Indies; and in this capacity he wrote his general hiſtory of the Indies, in four volumes folio. This work, with a deſcription of the Weſt Indies, gives an account of all the tranſactions of the Spaniards there from 1492 to 1554, and it is ſaid by Dr. Robertſon to furniſh the fulleſt and moſt accurate information concerning the conqueſt of Mexico, as well as of every thing elſe that relates to America. Some critics reckon him too fond of the marvellous, and cenſure his ſtyle, as partaking of the timidity of the country. Herrera compoſed a general hiſtory of his time, from 1554 to 1598, in three volumes folio. He died in 1625. Moreri. Robertſon.

HERRERA, FERDINAND DE, a Spaniſh poet who flouriſhed in the 16th century, was a native of Seville. In 1582 he publiſhed a collection of lyrical and heroic poems, which was reprinted in 1619. Theſe poems acquired their author a high reputation, and he was regarded as one who had attained to the greateſt excellence in the lyric poetry of Spain. His ſtyle is neat, correct, elegant, and copious. He publiſhed an edition of Garcilaſſo de la Vega, with notes; the life of ſir Thomas More; and a narrative of the war of Cyprus, and the battle of Lepanto. Moreri.

HERRERA, FRANCISCO DE, ſurnamed the *Elder*, was a painter who was born at Seville, a fellow ſcholar of Pacheco in the ſchool of Luis Fernandez, and was the firſt who freed the pencil from that timidity which had, till then, marked the execution of Andaluſian painters, and may be conſidered as the founder of a new ſchool, which counted among its primitive pupils, Diego Velaſques; but, though decided and rapid, Herrera was no manneriſt; his works bear the teſt of minute inquiry in deſign and compoſition, and charm by colour; ſuch is his Laſt Judgment, in St. Bernardo at Seville, and a freſco in the Cupola of St. Bonaventura. The common objects of life he imitated with uncommon preciſion; his kitchens, ales, hoſtels, are as exquiſite as difficult to be obtained. He has left ſome etchings, and he worked in bronze, which led him to forge coin; he was diſcovered, and, to eſcape the hands of juſtice, took an aſylum with the Jeſuits, who obtained his pardon from Philip IV. 1624. Herrera had two ſons; the elder, called El Rubio, died young; the ſecond called

Herrera el Mozo, or the *Younger*, was likewiſe named Franciſco, and inherited his father's talents to a conſiderable degree. He ſtudied at Rome, and from his ſkill and taſte in repreſenting Bambocciate, fiſh, and ſtill life, was, by the Italians, nicknamed Il Spagnolo degli Peſci. On his return to Seville, he was ſoon diſtinguiſhed, and made ſub-preſident or director of the academy eſtabliſhed in 1660; but, too proud to ſubmit to the ſuperior authority of Murillio, he went to Madrid, rivalled the moſt favourite artiſts, and was employed by the court. The St. Hermengildus painted for the Carmelites, the freſcoes of the chapel San Felipe el Real, and the Aſſumption of the Virgin in that of the Madonna de Atocha, procured him, with the execrations of his rivals, the honours of principal painter to the king, and the place of principal maſter of the royal works. He died at Madrid in 1685, at the age of 63.

The ſtyle of El Mozo allures with vigorous contraſts of chiaro-ſcuro and a compoſition full of fire; but his colour has neither the mellowneſs nor the imparts of his father's, whom he nearly equals in Bambocciate, and excels in flowers. Of architecture his knowledge was ſuperficial, notwithſtanding the praiſe of Palomino. His powers upon the whole, whatever be their ſcale, were certainly inferior to his opinion of them. Fuſeli's Pilkington.

Herrera, in *Geography*, a town of Spain, in Old Caſtile, 32 miles N.N.W. of Burgos.

HERRGOTT Marquard, in *Biography*, a learned and celebrated Benedictine of the abbey of St. Blaiſe, was born, in 1694, at Fribourg. Having completed his own education at his native place, he went to Straſburg, at the age of 15, to engage in the duties of private tutor to the ſons of a merchant of that city. He accompanied his pupils to Paris, where he reſided two years, and then returned to Straſburgh. In his 20th year he entered into the order of the Benedictines, and, having paſſed through various degrees of promotion, died at Vienna in 1762. As an author, his great work was entitled, "Genealogia diplomatica Auguſtæ gentis Habſburgicæ." This work was ſo well received that he was induced to undertake another, *viz.* "Monumenta Aug. Domus Auſtriacæ," which was patroniſed by the emperor Charles VI. and by the empreſs-queen Maria Tereſa, and obtained a degree of ſucceſs equal to the other. According to the plan laid down by the author, the work was divided into five parts. The firſt was to contain the ſeals and various marks of honour; the ſecond, the medals and coins; the third, the paintings and ſtatues; the fourth, the monuments; and the fifth, inſcriptions from churches, palaces, tomb-ſtones, &c. The firſt three parts were publiſhed in the lifetime of the author, who aſſociated with himſelf father Ruſten Heer. The fourth part was burnt with the abbey of St. Blaiſe in 1768; and, the authors being dead, this part was re-compoſed by Gerbet, prince abbot of St. Blaiſe, and publiſhed, in two volumes, under the title of "Topographia Principum Auſtriæ, quæ eſt pars i. et ii. tom. 4. et ultimi Monumentorum Domus Auſtriacæ, St. Blaiſii." 1772. Gen. Biog.

HERRICKS, in *Geography*, a poſt-town of America, in New Hampſtead, Queen's County, Long iſland, in the ſtate of New York; 28 miles E. of New York city.

HERRING, Thomas, in *Biography*, ſon of a clergyman at Walſoken, in Norfolk, was born in the year 1693. He was educated in grammar learning at Wiſbeach ſchool, in the iſle of Ely, from whence he removed to Jeſus College, Cambridge, where he continued till he took his degree of B.A. in 1714. He then removed to Bennet College, obtained a fellowſhip there in 1716, and was in the following year admitted to the degree of M.A. He undertook the office of tutor in his college, in the claſſical department, which he filled with great reputation for more than ſeven years. Upon his entering into orders he became miniſter of Great Shelford, and other places, in the neighbourhood of Cambridge. In 1722 the biſhop of Ely made him his chaplain, and preſented him to the rectories of Rettingdon, in Eſſex, and Barley, in Hertfordſhire. Two years after this he proceeded to the degree of B.D., and in 1726 he was choſen preacher to the honourable ſociety of Lincoln's Inn. About the ſame time he was appointed chaplain in ordinary to his majeſty, and in 1728 commenced doctor in divinity at Cambridge. In 1731 he was made dean of Rocheſter, and in 1737 raiſed to the biſhopric of Bangor, from whence, in 1743, he was tranſlated to York. Here he had, in a ſhort time, a full opportunity of diſplaying a noble zeal for the reigning family, and the intereſts of the Proteſtant religion. Amidſt the conſternation which, in the year 1745, ſpread through all ranks, when the news arrived of the defeat of the king's troops at Preſton Pans, the archbiſhop's ardour in the cauſe of civil and religious liberty diſplayed itſelf in the moſt eminent manner. He rouſed the people to a ſenſe of their danger, and, while he greatly contributed, by his exhortations, to remove the general panic, animated them to aſſociate with firmneſs and vigour in defence of their country. At a general county meeting, held at York, he addreſſed the people then aſſembled in a ſpirited ſpeech, urging them to unite as one man to ſtop the danger; and he called on them liberally to contribute to a ſubſcription, which had been begun in order to raiſe troops for their defence. His patriotic enthuſiaſm was ſeconded by that of the whole aſſembly; 40,000*l.* were ſubſcribed on the ſpot. For his great zeal in this criſis of national danger he was, in 1747, to the general ſatisfaction of the nation, raiſed to the ſee of Canterbury. He died at Croydon in the year 1756, when he was about 63 years of age. He is characterized by Dr. Jortin as having poſſeſſed piety without ſuperſtition, and moderation without meanneſs, an open liberal way of thinking, and a conſtant attachment to the cauſe of ſober and rational liberty, both civil and religious. Thus he lived and died; and few great men paſſed through a malevolent world better beloved and leſs cenſured than he. A volume of ſermons, on public occaſions, has been publiſhed ſince his death by Mr. Duncombe, with a preface, containing ſome memoirs of the author's life. In 1777 the ſame gentleman gave the world likewiſe a volume of the archbiſhop's letters, with notes, and an appendix, which may be conſidered as a happy model for a polite correſpondence between men of learning. Biog. Brit. Gen. Biog.

HERRING, Harengus, in *Ichthyology*, a ſpecies of the *clupea*, which ſee.

The name *herring* is derived from the German *heer*, an *army*, which expreſſes their number, when they migrate into our ſeas. Herrings are found in great plenty from the higheſt northern latitudes as low as the northern coaſt of France. They are alſo met with in vaſt ſhoals on the coaſt of America, as low as Carolina; they are found alſo in the ſea of Kamtſchatka, and poſſibly reach Japan; but their winter rendezvous is within the arctic circle, whither they retire after ſpawning, and where they are provided with plenty of inſect food. For an account of the remarkable migration of herrings (a fact, however, which ſome have diſputed, ſee Clupea), and the hiſtory of the fiſhery, &c. ſee *Herring* Fishery.

They are in full roe at the end of June, and continue in perfection till the beginning of winter, when they begin to depoſit their ſpawn.

There are divers names given to preſerved herrings, according to the different mode in which they are managed: as,

1. *Sea ſticks.* Theſe are ſuch as are caught all the fiſhing ſeaſon, and are but once packed. A barrel of theſe holds ſix or eight hundred; eight barrels go to the ton, by law; a 100 of herrings is to be a 120; a laſt is 10,000; and they commonly reckon 14 barrels to the laſt.

There are others, repacked on ſhore, called *repacked* herrings; 17 barrels of ſea-ſticks commonly make from 12 to 14 of repacked herrings.

The manner of repacking them is to take out the herrings, waſh them out in their own pickle, and lay them orderly in a freſh barrel: theſe have no ſalt put to them, but are cloſe packed, and headed up by a ſworn cooper, with pickle, when the barrel is half full. The pickle is brine; ſo ſtrong, as that the herring will ſwim in it.

2. *Summers.* Theſe are ſuch as the Dutch chaſers, or divers, catch from June to the 15th of July. Theſe are ſold away in ſea-ſticks, to be ſpent preſently, in regard to their fatneſs; becauſe they will not endure repacking. They go one with another, full and ſhotten; but the repacked herrings are ſorted, the full herrings by themſelves.

3 The *ſhotten* and *ſick* herrings by themſelves; the barrel whereof is to be marked diſtinctly.

4. *Crux herrings;* which are ſuch as are caught after the 14th of September. Theſe are cured with that kind of ſalt called ſalt upon ſalt, and are carefully ſorted out, all full herrings, and uſed in repacking.

5. *Corved herrings.* Theſe ſerve to make red herrings, being ſuch as are taken in the Yarmouth ſeas, from the end of Auguſt to the middle of October; provided they can be carried aſhore within a week, more or leſs, after they are taken. Theſe are never gipped, but rowed in ſalt, for the better preſerving of them, till they can be brought on ſhore; and ſuch as are kept to make red herrings, are waſhed in great vats in freſh water before they are hung up in the *herring hangs*, or *red-herring* houſes.

As for the *manner of ſalting herrings;* the nets being haled on board, the fiſhes are taken out, and put into the warbacks, which ſtand on one ſide of the veſſels. When all the nets are thus unloaded, one fills the gippers baſkets. The gippers cut their throats, take out their guts, and fling out the full herrings into one baſket, and the ſhotten into another. One man takes the full baſket when they are gipped, and carries them to the rower-back, wherein there is ſalt. One boy rows and ſtirs them about in the ſalt, and another takes them, thus rowed, and carries them in baſkets to the packers. Four men pack the herrings into one barrel, and lay them, one by one, ſtraight and even; and another man, when the barrel is full, takes it from the packers. It is left to ſtand a day or more open to ſettle, that the ſalt may melt and diſſolve to pickle; after which it is filled up, and the barrel headed. The pickle is to be ſtrong enough to ſuſtain a herring; otherwiſe the fiſh decay in it. See *Herring* Fishery.

It is unlawful to buy or ſell herrings at ſea, before the fiſhermen come into the haven, and the cable of the ſhip be drawn to the land, 31 Edw. III. ſtat. 2. No herring ſhall be ſold in any veſſel, but where the barrel contains 32 gallons, and half-barrel and firkin accordingly; and they muſt be well packed, of one time's packing and ſalting, and be as good at the middle as the ends, on the pain of forfeiting 3*s*. 4*d*. a barrel, &c. by ſtat. 22 Edw. IV. cap. 2. The veſſels for herrings are to be marked with the quantity, and place where packed, and packers to be appointed and ſworn in all fiſhing-ports, &c. under the penalty of 100*l*. ſtat. 15 Car. II. cap. 16. (For other regulations, ſee *Herring* Fishery.) Freſh herrings, conſidered as a food, are ſaid to be very good aliment, if uſed moderately; but if taken in quantities diſproportioned to the powers of digeſtion, they produce a putrefaction in the ſtomach of the alkaline kind, and are attended with all the bad conſequences of highly alcaleſcent aliment: but pickled herrings are very bad aliment, the fleſh being rendered hard, and ſcarcely digeſtible by the vital powers: theſe, however, are leſs injurious than thoſe which are ſalted and dried.

Herring-*buſs*, a veſſel uſed in the herring-fiſhery. See Buss and Fishery.

Herring-*cob* is a young herring. See *Herring* Fishery.

Herring-*fiſhery*. See *Herring* Fishery.

Herring-*gull*, in *Ornithology*, the name of a bird of the larus kind, called by authors *larus cinereus maximus*, or the great grey gull, and by Linnæus the Larus *Fuſcus*; which ſee.

Herring-*ſcales*, in *Agriculture*, the ſcales and other refuſe which are collected in the various places where herrings are cured, and which are found to be highly beneficial as a manure. It has been long ſince ſuggeſted by Mr. Young, that, in addition to other ſorts of manure, the farmers about Leoſtoff employ herring-ſcales. The herrings are waſhed in large tubs before they undergo the operation of ſmoking, and ſuch ſcales as come off in the proceſs are diſpoſed of to the farmers at about ſixpence the laſt, which are the ſcales of 10,000 herrings. The manner of uſing ſcales of this ſort is that of ſowing them upon wheat on clover lays, having them harrowed in with the corn, from which management conſiderable benefit is ſuppoſed to be derived. And it is ſuggeſted, that an additional advantage might probably be drawn from the uſe of the water in which the herrings have been waſhed, as it is found to be oily, bloody, and ſtrongly impregnated with the ſmell of the fiſh. It is hinted that this water might be received into reſervoirs, contrived at but little expence; from which it might occaſionally be drawn off, and conveyed in watering carts, ſimilar to thoſe employed in the roads near the metropolis, either directly to the grounds which are in a proper ſtate of preparation for its reception, or to a heap of earthy materials, which are deſigned to be formed into compoſt. Turf or ſods are particularly adapted to this purpoſe, from their quality of readily abſorbing the moiſture. Dung may be afterwards added with the beſt effect.

It is, however, confeſſed, that the probability of advantage being derived from the employment of ſuch water, is founded ſolely upon that of the uſe of the ſcales as ſtated above; yet if, upon the authority of the Leoſtoff farmers, the utility of the practice be admitted, the preſumption is greatly in favour of the ſuggeſtion which has been already ſubmitted to the conſideration of the experimental farmer reſiding in the neighbourhood of a fiſhing town. But, before any great expence may be incurred, a ſmall open ſpot of ground, which is equally good in every part, ſhould be appropriated to the trial; of which, if one-half ſhould receive a common dreſſing, and the other this kind of application from a watering-pot or other ſimilar means, the produce of the different portions will plainly ſhew the reſpective merits of each, and in ſome meaſure demonſtrate what degree of regard ought to be paid to the latter material when uſed in this way.

There are ſeveral other deſcriptions of fiſh refuſe that might, in all probability, be employed in the way of manure with great benefit, if ſufficient care was taken in the collecting and applying of them. See Manure.

Herring-*ſilver*, a compoſition in money, formerly paid in lieu of a certain quantity of herrings for the proviſion of a religious houſe.

Herring *Bay*, in *Geography*, a bay of America, on the W. ſide of Cheſapeak bay, Maryland, 26 miles S. of Annapolis; which derives its name from the herrings that frequent it.

Herring *Pond Indians*. See Sandwich.

HERRIOT. See Heriot.

Herriot, in *Geography*, a town of Scotland, in the county of Edinburgh; 10 miles S. of Dalkeith.

HERRISON. See Herisson.

HERRNHUTERS, in *Eccleſiaſtical Hiſtory*, the name of a fanatical ſect, called alſo Moravians, which ſprung up in Upper Luſatia towards the beginning of the laſt century. This ſect was founded by Nicholas Lewis, count of Zinzendorf; and to his activity and zeal the progreſs of it is to be aſcribed. According to the account which he gives of himſelf, he had formed a deſign, when only 10 years old, of collecting a ſmall ſociety of *believers*, who ſhould altogether employ themſelves in exerciſes of devotion, under his direction. Accordingly, when he became of age, in the year 1721, he ſettled at Bertholſdorf, a village in Upper Luſatia, where he was ſoon joined by a number of proſelytes from Moravia; ſo that in a few years Bertholſdorf became a conſiderable village, having an orphan-houſe, and other public buildings. In 1728, thirty-four new houſes were erected; and in 1732 the number of inhabitants amounted to ſix hundred. From the name of a hill in the neighbourhood of this village, called the Huth-berg, theſe coloniſts gave their dwelling place the appellation of *Huth des Herrn*, and afterwards *Herrnhuth*, ſignifying the guard or protection of the Lord; whence aroſe the denomination of their ſect. As their number increaſed, Zinzendorf eſtabliſhed a peculiar diſcipline; dividing his adherents into different claſſes of married men, married women, widowers, widows, maids, bachelors, and children; each claſs being under the inſpection of a director, choſen by its members; and the claſſes are alſo ſubject to the ſuperintendence of an elder, coelder, and vice-elder. Particular attention was paid by theſe ſeveral claſſes to the inſtruction of youth; and as a great part of their worſhip conſiſted in ſinging, they pretended that children were inſtructed in their religion by hymns. There are ſome perſons of both ſexes appointed by rotation to pray for the ſociety, who are admoniſhed of their duty by an inward feeling; and they pretend to determine the divine will in particular caſes by caſting lots. All matrimonial contracts are ſubject to the direction and approbation of the elders. This ſect profeſſed, in their firſt eſtabliſhment, to belong to the Lutheran church; but count Zinzendorf, for the greater credit of this new ſociety, afterwards pretended that it was a revival of the ancient Moravian church, or Bohemian brethren, who were converted from popery by John Huſs. Such was the origin of a ſect, which in proceſs of time became very conſiderable and extenſive, and which adopted a variety of ſingular tenets and practices. Zinzendorf was denominated the truſtee and guardian of the brethren; in 1737 he was conſecrated biſhop of this ſect, a dignity which he reſigned in 1740. Towards the cloſe of the year 1744 he was denominated miniſter plenipotentiary and economiſt; and it was enacted that nothing of importance ſhould be done without his conſent; and he afterwards ſtyled himſelf the lord advocate of the *unitas fratrum*. Zinzendorf travelled in perſon all over Europe, and was twice in America; and he has alſo ſent miſſionaries almoſt throughout the known world. It would be endleſs to recount the numberleſs attempts which this zealot has made uſe of to eſtabliſh his own authority, and to extend the intereſt of his party. According to his own account, publiſhed in 1749, the ſociety had almoſt a thouſand labourers diſperſed all over the world, who preached in 14 languages, and 98 different eſtabliſhments, among which are caſtles, that have 20, 50, or 90 apartments. How far this account is juſtified by fact we cannot pretend to determine; but it is certain that the decline of this ſect has been no leſs ſignal and rapid than its progreſs. With regard to the tenets of the Herrnhuters, it may be obſerved, that at their firſt riſe they profeſſed to admit the confeſſion of Augſburg, and count Zinzendorf has always referred to his confeſſion as the ſtandard of his doctrine. However, it is well known that he has advanced very different notions, and recommended very unwarrantable practices; notions and practices which ſome have thought to disfigure the ſacred truths of the goſpel, and ſap the foundations of morality. The count himſelf ſpeaks in very derogating terms of the ſcripture, and expreſsly aſſerts, that the reading of the ſcripture appears to him to be more dangerous than uſeful to the ſociety. To avoid idolatry, he ſays, people ought to be taken from the Father and Holy Ghoſt, and conducted to Chriſt, with whom alone we have to do. The Holy Ghoſt is called by the Herrnhuters the eternal wife of God, the mother of Chriſt, the mother of the faithful, and of the church. The language of their devotion has been charged with obſcenity: and it has been ſaid that the ideas excited by it are ſuch as no chaſte mind can entertain. The conjugal act is a piece of ſcenery in which the male repreſents Chriſt the huſband of ſouls, and the female the church; and they have actually appointed ceremonies, in the celebration of marriage, which have been repreſented as indecent. Count Zinzendorf expreſsly declares, that the law is not a rule of life to a believer; that the moral law belongs only to the Jews, and that a converted perſon cannot ſin againſt light. It has been ſaid, that no example can be found of a fanaticiſm more extravagant, and a myſticiſm more reproachful than thoſe of the Herrnhuters. Thoſe whoſe curioſity leads them to wiſh for farther information, may conſult Moſheim's Eccl. Hiſt. vol. v. p. 85, note (*s*). Warburton's Doctrine of Grace, vol. ii. p. 153. and Rimius's Candid Narrative of the Riſe and Progreſs of the Herrnhuters, commonly called Moravians, or Unitas Fratrum, &c. 1753, and Supplement, &c. publiſhed in 1755. In juſtice to thoſe who diſavow the opinions and practices charged upon the Herrnhuters, by theſe authors, an account of this ſect, extracted from their own writings, will be given under Unitas *Fratrum*.

HERRNHUTH, or Hernhutt, in *Geography*, a town or village of Luſatia, and principality of Gorlitz; founded, in the year 1721, by ſome Moravian brethren; 6 miles N. of Zittau. See Herrnhuters.

HERRNHUTT, New, a Moravian town or ſettlement in Greenland. See Greenland.

HERRNSTADT, a town of Sileſia, in the principality

lity of Wolau; 25 miles E. of Glogau. N. lat. 51° 33'. E. long. 16° 43'.

HERRNWERTH, or Herrn *Chiemſee*, a town of Bavaria, the ſee of a biſhop, founded, in 1215, by Everhard II., archbiſhop of Salzburg; 27 miles W. of Salzburg.

HERRSBRUCK, a town of Germany, in the territory of Nuremberg, ſituated on the Pregnitz, containing about 226 houſes; 15 miles E. of Nuremberg. N. lat. 49° 28'. E. long. 11° 24'.

HERSCHEL, Jacob, in *Biography*, brother of our great aſtronomer, and maſter of the king's band at Hanover, was an excellent inſtrumental compoſer, in the beſt taſte of Germany at the time, which was more ſerious and ſimple than the preſent, and more reſembled that of Abel than Haydn. We have ſeen only one ſet of his ſonatas for two violins and a baſe, printed in England by Bremner, which are extremely pleaſing; but he left behind him many compoſitions of a higher claſs; and ſons able to execute them, or any muſic that may be ſet before them.

Jacob Herſchel died the third of June, 1792, in the fifty-eighth year of his age.

Herschel, in *Aſtronomy*, a name given by the French and moſt other European nations to the new planet diſcovered by Dr. Herſchel in the year 1781. Its mark or character is ♅. The Italians call it Ouranos or Urania, but the Engliſh denominate it the Georgian *Planet*; which ſee.

HERSE, in *Fortification*, a lattice, or portcullice, in form of a harrow, beſet with iron ſpikes. See Portcullice.

The word *herſe* is French, and literally ſignifies *harrow*; being formed of the Latin *herpex*, or *irpex*; which denote the ſame.

It is uſually hung by a rope faſtened to a moulinet; to be cut, in caſe of ſurprize, or when the firſt gate is broken with a petard; that the herſe may fall, and ſtop up the paſſage of the gate or entrance of the fortreſs.

The herſe is otherwiſe called a *ſarraſin*, or *cataract*; and when it conſiſts of ſtraight ſtakes, without any croſs pieces, it is called *orgues*; which ſee.

Herse is alſo a harrow, which the beſieged, for want of chevaux de friſe, lay either in the way, or in breaches, with the points up, to incommode the march as well of the horſe as the infantry.

Herse, in *Mythology*, the daughter of Cecrops, beloved of Mercury. She had a temple at Athens.

HERSENT, or Hersant, in *Biography*, a French divine, who flouriſhed in the ſeventeenth century, brought himſelf into trouble by a book entitled "Optatus Gallus de cavendo Schiſmate," in which he charged cardinal Richlieu with views inimical to the Gallican church. He quitted France and retired to Rome, where he was excommunicated for advancing ſome peculiar notions on grace. He died in 1680. He was author of a paraphraſe on Solomon's Song, and other works. Moreri.

HERSFELD, or Hirschfeld, in *Geography*, a town of Germany, and capital of a principality of the ſame name, belonging to the houſe of Heſſe Caſſel; ſurrounded with walls; flanked with towers, and containing about five hundred houſes, a chateau, a public ſeminary, a rich hoſpital, and a ſpring of medicinal water; 32 miles S.S.E. of Caſſel. N. lat. 50° 53'. E. long. 9° 40'.

HERSILIA, in *Mythology*, the wife of Romulus, received the ſame honours with her huſband, and was revered under the name of "Herta," or the goddeſs of youth.

HERSILLON, in the *Military Art*, a ſort of plank, or beam, ten or twelve feet long, whoſe two ſides are driven full of ſpikes, or nails, to incommode the march of the infantry or cavalry.

The word is a diminutive of herſe; the herſillon doing the office of a little herſe.

HERSIPHORIA. See Arrhephoria.

HERSOU-TOUKA, in *Geography*, a town of Chineſe Tartary. N. lat. 43° 26'. E. long. 124° 29'.

HERSTAL, or Heristal, a town of France, in the department of the Ourthe, ſeated on the Meuſe, with a caſtle which belonged to Pepin, father to Charles Martel, ſold to the king of Pruſſia in 1741; 4 miles N. of Liege.

HERSTEIN, a town of France, in the department of the Saône. The place contains 408, and the canton 8011 inhabitants, in 38 communes.

HERTFORD, a borough and market-town, in the county of the ſame name, in England, is of conſiderable antiquity, but of uncertain origin; though it is known to have attained importance very early in the Saxon times; and a ſynod is recorded to have been held here either in the year 670 or 673. Its ſituation, on the Ermin ſtreet, and on a ford of the river Lea, is ſuppoſed to have occaſioned its preſent name, which is thought to be a corruption from *Here-ford*, that is, the *Army's-ford*: this etymology is confirmed by the name of the town being written Hereford by Saxon authors and in ancient charters. A caſtle was built here, by Edward the Elder, about the year 909: he is alſo recorded to have built and fortified the town, which had probably been wholly deſpoiled and ruined by the Danes. At the time of the Domeſday ſurvey, Hertford contained 146 burgeſſes, and had two churches: the lands and houſes were then divided between the king and eight of his principal officers, among whom was Peter de Valoines, who had been conſtituted governor of Hertford caſtle, and was afterwards confirmed in that poſt by Henry I. In the reign of Henry III. the caſtle was bravely defended by ſir Walter de Godarvil, then governor, againſt the dauphin and the confederate barons, during a ſiege of four weeks, but at length was ſurrendered on honourable terms. The caſtle was frequently a royal reſidence; in 1345, Edward III., having created his fourth ſon, John of Gaunt, earl of Richmond, granted him the honor, caſtle, and town of Hertford, as a place where he might be "lodged and accommodated in a manner ſuitable to his dignity: while it was in his poſſeſſion, it was the occaſional dwelling-place of the two illuſtrious priſoners, John, king of France, and David, king of the Scots. Henry, duke of Lancaſter, kept his court here at the time of king Richard's depoſition; and on the duke's aſſumption of the throne, he ſettled the town and caſtle on his queen for life. The honour was afterwards beſtowed on Catharine of France, queen of Henry V. Henry VI. kept his court in the caſtle in his ſeventh year, and the honour was afterwards ſettled on his queen, Margaret of Anjou. In ſeveral ſubſequent reigns we find frequent teſtimonials of the importance of the town and caſtle. Very few remains of the original fortreſs are now ſtanding, and theſe are principally confined to the outer walls, which ſhow parts of one round, and ſome angular towers." The preſent body is chiefly of brick, and apparently of the time of James or Charles I., except the tower, which is of greater antiquity. The walls have been ſurrounded by a deep moat, ſupplied with water from the river Lea, which flows under the north ſide.

Numerous privileges and immunities have been granted to Hertford by various ſovereigns, ſince the time of the Conqueror, who firſt incorporated the borough by charter. The civil government was originally veſted in a chief bailiff, an under bailiff, and other officers ; but this form, after being altered ſeveral times, was abrogated by James I., and the juriſdiction committed to a mayor and common council. Charles II., by letters patent dated 1680, veſted the corporation in a mayor, recorder, ten aldermen, a chamberlain, ſixteen aſſiſtants, and other officers ; and under this charter the borough is now governed. The earlieſt return of members to parliament was in the twenty-ſixth of Edward I. ; but, after the fiftieth of Edward III., no return appears to have been made till the twenty-firſt of James I., when the privilege was reſtored on a petition from the corporation. The right of election is in the inhabitant houſeholders, reſident freemen, &c. ; the number of voters is about 580. The burgeſſes were formerly obliged to furniſh one man, completely armed, to attend the king in any warlike expedition.

Hertford had formerly five churches ; four parochial, and one belonging to the priory : but only two are now ſtanding, reſpectively dedicated to All Saints, and St. Andrew. All Saints, the principal church, is a large edifice, ſituated in the ſouth-eaſt part of the town, and conſiſting of a nave chancel, and ſide aiſles, with a low tower and ſpire. The monuments are numerous : one of the moſt ancient is a ſlab at the eaſt end of the ſouth ſide, to the memory of John Hunger, eſq. formerly maſter cook to queen Catherine ; he died in 1435 : among the modern inſcriptions is a long one in honour of ſir John Harriſon of Balls, who died in 1669. In St. Andrew's church, which ſtands on the north ſide of the Lea, are likewiſe many ſepulchral memorials for different families. The priory, which ſtood in the eaſt part of the town, and on the ſeite of which a good modern houſe has been erected, was founded, for Benedictine monks, by Ralph de Limeſey, who had lands in this town granted to him by the Conqueror.

Hertford is a healthy, reſpectable, and improving town : the ſeſſions, and market-houſe, and the town-hall, were rebuilt about 1770, and are handſome brick-edifices. The blue coat ſchool, connected with Chriſt hoſpital, London, is a large building at the eaſt end of the town, forming three ſides of a quadrangle : it contains ſufficient accommodations for upwards of 500 children ; and about that number is now reſident. In this town is alſo a grammar ſchool, which was originally founded and endowed by Richard Hale, eſq. of King's Walden, in the time of James I. Since that period, the ſchool-houſe had been rebuilt, and the endowments encreaſed by various benefactors. Among other donations, Bernard Hale, eſq. gave 100*l.* *per annum*, for eſtabliſhing ſeven ſcholarſhips at Peter Houſe, Cambridge, for boys educated on this foundation. The number of inhabitants in Hertford, including the blue coat ſchool diſtrict, as returned under the act of 1801, amounted to 3360 ; of whom 1762 were males, and 1598 females : the number of houſes was 542. Hertford is 21 miles diſtant from London. In this town has recently been erected a large, handſome building, called Hertford college, for the reception and accommodation of ſeveral gentlemen, qualified to inſtruct youth in various branches of uſeful knowledge, and alſo for ſeveral young men, or ſtudents, deſtined for the Eaſt India ſervice. The building is from deſigns by Mr. Wilkins, and the ſcholaſtic eſtabliſhment is under the maſterſhip of the Rev. Samuel Henley. This inſtitution is of too important a nature to be paſſed over, or merely noticed in a brief manner. From its national character and highly uſeful tendency, it will be expedient to give a detailed account of its origin, eſtabliſhment, and purport. The aſſociated merchants, &c. of London, generally known by the name of the Eaſt India company, having thought it neceſſary to inſtruct a number of young men expreſsly for their ſervice in the Eaſt Indies, inſtituted, in April 1805, a college for this purpoſe ; and very ſhortly afterwards a ſpot was fixed on, and contracts made with Mr. Wilkins, the architect, to erect a ſuitable edifice : the firſt ſtone of which was laid on the 12th of May 1806, at Haileybury, in the pariſh of Amwell, near Hertford, and at the diſtance of 19 miles from the metropolis. This edifice is now completed, (1811), and in its exterior ſtyle of compoſition and interior arrangement, and appropriation, is highly creditable to the taſte and ſcience of the artiſt. Its ſituation is alſo peculiarly eligible, from the ſalubrity of the air, and pleaſantneſs of the ſurrounding country. The building will contain and accommodate 100 ſtudents, beſides maſters, and neceſſary attendants. About 30 of theſe ſtudents are annually drawn off for India. By the ſtatutes of the college, ſtudents are to be admitted on the completion of their 15th year, and remain here till the age of 18, or till the court of directors ſhall ſend them to their reſpective deſtinations. A nomination to the college on the part of the court is equivalent to an immediate appointment, provided the advantages be not forfeited by the ſtudents. The ſcholars are inſtructed by courſes of lectures, much on the plan purſued in the univerſities.

This inſtitution is under the direction and authority of a principal and ſeveral profeſſors, who conſtitute the college-council. The preſent officers are ;—principal, the Rev. Samuel Henley, D. D. F. S. A.—Profeſſors of mathematics and natural philoſopher, the Rev. Bewick Bridge, B. D. the Rev. William Dealtry, A. M. F. R. S.—Profeſſors of claſſical and general literature, the Rev. Edward Lewton, A. M. the Rev. Joſeph Hallet Batten, A. M.—Profeſſor of hiſtory and political economy, the Rev. Thomas Robert Malthus, A. M.—Profeſſor of general polity and the laws of England, Edward Chriſtian, eſq. A. M.—Profeſſor of Arabic, Perſian, and Hindûſtanni, Charles Stewart, eſq.—Profeſſor of Hindû literature, and of the hiſtory of Aſia, Alexander Hamilton, eſq —Aſſiſtants in the Oriental department, Moolvy Abd al Aly ; Moolvy Mirza Kheleel —Perſian writing-maſter, Moonſhy Ghoolam Hyder.—Viſitor and counſellor in the Oriental department, Charles Wilkins, eſq. F. R. S. L. L. D.—Regiſtrar and deputy librarian, Robert Bellew, eſq.—Maſters attached to the college, M. de Foligny, for French ; Mr. Thomas Medland, for drawing ; Mr. Henry Angelo, for fencing.—Beſides the general ſuperintendance of the college, it is the office of the principal, more eſpecially, to watch over the moral and religious conduct of the ſtudents ; to inſtruct them in the principles of ethics and natural theology, and in the evidences, doctrines, and duties of revealed religion. Whilſt, in this reſpect, he diſcharges the duty of a profeſſor in divinity, ſo, in the exerciſe of his clerical function, he takes his turn, in conjunction with ſuch profeſſors as are in holy orders, to preach in the college chapel, and at the ſtated ſeaſons to perform the ſolemnities of the eſtabliſhed church. The office of dean, which is held by a clerical member of the college-council, by annual appointment, is to aſſiſt the principal in the ſuperintendance of the college. The librarian is alſo a member of the ſame body by annual appointment. The courſes of lectures of the profeſſors are arranged under four diſtinct heads. I. Oriental literature. 1. Practical inſtruction in the rudiments of the Oriental languages, eſpecially the Arabic, Perſian, and Hindûſtanni, together with the Sanſcrit and

Bengalee. 2. A courſe to illuſtrate the hiſtory, cuſtoms, and manners of the people of India.—II. Mathematics and natural philoſophy. 1. A courſe of practical inſtruction, in the elements of Euclid, algebra, and trigonometry; on the moſt uſeful properties of the conic ſections, the nature of logarithms, and the principles of fluxions. 2. A courſe of lectures on the four branches of natural philoſophy; mechanics, hydroſtatics, optics, and aſtronomy; with elementary inſtructions in chemiſtry, mineralogy, and natural hiſtory.—III. Claſſical and general literature. 1. A courſe of lectures to explain the ancient writers of Rome and Greece, more particularly the hiſtorians and orators. 2. A courſe of lectures on the arts of reaſoning and compoſition, and ſuch ſubjects as are generally underſtood by the "belles lettres." The Engliſh language, and the merits of its moſt approved writers, are prominent objects in theſe lectures. The ſtudents in this department are exerciſed in ſuch ſpecies of compoſition as are appropriate to their future occupations. —IV. Law, hiſtory, and political economy. 1. A courſe of lectures on general polity, on the laws of England and the principles of the Britiſh conſtitution. 2. A courſe of lectures on general hiſtory, and on the hiſtory and ſtatiſtics of the modern nations of Europe. 3. On political economy. The whole of theſe inſtructions are as plain and practical as their different ſubjects will admit. The college year is divided into two terms of forty weeks each, with a ſummer vacation of eight weeks, and a winter vacation of four weeks. The principal examination extends through the laſt three weeks previous to the winter vacation, and is cloſed by a viſitation of the court of directors, when the reſult of the examination is publiſhed by the principal in ſeparate liſts for each department of the reſpective merits of every ſtudent; which liſts are inſerted in the public records of the company. A ſeparate liſt exhibits a relative view of the conduct and proficiency of each ſtudent. Prizes of books, gold medals, and certificates of ſuperior merit, with other marks of academical diſtinctions, are publicly conferred by the chairman: and every ſtudent on going to India carries with him a certificate, under the college ſeal, ſpecifying the attainments he has made during his academical courſe. Further particulars relative to this college, college-ſchool, (which is now fixed in Hertford caſtle,) and other inſtitutions of the company, for the purpoſe of military education, may be found in the Eaſt India Regiſter for 1811.

Among the ſeats in the vicinity of Hertford is Balls, the property of the marquis Townſhend, to whom it was bequeathed by Etheldreda, daughter and heireſs of Edward Harriſon, eſq. and wife of Charles, lord viſcount Townſhend, grandfather to the preſent marquis. The houſe was built in the time of Charles I. by ſir John Harriſon, knight, who, lies buried in All Saints church. Adjoining to Balls, on the ſouth, is Brickenden Bury, the ſeat of — Morgan, eſq.

Hertford, a county of America, in Edenton diſtrict, North Carolina, containing 6448 inhabitants, of whom 2733 are ſlaves: the chief town is Wynton.—Alſo, a poſt-town of N. Carolina, in Edenton diſtrict, and capital of the county of Gates; containing about 20 houſes, a court-houſe, and gaol; 18 miles N.N.E. of Edenton.

HERTFORDSHIRE, a midland county of England, is ſurrounded by Middleſex, Buckinghamſhire, Bedfordſhire, Cambridgeſhire, and Eſſex. Its limits are principally artificial, excepting on the ſouth-eaſt, where it is ſeparated from Eſſex by the rivers Lea and Stort.

Previous to the Roman invaſion, this diſtrict was chiefly poſſeſſed by the Caſſi, or Catieuchlani; whoſe ſovereign, Caſſivelaunus, was choſen to lead the aſſociated Britons againſt the Romans, and is thought to have had a principal reſidence, or city, at Verulam, which was at that period a ſtrong ſituation, contiguous to the modern St. Albans, and was afterwards advanced to the rank of a municipium. On the ſubjugation of the ſouthern parts of Britain by the Romans, Hertfordſhire was included in the diſtrict named Flavia Cæſarienſis; but after the conqueſt of the iſland by the Saxons, this county was divided between the Eaſt Saxon and Mercian kingdoms. The principal Roman ſtations, either in or connected with this country, were Durocobrivis; Verulamium, or Verulam; and Sullonicæ, or Brockley hills, the latter, however, are chiefly in Middleſex: that the Romans had other, though probably leſs important ſtations within its limits, is evinced by remains that are yet diſcoverable, or by antiquities that have formerly been found. The principal ancient roads which interſected Hertfordſhire, were the Watling-ſtreet, the Icknild-way, and the Irming, or Ermin-ſtreet.

Hertfordſhire extends in its longeſt direction thirty-ſix miles; its general breadth is about twenty-ſix miles; and its circumference between 130 and 140 miles. Its ſuperficies, according to Halley, includes 451,000 acres; yet this appears to be rather an exaggerated meaſurement, and if the ſtatement be limited to 385,000, it will probably be more accurate. The county is divided into eight hundreds, which contain two boroughs, ſeventeen other market towns, and 134 pariſhes: the number of houſes, according to the population return in 1801, amounted to 18,172; that of inhabitants to 97,577; of whom 48,063 were males, and 49,514 females. The repreſentatives in parliament are ſix: of which number two are for the ſhire, two for the borough of Hertford, and two for that of St. Albans.

The ſurface of the county is diverſified ſufficiently to conſtitute a conſiderable variety of pictureſque ſcenery. The northern parts are the moſt hilly; and a range of high grounds ſtretches out from the neighbourhood of King's Langley towards Berkhampſtead and Tring, and in many parts commands a great extent of country. Another elevated ridge commences at St. Albans, and extends in a northerly direction towards Market-ſtreet, at a little diſtance to the eaſt of the high northern road; while ſeveral other ranges of elevated ground run nearly parallel with the former from the vicinity of Sandridge, Whethampſtead, Whitwell, &c. The ſouthern line is alſo high enough to include ſome extenſive proſpects. Moſt of the county is incloſed; and the incloſures, being principally live hedges, intermixed with flouriſhing timber, have a verdant and pleaſing effect. Independently of the wood thus diſtributed in hedge-rows, large quantities of very fine timber are grown in the parks and grounds belonging to the numerous ſeats of the nobility and gentry, that are ſpread over almoſt every part of the county.

The landed property is greatly divided; the vicinity of the capital, the goodneſs of the air and roads, and the beauty of the country, have much contributed to this circumſtance, by making this county a favourite reſidence, and by attracting great numbers of wealthy perſons to purchaſe lands for building villas; this has multiplied eſtates in a manner unknown in the diſtant counties. Freehold eſtates have of late ſold at twenty-five and twenty-eight years purchaſe; and under particular circumſtances ſome very large tracts have obtained from thirty to thirty-two years purchaſe. The largeſt eſtate in the county is about the annual value of 7000*l.* Several others are averaged at from 3000 to 4000*l.*, more at 2000*l.*; and below that ſum, they may be met with of almoſt every amount. A large portion of the county is held by copyhold tenure, with a *fine certain*, or at the will of the lord: but which fine ſeldom exceed two years rent. Land thus held, ſells at about ſix years purchaſe under the price of freehold. The common extent of farms is from 150 to 400 acres; though there are many much ſmaller; ſeveral contain from 400 to 700 acres; and a few from 800 to 1000 acres. The largeſt farms are, in general, the beſt managed and moſt productive; the opinion is common, that the land cannot be kept in a degree of fertility requiſite to ſupport the rental and other expences, without bringing large quantities of manure from the capital; a buſineſs not ſufficiently practiſed on ſmall farms. The average of rent per acre is about 15*s.* ſubject to tythe, which is compounded for through the whole county. The prevailing ſoils are loam and clay; the former is met with in almoſt all its gradations, and is more or leſs intermingled with flints or ſand. The vales, through which the rivers and brooks take their courſe, are compoſed of a rich ſandy loam, with the exception of a ſmall quantity of peat and marſhy moor; the ſlopes of the hills deſcending to thoſe vales, exhibit inferior ſorts of the ſame loams; but the flatter ſurfaces of the higher grounds, are compoſed of a wet and ſtrong loam of a reddiſh hue, and tending in a greater or leſs degree to clay, by which term, it is frequently, though improperly denominated. Round St. Albans, and extending to Watford and Rickmanſworth, the ſoil is principally compoſed of deep flinty loam, with a chalk baſis. Chalk prevails generally on the northern ſide of the county; and extends from the neighbourhood of Barkway and Royſton, through all the contiguous pariſhes to Baldock, Hitchin, King's Walden, &c. The baſis, indeed, of the whole county is chalk, either more or leſs pure; though the depths at which it is found are very different. In the ſouth-weſt corner of the county, and particularly in the pariſhes of Rickmanſworth, Sarret, King's Langley, Abbot's Langley, Flaunden, Bovington, and partly in Watford and Aldenham, are many orchards: apples and cherries are their principal produce. The woodlands are extenſive; and, independently of thoſe which lie contiguous to the ſeats of gentlemen, the whole county is interſperſed with ſmall woods and copſes. The principal roads are very good; being chiefly turnpike, leading directly from the metropolis: the croſs-roads partake of a ſimilar character. The chief manufactures of the county are thoſe of cotton and ſilk; the former is principally carried on in the neighbourhood of St. Alban's and Rickmanſworth; the latter, in the vicinity of St. Alban's and Watford. About Berkhampſtead, black lace is made; but the principal employment of the labouring females, in moſt parts of the county, is plaiting of ſtraw, for bonnets, &c. The wages obtained by this employ are conſiderable; even young girls earn from ſix ſhillings to twelve or fifteen weekly; and the more expert women from that ſum to a guinea, or even twenty-five ſhillings.

The Grand Junction Canal interſects the weſtern ſide of the county; it enters on the ſouth from Middleſex, and paſſes into Buckinghamſhire about two miles above Tring.

The principal rivers in Hertfordſhire, are the Lea, the Rib, the Quin, the Beane, the Gade, the Colne, the Ver or Meuſe, and the Mimeram or Maran. The Lea riſes near Luton in Bedfordſhire; enters this county at Hide Mill, and finally quits it near Waltham-Abbey. This river is navigable to Ware and Hertford. The Rib has its riſe near Cornybury above Buntingford; and falls into the Lea between Hertford and Ware. The Beane riſes near Cromer, flows through Woodhall Park, and meets with the Lea at Hertford. The Colne is formed by the union of ſeveral ſmall ſtreams; theſe unite in the vicinity of North Mims. The New River, a fine ſtream, running in an artificial channel, and ſupplying the greater part of the metropolis with water, has its ſource at the village of Amwell in this county. At this place ſeveral ſprings are collected into a large deep reſervoir, and by means of flood-gates an uniform and regular ſtream of water is conveyed into the channel. On a large ſtone are inſcriptions, ſtating that the courſe of the river is forty miles, and that it was opened in 1608. It was not carried to London till the year 1613. In its courſe to the metropolis it is conveyed acroſs two vallies, by means of lofty, artificial embankments, and at Iſlington it paſſes, in a ſubterraneous channel, for 200 yards. At Sadler's Wells it terminates in a large pool or reſervoir, where a great number of iron pipes branch off in different directions, to convey the water under ground, to various parts of the town. This great and important undertaking was almoſt wholly effected by one man, Mr. Hugh Middleton, citizen and goldſmith, who impoveriſhed himſelf in proſecuting the ſcheme. (See Brayley's "London and Middleſex, 8vo., 1810, &c.) Scott, in a poem, called "Amwell," thus characteriſes and deſcribes the New-River:

> " ———— From Chadwell's pool
> To London's plains, the Cambrian artiſt brought
> His ample aqueduct —— ————
> —————— Our mercenary ſtream,
> No grandeur boaſting, here obſcurely glides
> O'er graſſy lawns, or willow ſhades.
> As through the human form, arterial tubes
> Branch'd every way, minute and more minute,
> The circulating ſanguine fluid extend;
> So, pipes innumerable to peopled ſtreets,
> Tranſmit the purchaſed wave."

HERTHA, or Herthus, in *Mythology*, a deity worſhipped by the ancient Germans. This is mentioned by Tacitus, in his book de Moribus Germanorum, cap. 40. Voſſius conjectures that this goddeſs was Cybele; but ſhe was more probably Terra, or the Earth (ſynonymous with Cybele); becauſe the Germans ſtill uſe the word *hert* for the earth, whence alſo the Engliſh *earth*. Some have ſuppoſed that Stone-henge was a temple conſecrated to the goddeſs Herta.

HERTHAMAN, in the *Materia Medica*, a name given by Avicenna and Serapion to the grain called Zea, uſed much in medicine in their time, and ſuppoſed to be of a middle nature between wheat and barley.

HERTIUS, John Nicholas, in *Biography*, was born, in 1651, at Oberklee, near Gieſſen. He was educated at Gieſſen, and afterwards became profeſſor of law and politics. He died in 1710. The king of Pruſſia had, a ſhort time previouſly to his death, offered him the poſts of privy-counſellor and chancellor. He was author of many eſteemed works, of which the principal are "Notitia Veteris Francorum Regni," containing an account of the early periods of the monarchy of the Franks to the reign of Lewis the pious; and "Commentationes et Opuſcula ad Hiſtoriam et Geographiam Antiquæ Germaniæ Spectantia." Moreri.

HERTZBERG, or Hirzberg, in *Geography*, a town of Saxony, 24 miles S. E. of Wittenberg. N. lat. 51° 42′. E. long. 13° 15′.—Alſo, a town of Pomerelia; 11 miles S. E. of Dantzic.

HERTZEWALT, a town of Pruſſia, in the province of Oberland; 9 miles N. E. of Biſchofswerder.

HERVES, a rich and flouriſhing town of France, in the department of the Ourthe, and chief place of a canton, in the diſtrict of Liege; 11 miles S. E. of Liege. The place contains 2,785, and the canton 10,599 inhabitants, on a territory of 57½ kiliometres, in five communes.

HERVEY, JAMES, in *Biography*, ſon of a clergyman at Harding-ſtone, in Northamptonſhire, was born in the year 1714, and educated at the grammar-ſchool of Northampton. He being intended for the church, was at a proper age removed to Lincoln college, Oxford. Here he became acquainted with ſome perſons, who, at that period, diſtinguiſhed themſelves by their great zeal for the primitive doctrines, as they ſuppoſed, of Chriſtianity, and who were afterwards denominated, "Methodiſts," and by their influence and example zealouſly attached himſelf to the intereſts of piety and learning. Beſides the uſual ſtudies of the place he learned anatomy of Dr. Keil; natural philoſophy from Dr. Derham's Phyſico and Aſtro-Theology, and for improvement in ſtyle and compoſition he paid particular attention to Mr. Spence's Eſſay on Pope's Odyſſey. In 1736, he became curate to his father, and afterwards removed to Biddeford in Devonſhire, where he obtained the warm eſteem of his pariſhioners. His ſtipend was in this place very ſmall, but by an annual ſubſcription among the inhabitants, his income was raiſed to about ſixty pounds a year. While Mr. Hervey was in this ſituation he planned his work, which has been very popular, entitled "Meditations among the Tombs, and Reflections in a Flower Garden;" this he publiſhed in the year 1746. In 1743 he was removed from that curacy, returned to his father, whom he afterwards ſucceeded in his livings of Weſton Flavel and Collingtree. In the exerciſe of his miniſterial duties he was moſt exemplary, preaching, not only on the Sundays, but in the evening of each Wedneſday, he catechiſed the children of his pariſh, and was regular in his paſtoral viſits. By theſe great labours he injured a weak conſtitution, and brought on a decline, which put an end to his valuable life on Chriſtmas-day 1758, when he was only in the forty-fifth year of his age. In 1755 he publiſhed his "Theron and Aſpaſia, or Dialogues and Letters on inportant Subjects." in three volumes; which are written in a popular ſtyle, and according to the Calviniſtic doctrines. He was author of ſeveral other works. The profits of his publications he devoted wholly to purpoſes of charity. Biog. Brit.

HERVEY, JOHN AUGUSTUS, third earl of Briſtol, was born in 1724, and was brought up to the navy, in which he ſerved while he was very young, and obtained the rank of lieutenant in the year 1744. About this time he married miſs Chudleigh, afterwards the celebrated ducheſs of Kingſton. In 1747 he was made poſt captain, and ſerved with high reputation in the Mediterranean. In 1771 he was made one of the lords of the admiralty, and in 1774 he ſucceeded his brother as earl of Briſtol. He died in 1779, and his titles deſcended to his brother, the biſhop of Derry. His lady, in 1768, obtained a deciſion in the Commons which annulled their marriage; but the ſentence was ſet aſide by the houſe of lords in 1771, and ſhe was afterwards indicted for, and convicted of bigamy.

HERVEY's *Bay*, in *Geography*, a large bay on the N.E. coaſt of New Holland, ſo called by captain Cook, in honour of captain Hervey, between Sandy Cape and South Head. S. lat. 24° 40′. W. long. 152° 35′.

HERVEY's *Iſland*. See HARVEY's *Iſland*.

HERVEY's *Point*, a cape on the N. coaſt of the iſland of Egmont, or New Guernſey. S. lat. 10° 42′. E. long. 164° 5′.

HERULI, in *Ancient Geography*, a fierce people, whoſe migrations from the coaſt of the Euxine ſea to the banks of the Danube, and through the dark foreſts of Germany and Poland, it is difficult to purſue, even under the conduct of Zoſimus, Procopius, and Jornandes. Such was their barbarity that they diſdained the uſe of armour, and condemned their widows and aged parents not to ſurvive the loſs of their huſbands, or the decay of their ſtrength. According to Jornandes and Procopius, the Heruli were originally a Gothic nation. The former writer affirms that they firſt dwelt in Scandinavia, and, being expelled from thence by the Danes, they wandered eaſtward as far as the Palus Mæotis, and ſettled in that neighbourhood. Procopius repreſents them as, in ancient times, inhabiting the countries that lie beyond the Danube. Here they continued, making frequent irruptions into the empire, till the reign of the emperor Anaſtaſius, who ſucceeded Zeno in 491, when great numbers of them were cut off by the Lombards, and the reſt driven from their ancient habitations. A large body, having long migrated from one country to another, ſettled at laſt in that of the Rugians, the preſent Pomerania, which they found uninhabited. Some time after they removed into Dacia, beyond the Danube, where, being ill treated by the Gepidæ, they had recourſe to Anaſtaſius, who, in 511, allowed them to paſs the Danube and ſettle in Thrace, on condition of ſerving in the Roman armies when required. Many of them, being driven out of their own country by the Lombards, migrated farther weſtward, and, paſſing without moleſtation, through ſeveral barbarons nations, arrived at the ocean, and embarking, ſet ſail for Thule, or the peninſula of Scandinavia, where they ſettled. They were, as we have already obſerved, remarkably ferocious. They were alſo addicted to every kind of lewdneſs and debauchery; they adored the gods of the other Gothic nations, and, on ſome extraordinary occaſions, they appeaſed them with human ſacrifices. The Heruli firſt began to invade the empire about the year 526, in Valerian's reign, but were ſoon repulſed by his ſon Gallienus. Eleven years after this period, they paſſed from the Palus Mæotis to the Euxine ſea, with a fleet of 500 veſſels, under the conduct of one of their chiefs, and landed at Byzantium and Chryopolis, now Scutari. After ſuſtaining a defeat, they re-embarked, and returned before Byzantium; and having croſſed the Boſphorus, they ſurpriſed and plundered the city of Cyzicus, with great part of Aſia, and the iſlands of Lemnos and Scyros in the Archipelago. Then they ſteered their courſe towards Greece, and beſieged and burnt Athens, Corinth, Sparta, and Argos; but, being compelled to retreat, they committed horrible devaſtations in Bœotia, Acarnania, Epirus, and Thrace. Having been defeated, with great loſs, by Gallienus, they, about two years afterwards, joined the Goths, and other northern nations, againſt the emperor Claudius, but were again defeated. In the fourth year of Diocleſian's reign (A.D. 287) they entered Gaul, and laid waſte the provinces bordering on the Rhine, but were totally defeated and diſperſed by Maximian. In the year 366, the third of Valentinian's reign, they ſerved in the Roman army on the Rhine; and about the year 370 they were attacked by Ermenric or Ermanaric, king of the Oſtrogoths, and obliged to pay a yearly tribute, and to ſupply his army with their youth, when required. They were afterwards ſubdued by Attila, and compoſed part of his army when he invaded Gaul. Upon the death of Attila, they recovered their ancient liberty; and, forming an alliance with the Romans, ſerved in their armies under commanders of their own nation, appointed by the emperor. When Odoacer conquered Italy, in 476, the Heruli, who then ſerved in the Roman armies, obtained lands in Italy. In the reign of the emperor Anaſtaſius, which began in 491, they made war on ſeveral barbarous nations, and ſubdued them; but being overthrown with great ſlaughter by the Lombards, many of them retired; and they were diſperſed among the Rugians, in Scandinavia, and in Thrace and Illyricum; thoſe who ſettled in theſe latter countries oppreſſed and barbarouſly uſed the Romans among whom they lived, to whoſe aſſiſtance Anaſtaſius marched with his troops, and on this occaſion moſt of the Heruli were cut to pieces. Thoſe who eſcaped, promiſing to ſerve the empire as faithful ſubjects, were ſuffered to continue in the countries which had been formerly aſſigned for their habitation. Having murdered their own king, Juſtinian, at their requeſt, appointed a ſovereign for them; but, revolting from him, Juſtinian drove them, and alſo the Gepidæ, who eſpouſed their cauſe, out of the empire. But as they aſſiſted him in his war he was reconciled to them; and in his reign many of them became proſelytes to Chriſtianity; but the change of their religion made no change in their manners; for, according to Procopius, they were the moſt wicked, the moſt treacherous and avaricious, and the moſt addicted to drunkenneſs, and all kinds of lewdneſs and debauchery, of all nations. Soon after the death of Juſtinian, they were ſubdued by the Lombards, and lived partly ſubject to them, and partly to the neighbouring nations.

HERVORDEN. See HERFORD.

HERWART, JOHN GEORGE, in *Biography*, chancellor of Bavaria, who flouriſhed in the early part of the 17th century, is known for the following works: "Chronologia Nova et Vera," 1626; "Admiranda Ethicæ Theologicæ Myſteri propatata, de antiquiſſima veterum Nationum ſuperſtitione qua Lapis Magnes pro Deo habitus colebatur." 1624. Bayle.

HERY, THIERRY DE, an eminent French ſurgeon, of the 16th century, was born at Paris. He ſtudied ſurgery with great aſſiduity in the Hôtel-Dieu. He followed the armies of Francis I. during the war in Italy; but after the battle of Pavia, in February 1525, he went to Rome, and entered into the hoſpital of St. James, where he found numbers of patients lingering under the venereal diſeaſe, to which he had already devoted conſiderable attention. He was ſtruck with the method of Carpi, who by means of mercurial friction, and, by accurate and extenſive obſervation, brought that practice to a great degree of perfection. On his return to France, his knowledge and ſucceſs in the uſe of the friction ſoon acquired him a high reputation; and, having devoted himſelf principally to the treatment of this diſeaſe, he accumulated an immenſe fortune. Nor was he leſs eſteemed for the qualities of his heart, being a man of great benevolence and liberality, compaſſionate and attentive to the poor, and faithful in all the relations of private life. According to Devaux, he died on the 12th of May, 1599; but Ambroſe Paré affirms that he was not living in the year 1585. The only writing which he left is a work on the ſubject of the diſeaſe to which he chiefly directed his practice: "La Methode curatoire de la Maladie Venerienne," &c. Paris 1552, 1569, 1634, in 8vo. It is the firſt treatiſe written in French on that ſubject, and was chiefly compiled from the Italian works which had preceded it. Eloy Dict. Hiſt.

HERZBERG, in *Geography*, a town of Weſtphalia, in the principality of Grubenhagen, near the Hartz mountain, in which are manufactures of arms and iron tools; 14 miles S. of Goſlar.

HERZELE, a town of France, in the department of the Scheldt, and chief place of a canton, in the diſtrict of Audenarde. The place contains 1295, and the canton 15,210 inhabitants, on a territory of 100 kiliometres, in 16 communes.

HERZGOVINA, HERSEK, or *St. Saba*, a town of Dalmatia, giving name to a duchy, called alſo *Moſtar*, which ſee. It is fortified, and is the reſidence of a Turkiſh governor; but a great part of the duchy belongs to Italy; 80 miles S.S.W. of Belgrade. N. lat. 43° 30′. E. long. 18° 20′. The chief towns of the duchy are Narona, or Narenta, formerly the capital, Imos, Varboſania, Moſtar, and Klinova.

HESAUTTA, a town of Bengal; 24 miles north of Toree.

HESDIN, in *Geography*, a town of France, and ſeat of a tribunal, in the department of the Straits of Calais, ſituated on the Canche, built in the form of a regular hexagon, ſtrongly fortified, and almoſt ſurrounded with marſhes; 12 miles S.E. of Montreuil. N. lat. 50 22′. E. long. 2° 7′. The town contains 3792, and the canton 12,619 inhabitants, on a territory of 157½ kiliometres, in 24 communes. *Old Heſdin* is three miles S.E. of the former.

HESHBON, in *Ancient Geography*, a town of Paleſtine, the capital of the tribe of Reuben. It was on the boundaries of the tribe of Gad. (See Joſh. xxi. 39.) It had been the royal city of the Amorites; but after its capture by the Iſraelites it became one of the Levitical cities. Heſhbon, or Heſbon, is 35 miles E. of Jeruſalem.

HESHUSIUS, TILEMANNUS, in *Biography*, noted for his violence againſt the Calviniſts, was born at Weſel, in the year 1526. So great was his proficiency in literature and theology, that, when very young, he was appointed profeſſor of divinity at Heidelberg, and alſo preacher in the church of the Holy Ghoſt. It was in the laſt character that he exhibited that eagerneſs of temper for which he has been noticed by biographers, and on account of which he was deprived of ſome lucrative poſts which he held at Heidelberg. He was afterwards invited into Pruſſia, and appointed profeſſor of theology at Konigſberg. Here he continued till the year 1577, when he was appointed biſhop of Samia; but having written a treatiſe againſt Beza, in which he advanced the abſurd poſition, that "the fleſh of Jeſus Chriſt, in abſtracto, is adorable," he was accuſed, before a ſynod, of maintaining a moſt dangerous propoſition, and was ordered to retract it, which he refuſed, and was accordingly baniſhed. He died at Helmſtadt in 1588. His principal works are, 1. Commentaries on the Pſalms; 2. On Iſaiah; 3. On Paul's Epiſtles; 4. On Juſtification and the Lord's Supper. Bayle.

HESIOD, in *Biography*, an ancient Greek poet, ſuppoſed by ſome to have been a contemporary with Homer, though others have dated the era in which he flouriſhed a century later. He was probably born at Cuma, in Æolia, but removed in his infancy with his father to Aſcra, a ſmall town in Bœotia. Thoſe who contend that he was a contemporary of Homer affirm, that he even obtained a poetical prize in competition with him. He is, at any rate, the firſt that is known to have written a poem on agriculture. This is entitled "The Works and Days," being a kind of calendar of rural occupations; but beſides the inſtructions which are given to the cultivator of the ground, the reader is gratified by a variety of moral reflections, worthy of a Socrates or Plato. His "Theogony" is a miſcellaneous relation, executed without much art or judgment; yet it has been highly eſteemed for the faithful account it gives of the gods of antiquity. "The ſhield of Hercules" is but the fragment of a much larger poem, in which it is imagined the author gave an account of the moſt celebrated heroines among the ancients. Heſiod is ſaid to have written ſeveral other works, which are loſt. He is admired for the elegance of his diction, and the ſweetneſs of his poetry. Pauſanias ſays that in his age the verſes of Heſiod were written on tablets, in the temple of the muſes of which the poet was a prieſt. Virgil, in his celebrated Georgics, has imitated the manner of Heſiod, though he has gone far beyond the model in every kind of excellence. The Greeks were ſo partial to the poetry and moral inſtructions of Heſiod, that they ordered their children to commit them to memory. Heſiod was murdered by the ſons of Ganyctor of Naupactum, and his body thrown into the ſea. The beſt editions of Heſiod are thoſe of Amſterdam, 1667 and 1701; of Oxford, 1737, and of Leipſic 1746, 1778. Moreri. Lempriere.

HESIVON, in *Geography*, a town of Egypt; 22 miles S.S.W. of Cairo.

HESN, a town of Aſiatic Turkey, in the province of Diarbekir; 40 miles W. of Tecrit.

Hesn-*Dkarie*, a town of Arabia, in the province of Nedsjed; 140 miles E N.E. of Mecca.

Hesn-*Keifa*, a town of Aſiatic Turkey, in the province of Diarbekir; 30 miles E.S.E. of Diarbekir.

Hesn-*Mohdi*, a town of Perſia, in the province of Chuſiſtan, at the mouth of the Euphrates; 55 miles E. of Baſſora.

Hesn-*Ratrik*, a town of Aſiatic Turkey, in the government of Maraſch; 25 miles N. of Malatia.

Hesn-*Tchekbi*, a town of Aſiatic Turkey, in the government of Sivas; 40 miles S. of Sivas.

HESNAL-MAI, a ſmall iſland and village of Egypt, in the lake of Tennis; 25 miles N.W. of Tineh.

HESPER, Hesperus, in *Aſtronomy*, the *evening ſtar*; an appellation given to Venus when ſhe follows, or ſets after the ſun.

The word is formed of the Greek Ἑσπερος, and is ſuppoſed to have been originally the proper name of a man, brother of Atlas, and father or grandfather of the Heſperides.

Diodorus, lib. iii. relates, that Heſperus, diſtinguiſhed by his piety, juſtice, and generoſity, having aſcended to the top of mount Atlas, the better to obſerve and contemplate the ſtars, was carried away by an impetuous wind, and never returned more; and that hence he was fabled to have been changed into this ſtar.

HESPERANTHA, in *Botany*, ſo named by Mr. Ker, late Gawler, from εσπερα, *the evening*, and ανθος, *a flower*, becauſe the flowers expand at the cloſe of day, and ſhut up again in the morning, contrary to the uſual habits of the family to which they belong; and this they perform each for ſeveral ſucceſſive nights. Ker in Ann. of Bot. v. 1. 224. Curt. Mag. v. 21. 790. Ait. Hort. Kew. ed. 2. v. 1. 84.—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Enſatæ*, Linn. *Irides*, Juſſ.

Gen. Ch. *Cal.* Spatha inferior, ſhorter than the corolla, of two oblong, ribbed, herbaceous, permanent valves; the outermoſt larger, enfolding the inner one. *Cor.* of one petal, ſuperior; tube cylindrical, ſlightly ſwelling upwards, longer than the calyx; limb regular, in ſix deep, elliptic-oblong, equal, widely ſpreading or reflexed ſegments, the three outer ones moſt coloured at the back. *Stam.* Filaments three, inſerted into the mouth of the tube, ſhorter than the limb, cylindrical, equal; anthers as long as the filaments, vertical, verſatile, linear. *Piſt.* Germen inferior, obſcurely triangular; ſtyle cylindrical, erect, ſtigmas three, ſpreading, as long as the ſtamens, ſeparate to the mouth of the tube, linear. *Peric.* Capſule oblong, bluntly triangular, membranous, toruloſe, of three cells and three valves. *Seeds* numerous, rather ſmall, roundiſh, but ſomewhat angular and rugged, their coat ſlightly pulpy.

Eſſ. Ch. Spatha of two valves. Corolla tubular; its limb regular, in ſix deep, equal, ſpreading ſegments. Stigmas three, linear, ſeparate to the mouth of the tube. Capſule oblong, triangular.

The ſpecies of this genus, of which Mr. Ker, in the Annals of Botany, enumerates ſix, were previouſly referred to *Ixia*, and we ſcarcely think that they ought to be removed from thence. The chief difference, in the technical character, is the oblong capſule, that of *Ixia* being globoſe. The *Heſperanthæ* indeed are night-flowering plants, and the back of their corolla is remarkably different in colour from the front, which is ſcarcely ſeen in *Ixia*; but there is no peculiar difference of habit on the whole. Still, as they are kept ſeparate in the new edition of the *Hortus Kewenſis*, and as the natural order to which they belong is vaſt and intricate, we ſhall, for the ſatisfaction of our readers, indicate the ſpecies.

1. H. *virginea*. (Ixia virginea of the Bankſian herbarium.) Of this Mr. Ker gives us no character nor deſcription, nor is any figure quoted.

2. H. *radiata*. Curt. Mag. t. 573 and 790. (Ixia radiata; Jacq. Ic. Rar. t. 280. I. fiſtuloſa; Andr. Repoſ. t. 59.)—Leaves fiſtulous. Limb of the corolla ſtrongly reflexed.—Native of the Cape of Good Hope, like all the reſt. The dowager lady de Clifford is ſaid to have imported it in 1794. It blooms from April to June. The *leaves* are ſheathing at the baſe, compreſſed upwards, ſhort, various in breadth. *Stem* a foot or more in height, ſimple. *Flowers* racemoſe, drooping, about five or ſix, cream-coloured, yellowiſh, or pale bluſh-coloured, within; ſtriped with purple or brown without. The plates above cited indicate ſeveral varieties of colour. The ſcent of the flowers, when open at night, is ſpicy, like that of a pink.

3. H. *falcata*. (Ixia falcata; Linn Suppl. 92. Curt. Mag. t. 566. Jacq. Ic. Rar. t. 276. I. cinnamomea; Andr. Repoſ. t. 44.)—Radical leaves ſickle-ſhaped, flat. Segments of the corolla concave. The elegant *flowers* are pure white, except the backs of the three outer ſegments, which are of an uniform red-brown edged with yellow. Jacquin repreſents them crimſon at the back. Their ſmell is like cinnamon, and they are ſaid to open exactly at four o'clock in the afternoon, at the Cape, unleſs rain is at hand, in which caſe they remain cloſed. Mr. Maſſon ſent this ſpecies to Kew in 1787.

4. H. *cinnamomea*. Curt. Mag. t. 1054. (Ixia cinnamomea; Linn. Suppl. 92. Thunb. Diſſ. de Ixia. 10. t. 2. f. 3.)—Radical leaves ſickle-ſhaped, waved and criſped.—Smaller than the laſt, with curiouſly undulated *leaves*. The outſide of the *flowers* is brown; their ſcent is compared, by Mr. Ker, to oil of cloves.

5. H. *anguſta*. (Ixia anguſta; Willd. Sp. Pl. v. 1 202. Jacq. Ic. Rar. t. 279, by miſtake marked *linearis*. I. radiata, β. anguſta; Curt. Mag. v. 16. 573.)—Leaves linear, ſmooth, flat. Stem zig-zag. Flowers erect.—We know this only by the above authorities. The *herbage* is drawn rather glaucous. *Flowers* greeniſh white.

6. H. *piloſa*. (Ixia piloſa; Thunb. Diſſ. de Ixia. 8.)—Leaves linear, hairy. Flowers rather drooping.—Gathered by Thunberg on hillocks about the Cape town. The *ſtem* is three or four inches high. *Leaves* hairy, not half ſo tall.—*Flowers* white within, reddiſh without, opening at four in the afternoon.

HESPERIA, in *Entomology*, a Fabrician genus of the Papiliones, in which the feelers are compreſſed and hairy at the baſe; the tip cylindrical and naked; and the club oblong and often naked. This newly inſtituted genus correſponds with the Linnæan diviſion of Papilio, *Plebeii*, and like that family is divided into two ſections, *rurales* and *urbicolæ*. They are the ſmalleſt of the butterfly tribe. See Papilio.

HESPERIDES, Ἑσπεριδες, in the *Ancient Mythology*, were the daughters, as ſome ſay, or rather the grand-daughters of Heſper, or Heſperus, the brother of Atlas. According to Diodorus, Heſperus and Atlas were two brothers, who poſſeſſed great riches in the weſtern parts of Africa, in a country called Heſperitis. Heſperus had a daughter called Heſperia, or Heſperis, who married her uncle Atlas, and from this marriage proceeded ſeven daughters, called Heſperides, from the name of their mother, and Atlantides, from that of their father. Theſe young women are ſaid to have poſſeſſed ſuch extraordinary beauty and wiſdom, that Buſiris, king of Spain, having heard of their fame, employed pirates to carry them off. Theſe pirates, finding the daughters of Atlas diverting themſelves in a garden, ſeized upon them; but they were reſcued by Hercules, and reſtored to their father Atlas. That prince, in gratitude to Hercules, made him a preſent of the apples which he had come in queſt of. According to the poets, the Heſperides were three in number, Ægle, Arethuſa, and Heſperthuſa. Heſiod, in his Theogony, makes them the daughters of *Nox*, *Night*, and ſeats them in the ſame place with the Gorgons, *viz.* at the extremities of the weſt, near mount Atlas; it is on that account he makes them the daughters of Night, becauſe the ſun ſets there. The Heſperides are repreſented by the ancients as having the keeping of certain golden apples on the other ſide of the ocean. And the poets give them a dragon to watch the garden where the fruit grows; this dragon they tell us Hercules ſlew, and carried off the apples.

Pliny and Solinus will have the dragon to be no other than an arm of the ſea, wherewith the garden was encompaſſed, and which defended the entrance thereof. And Varro ſuppoſes, that the golden apples were nothing but ſheep, and they are ſuppoſed to have been of a particular colour, inclining to gold. It is ſuggeſted alſo, that by the dragon we are to underſtand the ſhepherd that kept thoſe ſheep, a man of great ſtrength and courage, who uſed to put to death ſuch as attempted to force from him any of his flock. Others, with more probability, ſay they were oranges.

The Gardens of the HESPERIDES, *Heſperidium horti*, or *horti Heſperidum*, are placed by ſome authors at Larach, a city of Fez; by others at Bernich, a city of Barca, which tallies better with the fable. Others take the province of Suſa, in Morocco, for the iſland wherein the garden was ſeated. And laſtly, Rudbecks places the Fortunate iſlands, and the gardens of the Heſperides, in Sweden.

The iſles of the Heſperides were iſlands of the ocean of uncertain ſituations; they were either the iſlands of Cape Verd, the Canaries, or the Azores.

HESPERIS, in *Botany*, is the [illegible], or *evening-flower*, of Pliny, becauſe it is moſt in perfection, and has a very delightful fragrance in the evening. Linn. Gen. 340. Schreb. 443. Tourn. 108. Willd. Sp. Pl v. 3. 530. Mart. Mill. Dict. v. 2. Sm. Fl. Brit. 711. Ait. Hort. Kew. v. 2. 398. Juſſ. 238. Lamarck Dict. v. 3. 320. Illuſtr. t. 564.—Claſs and order, *Tetradynamia Siliquoſa*. Nat. Ord. *Siliquoſæ*, Linn. *Cruciferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of four leaflets, which are linear-lanceolate, cohering longitudinally, incumbent at the top, opening at the bottom, deciduous; the two oppoſite ones gibbous at their baſes. *Cor.* of four, cruciform, oblong petals, their limb rather obliquely reflexed contrary to the ſun's motion, with attenuated claws the length of the calyx. *Stam.* Filaments ſix, awl-ſhaped, as long as the claws, two of them only half as long as the reſt; anthers linear, erect, reflexed at the top; a honey-bearing, acuminated gland is placed between the ſhorter ſtamens and the germen, ſometimes ſurrounding each ſhort ſtamen. *Piſt.* Germen the length of the calyx, priſmatic, ſquare; ſtyle none; ſtigma cloven, ſituated internally, oblong, erect, doubly-forked at the baſe, meeting at the top, withering. *Peric.* Pod long, flatly compreſſed, ſtriated, of two cells, and two valves as long as the partition. *Seeds* numerous, ovate, compreſſed.

Eſſ. Ch. Petals bent obliquely. A gland withinſide of the ſhorter ſtamens. Pod ſtraight. Calyx cloſed, having two of its leaves gibbous at the baſe.

The few ſpecies of which this genus is compoſed, are ſeveral of them involved in conſiderable obſcurity. We ſhall mention the principal ones.

H. triſtis. Night-ſmelling Rocket. Linn. Sp. Pl. 927. Jacq. Auſtr. t. 102. Curt. Bot. Mag. t. 730.—"Stem hiſpid, branched, and ſpreading."—Native of the outſkirts of woods, and ſhrubby ditches, in Germany, flowering in May. *Root* biennial. The *ſtem* is about two feet high, erect, rough with long deflexed hairs. *Leaves* ſcattered, on ſhort ſtalks, ovate, ſlightly wavy or toothed, hairy, eſpecially their ribs; the upper part of the ſtem is branched, bearing numerous ſpreading cluſters of flowers, of that peculiar dull greeniſh hue, which ſeems excluſively appropriated to flowers that are fragrant in an evening, and whoſe ſcent is beſt deſcribed by its reſemblance to the Bergamot pear. On this account the plant is very deſirable for cultivation, and more eſpecially becauſe it thrives well in town air, when raiſed in a pot. We have frequently obſerved it in the gardens about London. An excellent figure of this plant may be ſeen in Gerarde's Herbal, 462, under the name of *viola matronalis flore obſoleto*, Ruſſet Dame's Violet, which common name this genus appears to have obtained from the ladies of Germany keeping pots of it in their apartments.

H. laciniata. Willd. n. 2. Allion. Ped. n. 985. t. 82. f. 1, of which we have a ſpecimen from the author himſelf, appears to be but a ſlight variety of the laſt, differing in the ſtronger teeth of its leaves, poſſibly this may be the *Leucojum melancholicum*, figured in Ger. em. 463.

H. matronalis. Purple Dame's Violet. Linn. Sp. Pl. 927. (Viola matronalis flore purpureo ſive albo; Ger. em. 462.)—"Stem ſimple, upright. Leaves ovato-lanceolate, finely toothed."—Native of the continent of Europe, flowering in May and June, very common in ruſtic gardens, and ſucceding extremely well even in the town of London. Whether the *root* be annual or biennial we are not certain. The whole plant is clothed with ſhort hairs, and about three feet high. *Flowers* very abundant, pale, purple, or white, exhaling in the evening only a very ſweet perfume, like that of a pink or ſtock. It propagates itſelf plentifully by ſeed.

H. inodora. Scentleſs Dame's Violet. Linn. Sp. Pl. 927. Sm. Fl. Brit. 711. Engl. Bot. t. 731. Jacq. Auſtr. t. 347. —"Stem erect. Leaves ovato-lanceolate, toothed, ſometimes ſlightly haſtate at the baſe. Petals obtuſe."—This is found in Glouceſterſhire, and in the North of England, as well as in Scotland. We received it from Switzerland as Haller's n. 448. We have alſo from Mr. Schleicher a ſpecimen of the laſt deſcribed ſo numbered. The third *Heſperis* of *Cluſ. Hiſt.* 297, is the very ſame cut which we have quoted from Gerarde for *matronalis*. In fact, we really do not know how to diſtinguiſh theſe two ſpecies. The ſynonyms of Linnæus and Jacquin depend on an original ſpecimen in the Linnæan herbarium. Gouan has ſent, as *H. inodora*, a very diſtinct ſpecies with much ſmaller flowers, and ſhorter, broader, deeply-toothed leaves.

Several more ſpecies may be found in Willdenow, about which we have no particular information.

H. verna. Linn. Sp. Pl. 928. (Leucojum marinum latifolium; Ger. em. 460.) is a very pretty dwarf ſpecies, flowering abundantly about the neighbourhood of Naples in

March, and ſeeming to occupy the place of our *Arabis thaliana*, which, however, it much exceeds in beauty. The *Leaves* are hoary with ſtellated hairs, and ſtrongly toothed. *Flowers* occaſionally purple or white.

Hesperis, in *Gardening*, contains plants of the hardy, herbaceous, flowery kind; of which the ſpecies moſtly cultivated are, the night-ſmelling rocket, or dame's violet (H. triſtis); the garden rocket, or queen's gilliflower (H. matronalis); and the unſavoury rocket (H. inodora). The ſecond ſpecies has different varieties, as with ſingle purple flowers, with double flowers of each colour, and with a mixture of each colour. And the Siberian variety has a ſtem of twice the height of the common ſort, the corolla of the flower being purple and not white.

Method of Culture.—Theſe plants are capable of being increaſed either by the ſeeds, the off-ſets from their roots, or by cuttings made from the flower ſtems.

In the ſeed method, the well-ripened ſeeds ſhould be ſown in the early part of the ſpring on a bed or border of light earth, being raked in lightly, or covered in with light mould to the depth of a quarter of an inch. When the young plants have acquired a few inches growth, they ſhould be planted out in beds, ſix inches apart, in order to continue until autumn or the ſpring following, when they ſhould be tranſplanted to the places where they are to grow and flower.

From moſt of theſe ſeedling plants only producing ſingle flowers, and a great many of theſe going off as ſoon as they have flowered, it is neceſſary to provide annually a freſh ſupply.

The moſt certain method of increaſing the double ſorts is by having recourſe to the diviſion of their roots, or by planting out cuttings made from them.

In the root method of proceeding, with the intention of providing off-ſets more abundantly, ſome of the beſt plants ſhould be placed in an open bed or border, and not ſuffered to run up fully to flowers; but as ſoon as the flower ſtems have advanced eight or ten inches in height to cut them down as cloſe to the ground as poſſible; and as they ſhoot again to have them alſo cut off; for by ſtopping their upright growth in this manner, the roots are induced more readily to throw out young off-ſets from their ſides, which will be well formed by the beginning of the autumn, when the whole root ſhould be taken up, and the off-ſets ſeparated from it, and planted out in a nurſery bed at about ſix inches diſtance, in order to continue until the beginning of autumn, or the following ſpring; at which times they ſhould be carefully removed to the places where they are to grow for flowering, with good balls of earth about their roots.

Such of the flower ſtems as are thus cut down occaſionally for the purpoſe of increaſing the number of off-ſets, may be formed into cuttings of proper lengths, and planted out in the method that is adviſed below, when each of them will conſtitute a plant for flowering in the ſucceeding year. This practice ſhould be had recourſe to every year in order to keep up the ſtock of double flowers; as thoſe plants which run up to full growth and flower, ſeldom ſend out any off-ſets, except a very few in caſes where the ſtalks are removed immediately after the flowers begin to decline, but which are rarely of much ſtrength.

The proper ſeaſon for planting out the cuttings of the flower ſtems is any time in the early part of the ſummer, as ſoon as the ſtalks are advanced about a foot in length, or before the plants flower, each being divided into two or three cuttings of about four or five inches in length. The lower half commonly furniſhes the beſt cuttings.

Theſe cuttings ſhould be planted out in a ſhady border, depoſiting them two parts within the ground and about three inches aſunder, water being given at the time, and repeated as there may be occaſion.

In moſt caſes, a number of the cuttings will have ſtricken good root, and formed ſhoots at the tops in the courſe of ſix or eight weeks. But in order to promote their taking root in a more effectual manner, they ought to be covered cloſely with bell or hand-glaſſes as ſoon as they are planted, raiſing them occaſionally as the plants begin to ſhoot at the tops, in order to the admiſſion of air, to the influence of which they ſhould be gradually hardened.

Theſe different ſpecies of plants afford a fine ornamental effect in the large open borders and clumps of pleaſure-grounds; as well as when mixed and interſperſed with other plants of the herbaceous kinds, towards the front parts of the more ſhowy clumps, and on the ſides of the lawns and walks, in which they ſhould be always planted in the autumn or very early ſpring, before they begin to puſh for flower ſtems.

Hesperis, in *Ancient Geography*, a town of Cyrenaica, reckoned by Pomponius Mela among the five towns of the Pentapolis, the other four being Apollonia, Ptolemais, Arſinoé, and Cyrené. The name Heſperis, according to Pliny, Ptolemy, and Ammianus Marcellinus, ſucceeded to *Berenice*, which ſee.

HESS, El, in *Geography*, a town of Nubia, ſix miles S. of Sennaar.

HESSA, an iſland in the Nile, 11 miles S. of Syené.

HESSE, William, *prince of*, in *Biography*, who flouriſhed in the 16th century, was a great encourager of learning, particularly of aſtronomical ſcience. He built an obſervatory at Caſſel, and was for many years a moſt aſſiduous obſerver of the heavenly bodies. He died in 1597, and his obſervations were printed at Leyden in 1618.

Hesse, in *Geography*, a principality of Germany of variable boundaries; but of late bounded by the biſhopric of Fulda, the principalities of Hersfeld, Thuringia, Eichsfeld, Calenberg, and Waldeck, biſhopric of Paderborn, duchy of Weſtphalia, and counties of Witgenſtein, Solms, Naſſau, Dillenburg, and Upper Iſenburg; without including within theſe limits, Catzenenelnbogen and ſome other territories. The ruling ſtate is Heſſe-Caſſel, ſo called from the capital. This territory is about 80 Britiſh miles in length, and nearly the ſame in breadth, 2760 miles ſquare, including 750,000 inhabitants, or with Heſſe-Darmſtadt, according to Hoeck, only 700,184, and poſſeſſing a military force of 12,000 men. The annual revenue of Heſſe-Caſſel has been uſually eſtimated at about 1,200,000 rix-dollars; and that of Darmſtadt at 600,000. Heſſe is divided into Upper and Lower, and ſub-divided into five diſtricts, which take their names from the rivers Lahn, Schwalm, Fulda, Werra, and Diemel. The principal town of Lower Heſſe is Caſſel, and Marburg is the capital of Upper Heſſe.

The country is generally mountainous, interſperſed with many pleaſant vales, ſometimes concealing vineyards, and fields fertile in corn and paſturage, which feed multitudes of cattle. It abounds in game and fiſh, and has many foſſils and minerals; the ſands of the Eder contain particles of gold; and there was formerly a mine of that metal, of ſmall account, near Frankenberg. There are alſo found ſilver, copper, lead, alum, vitriol, coal, fine clays, with veins of marble and alabaſter, and ſome medicinal waters. Detached parts are watered by the Rhine and Mayn, which are the two principal rivers. In this country, the ſtates are of three orders, *viz.* nobles, clergy, and burgeſſes from Caſſel, Marburg, and other towns. The religion is the reformed, with two or three ſuperintendants. The univerſities are thoſe of

Marburg and Rinteln, and that of Gieſſen belonging to Heſſe Darmſtadt, which is under the dominion of another branch of the family. The natural products of the country ſupply ſome trade, and a few manufactures of linen, cloth, hats, ſtockings, &c. The chief city is Caſſel, containing about 22,000 inhabitants, which has often ſuffered by war; the Heſſians being more remarkable for expoſing their lives abroad, than for a vigorous defence of their own country. Hanau is alſo a conſiderable place, and gives name to a county, which is ſuppoſed to contain 100,000 perſons. The artificial rivers and cataracts of the elector's country palace, Wilhemſhohe, are the firſt in Europe. Two leagues from Darmſtadt is the Felſberg, called the ſea of ſtones, on account of the number of granite pillars, prepared by the Romans for ſome work; it is a fine-grained light grey granite.

Some perſons, by an arbitrary etymology, have derived the appellation of Heſſi from that of the ancient Catti; whereas it moſt probably originates from the river Eſſe, which runs into the Fulda. However this be, the territory was anciently occupied by the Catti. In the year 902 there were counts of Heſſe, one of whom became king of Germany. In 1292, Heſſe became a principality of the empire, though in proceſs of time it was commonly denominated a landgravate. All the territories were united under Philip the Generous, from whom all the modern landgraves are deſcended. He, in his will, divided his dominion among his four ſons; and from the eldeſt, who had half, aſcended the houſe of Heſſe-Caſſel; the youngeſt, who received the half-quarter part, was the founder of the houſe of Heſſe-Darmſtadt. Accordingly in Heſſe, there have been two ſovereign families, *viz.* Caſſel and Darmſtadt, between whom all the Heſſian territories were divided, with ſeveral articles of ſovereignty poſſeſſed in common. In both houſes there have been princes appenaged; thoſe of Heſſe-Caſſel were Heſſe-Philip-Ithal, and Rothenburg or Rhinfels. The only appendage of Heſſe-Darmſtadt was Heſſe-Homburg. Since the peace of Tilſit, Heſſe-Caſſel has been annexed to the kingdom of Weſtphalia.

Hesse-Darmstadt. See the preceeding article and Darmstadt.

HESSERAH, a town of Hindooſtan, in Dowlatabad; 10 miles E. of Carmullah.

HESSIAN Bellows. See Bellows.

HESTER, in *Geography,* a town of Sweden in Eaſt Gothland; 25 miles S.W. of Linkioping.

HESTRA, a town of Sweden, in the province of Smaland; 55 miles W. of Wexio.

HESTROE, one of the ſmaller Faroer iſlands; ſix miles N. of Sandoe.

HESUDRUS, in *Ancient Geography,* a river of India; probably the ſame with the preſent Setlege or Sutterlaz.

HESYCHASTES, Hesychasta, a perſon who keeps himſelf vacant, and at leiſure, to attend the better, and with the leſs interruption, to the contemplation of divine things.

The word is Greek ἡσυχαστης, formed of ἡσυχαζω, *quieſco, quieti indulgeo,* a derivative of ἡσυχος, *quietus, quiet;* ſo that heſychaſtes, in Greek, anſwers to the literal ſenſe of *quietiſt* in Engliſh.

The name was chiefly uſed by the ancients for ſuch among the monks as did not employ themſelves in any labour of the hands, but renounced all bodily action, to reſign themſelves wholly to prayer and meditation.

HESYCHASTIC, in the *Ancient Muſic,* a kind of melopopeia of the Greeks, proper to calm the paſſions. Encycl. Suppl.

HESYCHIUS of Alexandria, in *Biography,* is placed by different writers in the fourth and at the end of the ſixth century. He is celebrated as a great lexicographer, and has been ſuppoſed by ſome to be the ſame perſon as the patriarch of Jeruſalem, of that name. From the inſertion of ſcriptural words in his lexicon, it is inferred that he was a Chriſtian, though critics have thought that theſe might have been added by another hand. His work is a Greek lexicon or vocabulary, which has been eſteemed by authors of reputation one of the moſt valuable treaſures of the Greek language. Daniel Heinſius wrote notes upon it. The beſt editions are thoſe of Schrevelius 1668, and of Alberti Leyden in two volumes folio, 1746. Moreri.

Hesychius of Miletus, ſon of a ſpecial pleader of that name, who flouriſhed under the emperors Juſtin and Juſtinian, compoſed an "Univerſal Hiſtory" from the reign of Belus to the death of Anaſtaſius. He was author likewiſe of two books "De Viris Doctrina Claris," and "De Rebus Patriis Conſtantinopoleos." The two latter works were edited in Greek and Latin by Meurſius, who added his own notes, with thoſe of Adrian Junius, and Henry Stephens. It was printed at Leyden in 12mo. in the year 1613. Moreri.

HETERANTHERA, in *Botany,* ſo named by Paliſot de Beauvois, from ἕτερος, *other,* or *different,* and ανθηρα, *an anther,* becauſe one of thoſe parts is often different in ſhape or proportion from the reſt, in the ſame flower.—Vahl. Enum. v. 2. 42. (Leptanthus; Michaux Boreal-Amer. v 1. 24.)—Claſs and order, *Triandria Monogynia.* Nat. Ord. *Junci,* Juſſ.

Gen. Ch. *Cal* Spatha inferior, of one leaf, convoluted, containing one or more flowers. *Cor.* of one petal, inferior; tube thread-ſhaped, very long; limb regular, in ſix deep, nearly equal, oblong ſegments. *Stam.* Filaments three, inſerted into the baſe of the limb, linear, ſhorter than the limb, one of them often longer than the reſt; anthers vertical, roundiſh or oblong. *Piſt.* Germen ſuperior, cloſely inveſted with the baſe of the tube, oblong; ſtyle thread-ſhaped, the length of the tube; ſtigma a little dilated, downy, ſomewhat concave. *Peric.* Capſule inveſted with the tube and the calyx, oblong, obſcurely triangular, of three cells and three valves, burſting at the angles, the partitions very narrow, from the centre of each valve. *Seeds* numerous, in a double ſeries in each cell, ovate, longitudinally ſtriated.

Eſſ. Ch. Spatha of one valve. Corolla of one petal; its limb in ſix deep ſegments, nearly equal. Stigma ſimple. Capſule ſuperior, of three cells and three valves. Seeds many.

1. H. *acuta.* Willd. in Nov. Act. Soc. Amer. Hiſt. Nat. v. 3. 438. (Leptanthus reniformis, Michaux v. 1. 25.)—Leaves roundiſh-kidney-ſhaped, acute. Spatha ſmooth, containing about three flowers.—Gathered by M. Louis Boſc in Pennſylvania and Virginia. *Stem* creeping, taking root at the joints, leafy. *Leaves* ſtalked, the earlier ones floating, an inch or more in length and breadth, ſomewhat heart-ſhaped at the baſe, ſmooth like the reſt of the plant. *Flowers* from near the baſe of the foot-ſtalks. *Spatha* an inch long. *Corolla* in two principal diviſions, each in three ſhorter ones, of which the middle one is broadeſt in the upper half, narroweſt in the lower. Two *ſtamens* bear round *anthers;* the third, which is longeſt, an oblong one.

2. H. *reniformis.* Ruiz and Pavon Fl. Peruv. v. 1. 43. t. 71. f. *a.*—Leaves roundiſh-kidney-ſhaped. Spatha oblong, pointed, many-flowered.—Native of marſhes and pools at Lima.—*Stem* branched, ſtriated. *Stipulas* membranous, convoluted, ſtriated, enfolding the young leaves and flowers. *Leaves* ſtriated beneath, on very long ſtalks. *Spatha* at length reflexed, terminating in a linear point.

Flowers three or four, of a pale green, their longer filament bearing a long arrow-ſhaped anther.

3. H. *pubeſcens.* Vahl. n. 3. (Pontederia; Linn. in Loefl. It. 178.)—Leaves heart-ſhaped, acute; the radical ones downy. Spatha linear, many-flowered.—Gathered by Lœfling in marſhes near Barcelona in South America. *Stem* a ſpan high. Upper *leaves* ſmooth. *Flowers* from a ſlit in the uppermoſt footſtalk, pale purpliſh blue.

4. H. *cordata.* Vahl. n. 4.—Leaves cordate-oval, very blunt. Spatha oblong, very obtuſe, about three-flowered. —Found in South America by Von Rohr.—*Stem* a ſpan high. *Leaves* riſing above it, ſcarcely more than half an inch in length, on long ſtalks. *Spatha* ſhort and narrow.

5. H. *limoſa.* (Pontederia limoſa; Swartz. Ind. Occ. v. 1. 611. Leptanthus ovalis; Michaux v. 1. 25. t. 5. f. 1.)—Leaves ovate-oblong. Spatha lanceolate, ſingle-flowered.—Native of the muddy banks of rivers in Jamaica, Hiſpaniola, and the country of the Illinois in Canada, flowering in Auguſt. *Stems* ſeveral, very ſhort, each bearing only one or two ovate, ſmooth, erect *leaves*, on long, thick, fiſtulous ſtalks, from whoſe lower part ſprings a ſhort *flower-ſtalk*, with a ſingle-flowered, oblong, pointed *ſpatha*. *Corolla* blue. *Stigmas* ſix, according to Swartz, which is remarkable, and requires examination.

6. H. *diverſifolia.* Vahl. n. 6.—Leaves partly ovate, inclining to heart-ſhaped, ſtalked; partly linear and ſeſſile.—Gathered by M. Richard in Guiana. *Stem* ſlender, branched. Lower *leaves* linear, acute, wavy, probably immerſed; the upper apparently floating, thicker than the former. *Footſtalks* roundiſh. *Spatha* ſaid by Richard to conſiſt of two valves.

7. H. *graminea.* Vahl. n. 7. (Leptanthus gramineus; Michaux v. 1. 25. t. 5. f. 2.)—All the leaves linear.—Gathered by Richard in the river Ohio. This has the aſpect of *Potamogeton gramineum.* *Stem* ſlender, throwing out roots from the joints. *Leaves* alternate, ſheathing, ſeſſile, two inches long. *Spathas* ſolitary, axillary, ſingle-flowered. Tube of the *corolla* much longer than the leaves. *Stamens* ſometimes four.

None of the ſpecies of this genus have been brought alive to England, nor are they, ſcarcely, to be met with in herbariums. They all ſeem to be aquatics. Their flowers are inconſpicuous, and probably very tranſitory. The name given by Michaux to this genus, from λεπτος, *ſlender*, and ανθος, *a flower*, is very expreſſive of their appearance.

HETERIARCH, Heteriarcha, in *Antiquity*, an officer in the Greek empire, whereof there were two ſpecies; the one called ſimply heteriarch; and the other, great heteriarch, who had the direction of the former.

The word is Greek ἑταιριαρχα, formed of the Greek ἑταιρος, *ſocius, companion, ally*, and αρχη, *imperium, command.* Their principal function was to command the troops of the allies; beſides which, they had ſome other duties in the emperor's court, deſcribed by Codin, De Officiis, cap. 5. n. 30, 31, 32, 37.

HETEROCERUS, in *Entomology*, a genus of Coleoptera, eſtabliſhed by Boſc in the Tranſactions of the Natural Hiſtory Society of Paris. The antennæ in this genus are very ſhort, and compoſed of ten joints, the two firſt of which are very large, the ſucceeding ſeven ſmaller, and forming by their union at the outer edge a kind of ſerration, the extreme joint obtuſe; the head is advanced and elongated, and the jaws, which are exſerted, are denticulated at the tip; the thorax is convex and attenuated in front; the body ovate.

This genus is nearly allied in appearance to the Dermeſtes, to which genus Thunberg refers the ſpecies deſcribed by Boſc under the name of marginatus. Fabricius, in his mantiſſa, places it in the genus Apate. Marſham adopts the generic name aſſigned by Boſc. The habits of the heterocerus are not peculiar; it frequents ſtagnant waters, where it is ſuppoſed to feed on the refuſe of decayed animal and vegetable ſubſtances, and on the multiplicity of animalculæ that occur in ſuch ſituations. There are four joints in the tarſi of the legs.

Species.

Marginatus. Downy, blackiſh; margin and dots on the wing-caſes ferruginous. *Heterocerus marginatus*, Boſc. *Dermeſtes feneſtratus*, Thunb. *Heterocerus marginatus*, Marſh. Ent. Brit.

This ſpecies, according to Olivier, is not rare in the marſhes of the foreſt of Bondy, in France. It has been alſo taken in abundance, near Sheerneſs, in the month of September. Its length is about two lines and a half.

HETEROCLITE, Heterocliton, in *Grammar*, an irregular, or anomalons word, which either in declenſion, conjugation, or regimen, deviates from the ordinary rules of grammar. See Anomalous.

The word is Greek ἑτεροκλιτον, formed of ἑτερος, *alter, another, different*, and κλινω, *I decline.*

Heteroclite is more peculiarly applied to nouns, which vary, or are irregular, in point of declenſion; having fewer caſes, numbers, &c. than ordinary; or that are of one declenſion in one number, and another in another.

We have various ſorts of heteroclites, as defective and redundant heteroclites, &c. Under the claſs of heteroclites come aptotes, diptotes, monoptotes, triptotes, tetraptotes, pentaptotes, &c.

HETERODOX, formed of the Greek ἑτεροδοξος, a compound of ἑτερος, *alter*, and δοξα, *opinion*, in *Polemical Theology*, ſomething that is contrary to the faith or doctrine eſtabliſhed in the true church. Thus, we ſay, a heterodox opinion, a heterodox divine, &c.

The word ſtands in oppoſition to *orthodox.*

Heterodox, *Heterodoxi*, in *Botany*, that ſet of ſyſtematical writers on this ſcience, who formed their diſtributions and claſſes of the plants on wrong foundations, not on the diviſions made by nature in the different ſtructure of the parts of fructification in the different claſſes, but on the ſhape of their leaves, or roots; or who ranged them by their common names, according to the letters of the alphabet. Linnæi. Fund. Bot. p. 2. See Botany.

HETERODROMUS Vectis, in *Mechanics*, a lever wherein the fulcrum, or point of ſuſpenſion, is between the weight and the power. This is what we otherwiſe call a *lever of the firſt kind.* See Lever.

This term is uſed by way of contradiſtinction to the *homodromus vectis.*

HETEROGENEITY, in *Phyſics*, the quality or diſpoſition which denominates a thing heterogeneous.

The word is alſo uſed for the heterogeneous parts themſelves. In which ſenſe, the heterogeneities of a body are the ſame thing with the *impurities* thereof.

Heterogeneity is a term of a very lax ſignification: but, ſo far as the term may be made uſe of, to convey any diſtinct ſignification, it muſt be by conſidering natural bodies under different ſortments, according as they are diverſified by figure, bulk, motion, and their more ſenſible properties; ſo that thoſe of different ſortments are heterogeneous to one another, and the parts of the ſame ſortment are homogeneous.

In effect, they are two terms, which ſerve frequently as a refuge for ignorance; otherwiſe, the common terms of *like* and *unlike* may ſerve every whit as well. Quincy.

HETEROGENEOUS, or HETEROGENEAL, literally imports ſomething of a different nature, or that conſiſts of parts of different or diſſimilar kinds; in oppoſition to homogeneous.

The word is Greek, formed of ἕτερος, *alter, different,* and γένος, *genus, kind;* q. d. compoſed of different kinds of parts.

HETEROGENEOUS is particularly applied, in *Mechanics*, to thoſe bodies, whoſe denſity is unequal in different parts of their bulk. Or, heterogeneous bodies are ſuch, whoſe gravities in different parts are not proportionable to the bulks thereof.

Bodies equally denſe, or ſolid in every part, or whoſe gravity is proportionable to their bulk, are ſaid to be homogeneous.

HETEROGENEOUS *Light*, is that which conſiſts of parts or rays of different refrangibility, reflexibility, and colour.

HETEROGENEOUS *Nouns*, in *Grammar*. See NOUN, GENDER, &c.

HETEROGENEOUS *Numbers*. See NUMBERS.

HETEROGENEOUS *Quantities*, are thoſe which are of ſuch different kind and conſideration, as that one of them, taken any number of times, never equals or exceeds the other.

HETEROGENEOUS *Surds*, are ſuch as have different radical ſigns; as $\sqrt{aa}$, and $\sqrt[3]{bb}$; $\sqrt[5]{9}$, and $\sqrt[7]{19}$.

How to reduce the heterogeneous ſurds to homogeneous ones, ſee under the article SURDS.

HETEROPHAGI, formed of ἕτερος, *different*, and φάγω, *I eat*, in *Natural Hiſtory*, a term uſed by ſome authors to expreſs a peculiar claſs of inſects, diſtinguiſhed by their eating many different things, but not feeding on one another, as thoſe do which are of the claſs of the allelophagi, of which there are a great number of ſpecies.

HETEROPLON, in *Antiquity*. See AMPHOTEROPLON.

HETEROPYRÆ, in *Natural Hiſtory*, the name of a genus of ferruginous foſſils, compoſed of ſeveral coats, incloſing a nucleus of a different ſubſtance from themſelves, and often looſe, and rattling in them. See SIDEROCHITA.

Of this genus there are ſeven ſpecies. Hill's Foſſils, p. 536.

HETERORHYTHMUS, compounded of ἕτερος and ῥυθμός, *meaſure*, a term uſed, by ſome fanciful writers, for a courſe of life unſuitable to the age of thoſe who live in it.

The ſame is alſo applied to pulſes, when they beat variouſly or irregularly in diſeaſes; or rather, when a pulſe belonging to one age is found in a patient of another.

HETEROSCII, formed of ἕτερος, *different*, and σκιά, *ſhadow*, in *Geography*, a term vulgarly applied to thoſe inhabitants of the earth whoſe ſhadow at noon-tide is always projected the ſame way, either north-ward, or ſouth-ward.

In this ſenſe, the inhabitants of the temperate zones are denominated heteroſcii. See ZONE.

HETEROSCII, however, in ſtrictneſs, and according to the origin and reaſon of the word, is a term of relation, and denotes thoſe inhabitants, which, during the whole year, have their noontide ſhadows projected different ways from each other. Thus, we who inhabit the northern temperate zone, are heteroſcii with regard to thoſe who inhabit the ſouthern temperate zone; and they are heteroſcii with reſpect to us.

From this definition it follows, that only the inhabitants of the two temperate zones are heteroſcii; nor is the word ordinarily applied to any other; though in reality, there is always one part of the torrid zone, whoſe inhabitants are heteroſcii with regard to thoſe of the reſt, and with regard to thoſe of one of the temperate zones, except at the time of the ſolſtices. And even at that time, all of the torrid zone are heteroſcii with regard to thoſe of one of the temperate zones. But as this is variable, and the people of the torrid zone have their ſhadow now on this, and then on that ſide, the cuſtom is to call them *amphiſcii*, and not *heteroſcii*.

HETEROSPERMUM, in *Botany*, a name given by the late abbé Cavanilles, from ἕτερος, *different*, and σπέρμα, *ſeed*, from the two different forms of the ſeeds in the ſame flower. He writes it *Heteroſperma*; but Willdenow, in adopting the genus, has properly corrected him, as above. Cavan. Ic. v. 3. 34. Willd. Sp. Pl. v. 3. 2129. Claſs and order, *Syngeneſia Polygamia-ſuperflua*. Nat. Ord. *Compoſitæ oppoſitifoliæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common Calyx* ſimple, in three or four deep, linear ſegments. *Cor.* compound, radiated; florets of the diſk ſeveral, tubular, four-cleft in their border, hermaphrodite; thoſe of the radius three or four, female, prolific, their corolla ligulate, ſhort, three-cleft. *Stam.* Filaments four, very ſhort, in the florets of the diſk only; anthers forming a cylinder. *Piſt.* Germen to each of the florets, except three or four in the very centre, ovate, compreſſed, bordered; ſtyle thread-ſhaped; ſtigmas two, revolute. *Peric.* none, except the permanent calyx. *Seed* ovate, ſurrounded by a membrane concave on the inner ſide, three or four of the inner ſeeds, as they approach the centre, becoming narrower and longer, with a cloven beak at the ſummit, which in the innermoſt is barbed with reverſed briſtles. *Recept.* ſmall, clothed in the circumference with ovate ſcales.

Eſſ. Ch. Receptacle ſcaly in the circumference. Seeds of the circumference ovate, with a membranous margin; of the centre oblong, crowned with a cloven awn. Calyx ſimple, deeply four-cleft.

Obſ. Willdenow takes the large ovate ſcales of the external part of the receptacle for an inner calyx; but it ſeems to us, by analogy, that they are beſt underſtood as above. Cavanilles obſerves, that it is not merely the radius which bears ovate ſeeds; the elongated briſtly ones, like thoſe of *Bidens* in appearance, being only three or four in the middle part, next to the very central florets of all, which have no traces of germen or ſeed.

1. H. *pinnatum*. Cavan. Ic. t. 267. Lecciones 204.—Stem ſmooth. Leaves pinnate, linear, entire. Native of New Spain, flowering in the botanic garden at Madrid from Auguſt to October. *Root* annual. *Stem* a yard high, leafy, with oppoſite branches. *Leaves* oppoſite, connate, compoſed of three pair of linear entire leaflets, an inch long, with an odd one. *Flowers* ſmall, yellow, ſolitary, on long, ſimple, terminal, naked ſtalks.

2. H. *ovatum*. Willd. n. 2. (H. ovatifolia; Cavan. Leccion. 204.)—Stem hairy. Leaves ſimple, ovate, toothed in their upper part.—Gathered by Luis Née in Peru. The *ſtem* is branched, villoſe. *Leaves* oppoſite, ovate, from five to eight lines long, ſomewhat fringed in the lower part. In other reſpects this ſpecies much reſembles the former. *Cavanilles.*

HETEROSTROPHE, formed of ἕτερος and στρέφω, *I turn*, an epithet applied to certain ſhells, the wreaths of which turn a contrary way from thoſe of other ſhells of the ſame genera. We have in the Philoſophical Tranſactions, N 56, an account of two very remarkable ſnail-ſhells of this kind.

HETEROUSII, Heterousians, compoſed of ἑτερος, and ȣσια, *ſubſtance*, a ſect or branch of Arians, the followers of Aëtius, and from him alſo denominated *Aëtians*.

They were called Heterouſii, becauſe they held, not that the Son of God was of a ſubſtance like, or ſimilar to, that of the Father: which was the doctrine of another branch of *Arians*, thence called *Homoouſians*, *homoouſii;* but that he was of another ſubſtance different from that of the Father.

HETH, in *Scripture Hiſtory*, the father of the Hittites, was the eldeſt ſon of Canaan, and dwelt S. of the promiſed land, at or near Hebron. Some maintain that there was a city called Heth; but no traces of it occur in ſcripture.

HETSHOLM, or the Horse *Iſle*, in *Geography*, an uninhabited iſland of the Baltic, S. of Vorms or Ormſon; only viſited for taking its crop of hay.

HETSIN, or Etsin, a town of Corea, in the province of Tchu-ſin; 97 miles E. of King-kitao. N. lat. 36° 47'. E. long. 126° 54'.

HETTSTADT, or Heckstadt, a town of Germany, in the county of Mansfield, belonging to Saxony, on the Wipper. The magiſtrates of this town poſſeſs conſiderable privileges. The caſtle or palace is converted into a brewery: five miles N. of Mansfield. N. lat. 51° 49'. E. long. 11° 42'.

HETZARDARA, or the Thouſand mountains, a mountain of Perſia, S.S.W. of Iſpahan, between the provinces of Irak and Farſiſtan. One branch of this mountain, which gives riſe to the river of Iſpahan, is called Koh Zerdeh, or the Yellow mountain.

HEUCHERA, in *Botany*, a genus named in honour of John Henry Heucher, profeſſor of medicine in the univerſity of Wittemberg, who publiſhed, in the year 1711, "Index Plantarum Horti Medici Academiæ Wittembergenſis." This work was arranged according to the ſyſtem of Rivinus, with many annotations, containing various ludicrous as well as fabulous botanical obſervations. It is not ſurprizing then that a book which appeared at Wittemberg in the year 1720, under the title of *Vegetabilia Magica,* ſhould have been aſcribed to our author, though, it ſeems, he was innocent of the charge. The following treatiſe he publiſhed in 1712, "De igne per ignem extinguendo, ſive de præſtantiſſimo Camphoræ uſu in febribus acutis."—Linn. Gen. 125. Schreb 174. Willd. Sp. Pl. v. 1. 1328. Mart. Mill. Dict. v. 2. Juſſ. 308. Lamarck Dict. v. 3. 127. Illuſtr. t. 184. Gærtn. t. 36.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Succulentæ*, Linn. *Saxifragæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, with five, roundiſh, narrow, obtuſe ſegments. *Cor.* Petals five, lanceolate, inſerted into the margin of the calyx, and of the ſame length with it. *Stam.* Filaments five, awl-ſhaped, erect; anthers roundiſh. *Piſt.* Germen roundiſh, cloven half way down, ending in two ſtraight ſtyles, the length of the ſtamens; ſtigmas obtuſe. *Peric.* Capſule ovate, acuminated, half cloven, of two cells, with two beaks which are reflexed. *Seeds* numerous, ſmall.

Eſſ. Ch. Petals five. Capſule with two beaks and two cells.

1. H. *americana.* Linn. Sp. Pl. 328. Ehr. Exſicc. n. 34. (H. Cortuſa; Michaux Boreal-Amer. v. 1. 171. Cortuſa americana, flore ſqualidè purpureo; Herm. Parad. 131.) "Downy and viſcid. Leaves roundly lobed. Panicle rather denſe."—A native of various parts of North America, ſcarcely cultivated in this country, except in the more curious gardens.—It is perennial, flowering early in the ſummer. *Leaves* radical, heart-ſhaped, on long ſtalks, cut, and crenate. *Flower-ſtalks* taller than the leaves, bearing numerous, inconſpicuous, but not inelegant browniſh flowers.

2. H *villoſa.* Michaux Boreal-Amer. v. 1. 172—"Very villoſe. Leaves acutely lobed. Panicle lax."—Found on the higher mountains of North Carolina by Michaux. It is ſmaller and more ſlender than the former, with ſmall white flowers. We know it only from the above quoted author's account.

HEUCHIN, in *Geography*, a town of France, in the department of the ſtraits of Calais, and chief place of a canton, in the diſtrict of St. Pol; eight miles N.N.W. of St. Pol. The town contains 513, and the canton 12,559 inhabitants, on a territory of 185 kiliometres, in 33 communes.

HEVE, or La Haive, a port and cape on the S. coaſt of Nova Scotia.

HEVEA, in *Botany*, a name of Aublet for one of the trees producing elaſtic gum. Schreber retains it as a genus by the appellation of *Siphonia*, but Juſſieu reduces it to *Jatropha*.

HEVELIUS, in *Biography*, a celebrated Poliſh aſtronomer, was born at Dantzic in the year 1611. He ſtudied mathematics with great ardour, but he chiefly devoted himſelf to aſtronomical purſuits, and built an obſervatory for the purpoſe of making accurate obſervations, which he did with inſtruments of his own conſtruction; the reſult of theſe was publiſhed in 1647 under the title of "Selenographia," or a Deſcription of the Moon, to which he added the phaſes of the other planets, as obſerved by the teleſcope. He was author of many valuable diſcoveries in the heavens. He firſt obſerved the libration of the moon, and diſcovered ſeveral fixed ſtars, which he named "The firmament of Sobieſki," in honour of John III. king of Poland. He drew up a large catalogue of the ſtars, and collected many of the unformed ones into new conſtellations of his own formation. In making his obſervations he received much important aſſiſtance from his wife, who, under his inſtructions, had become an adept in the ſcience, and to whom a part of the honour of them is due. Hevelius publiſhed many works beſides that which is above noticed, but his "Cometographia," publiſhed in 1668, is the moſt valuable, though they all poſſeſs much merit. This work ſets forth the nature of comets, their ſituation, parallaxes, diſtances, varying appearances, and ſurpriſing motions, with a hiſtory of all the comets from the creation to the preſent time, illuſtrated with a curious engraving of his own execution. Having ſent a copy of this work to Dr. Hooke, it occaſioned a controverſy between them on this ſubject, "whether diſtances and altitudes could be taken with plain ſights nearer than to a minute," which Hooke denied, and Hevelius maintained. In 1679, Hevelius had the misfortune to have his houſe at Dantzic burnt down. By this calamity he ſuſtained a loſs to the amount of ſeveral thouſand pounds, having not only his obſervatory, and all his valuable inſtruments deſtroyed, but his books, and numerous copies of his "Machina Cœleſtis," which had lately iſſued from the preſs. He died at Dantzic in 1688, on the day in which he had completed his ſeventy-ſixth year, univerſally reſpected. After his deceaſe ſome poſthumous works of this aſtronomer were given to the world, particularly "Prodromus Aſtronomiæ, et novæ Tabulæ Solares, una cum Catalogo Fixarum," in which he lays down the neceſſary preliminaries for taking an exact catalogue of the ſtars. Moreri.

HEUGH-Head, in *Geography*, a cape of Scotland, in the Frith of Forth, on the coaſt of Fife; three miles W. of Elieneſs.

HEVILKASERAI, a town of Hindooſtan, in Candeiſh; 18 miles S.S.E. of Barawnay.

HEVOSKARI, a cluſter of ſmall iſlands, in the gulf of Bothnia, near the coaſt of Finland. N. lat. 64 12′. E. long. 23 32′.

HEURNIUS, or Van Heurne, John, in *Biography*, an eminent medical profeſſor, was born at Utrecht, on the 25th of January, 1543, where his father was a vintner. No expence was ſpared in order to procure him a liberal education; but ſo tardily did his faculties develope themſelves, that it is ſaid he was ſcarcely able to read at ten years of age, and was not maſter of the rules of grammar before his fifteenth year. From that time, however, he entered with extreme ardour into ſtudy, paſſing even nights and days in continued occupation, and made a rapid progreſs. He ſtudied at Louvain, and afterwards at Paris, under Duret. Thence he went to the ſchools of Italy, having Fabricius ab Aquapendente and other eminent profeſſors for his tutors at Padua; and at Pavia he took the degree of M. D. in 1571. Here he remained two years longer, in the capacity of phyſician to a nobleman. He declined a very favourable offer, made by one of the profeſſors of Pavia, of reſigning his chair in his favour, and giving him his only daughter in marriage, and returned to Utrecht in 1573, after an abſence of twelve years. Here he began the practice of his profeſſion, was appointed phyſician to the counts of Egmont, and nominated a magiſtrate of that city by the prince of Orange. But he was induced to relinquiſh theſe advantages, upon an appointment to the medical profeſſorſhip in the univerſity recently eſtabliſhed at Leyden, whither he went about the end of October, 1581. He fulfilled the duties of this poſt with great reputation for twenty years, during which he was alſo engaged in a very extenſive practice, and was often conſulted by William I. prince of Orange. He had enjoyed uniform good health, until about the 56th year of his age, when he became ſubject to frequent attacks of pain from ſtone in the bladder, which tormented him for two years, and ultimately deſtroyed life, in the month of Auguſt, 1601.

Heurnius had the reputation of great ſagacity in the diſcrimination of diſeaſes, but he was much bigotted to the doctrines and practice of the ancients: he wrote a conſiderable number of books, and was greatly eſteemed in his time. His works are; "Praxis Medicinæ nova Ratio," &c. Leyden, 1587, ſeveral times reprinted. "Oratio de Medicinæ Origine, Æſculapii et Hippocratis ſtirpe et ſcriptis." ibid. 1589. "Inſtitutiones Medicinæ," 1592, which underwent many editions. "De morbis qui in ſingulis partibus humani capitis inſidere conſueverunt," 1594; a very learned performance, and containing ſome important caſes of his own. "De Febribus," 1598. "De Peſte," 1600. "De morbis oculorum, aurium, naſi, dentium, et oris," 1602. "De morbis pectoris." ibid. "De graviſſimis morbis mulierum, & de morbis novis et mirandis," 1607. "De morbis ventriculi," 1608. Beſides theſe, he publiſhed ſeveral works of Hippocrates, with commentaries, and occaſionally with a new verſion, ſome of which were ſeveral times reprinted. All his writings were printed, under the title of "Opera Omnia, tam ad Theoriam, quàm ad Praxim medicam ſpectantia," Lugd. Bat. 1609, in two vols. 4to. and in 1658, folio. Eloy. Dict. Hiſt. Gen. Biog.

HEUSDEN, in *Geography*, a town ſituated on the borders of Brabant and Holland, in the midſt of marſhes, and nearly ſurrounded by a branch of the Meuſe; it is well fortified with a caſtle, baſtion, and horn-works. The juriſdiction of the magiſtrates extends over ſeveral villages, almoſt to Bois-le-Duc; 15 miles N.E. of Breda. N. lat. 51° 45′. E. long. 5 .

HEUST, a town of Pruſſia, on the Friſch Nerung; 17 miles E. of Dantzic.

HEWHOLE, or, as it is pronounced in ſome places, the *high-hoo*, a name given by many to the common green wood-pecker, from its making holes in trees. See Picus *Viridis*.

HEWSON, William, in *Biography*, an eminent anatomiſt, was born at Hexham, in Northumberland, in November 1739. He attended the grammar ſchool of that town until he was apprenticed to his father, a ſurgeon and apothecary of reputation; after which he reſided ſome time with Mr. Lambert, ſurgeon, at Newcaſtle. In 1759 he was ſent to London, and reſided with that diſtinguiſhed anatomiſt, Mr. John Hunter, attending the lectures of his no leſs celebrated brother, Dr. Wm. Hunter. Young Hewſon's aſſiduity and ſkill having attracted the attention of the teachers, he was appointed to ſuperintend the diſſecting room, while Mr. Hunter went abroad with the army in 1760; and in 1762, after ſtudying a year at Edinburgh, he became aſſociated with Dr. Hnuter, and occaſionally delivered the anatomical lectures; and when Dr. Hunter's ſpacious eſtabliſhment was completed in Windmill-ſtreet, Mr. Hewſon was allotted an apartment in the houſe. Here he purſued his anatomical inveſtigations, and "his experimental enquiries into the properties of the blood;" an account of which he publiſhed in 1771, and he communicated to the Royal Society ſeveral papers, containing an account of his diſcoveries of the lymphatic ſyſtem in birds and fiſhes, for which he received the Copleyan medal, and was ſoon after elected a fellow of that body. In 1770, his connection with Dr. Hunter was diſſolved, and he began a courſe of anatomical lectures alone in September 1772, in Craven-ſtreet; and publiſhed a ſecond edition of his "Experimental Inquiry," which he dedicated to ſir John Pringle, as a teſtimony of gratitude for the undeviating friendſhip of that illuſtrious phyſician. In the ſpring of 17 4, he publiſhed his work on the "Lymphatic ſyſtem." At this time his anatomical theatre was crowded with pupils, his practice was daily increaſing, and his ardour for experimental reſearch undiminiſhed, when he was ſeized with a fever, occaſioned by a wound received in diſſecting a morbid body, which terminated fatally on the 1ſt of May 1774, in the thirty-fifth year of his age. His papers, which were afterwards collected together, were originally publiſhed in the 23d, 24th, 25th, and 28th volumes of the Philoſophical Tranſactions, annis 1768-73. See Tranſactions of the Med. Society of London, vol. i. 1801. —Alſo Hutchinſon, Med. Biog.

HEXACHORD, from the Greek, is a term, in *Muſic*, implying either an inſtrument with ſix ſtrings, or a ſcale of ſix ſounds. In the general ſyſtem, the ſcale of Guido had originally only the Roman literal notation; and it was ſome time after its invention that it was divided into theſe relative hexachords, which were interwoven into each other, and called by theſe ſeveral names: as the *durum* hexachord, from gammut, or G to E; the *natural* hexachord, from C to A; and the *molle* hexachord, from F to D, in which B is flat. The term hexachord never appears in the Micrologus. See theſe terms ſeverally explained.

The ſyllables ſuppoſed to be taken by Guido from the hymn to St. John the Baptiſt, "Ut queant laxis reſonare fibris, &c." *Ut re mi fa ſol la*, and being applied to each of theſe hexachords, was to give articulation to ſounds in ſinging, and aſſiſt the ſtudent in hitting diſtances.

And it is from the mixture of theſe hexachords that the mutations in ſolmiſation ariſe. See MUTATION, SOLMISATION, and *Harmonic* HAND.

HEXACHORD, *Major*, or Hexachordon major, is the major, greater, or ſharp ſixth, an interval whoſe ratio is $\frac{3}{5}$ = 451 Σ + 9*f* + 39 *m*. See *Major* SIXTH.

HEXACHORD, *Major*, of Galileo, is an interval whoſe ratio is $\frac{16}{27}$ = 462 Σ + 9 *f* + 40 *m*, and is the *comma redundant major* SIXTH, which ſee.

HEXACHORD, *Minor*, or Hexachordon minor, is the minor, leſſer, or flat ſixth, whoſe ratio is $\frac{5}{8}$ = 415 Σ + 8 *f* + 36 *m*. See *Minor* SIXTH.

HEXACHORD, *Minor*, of Galileo, is an interval whoſe ratio is $\frac{50}{81}$ = 426 Σ + 8 *f* + 37 *m*, which is the *comma-redundant minor* SIXTH, which ſee.

HEXACHORD, *Minor*, of Didymus, is an interval whoſe ratio is $\frac{81}{125}$ = 404 Σ + 8 *f* + 35 *m*, which is the *comma-deficient minor* SIXTH, ſee that article.

HEXACONTALITHUS, in *Natural Hiſtory*, the name of a ſtone deſcribed by Pliny, and other of the ancient writers, as being very ſmall, yet ſhewing an almoſt infinite variety of colours. It ſeems only another name for the opal.

HEXADICA, in *Botany*, is derived from ἑξαδικος, relating to the number *ſix*, becauſe this plant has ſix cells in each of its ſeed-veſſels.—Loureir. Cochinch. v. 2. 562.—Claſs and order, *Monœcia Pentandria*. Nat. Ord. *Euphorbiæ*, Juſſ.?

Gen. Ch. Male, *Cal.* Perianth of five, obtuſe, ſhort, ſpreading leaves. *Cor.* Petals five, ovate, concave, ſpreading. *Stam.* Filaments five, ſhorter than the corolla; anthers ovate, two-lobed, erect.

Female, *Cal.* of ſix, obtuſe, very ſhort, perſiſtent leaves. *Cor.* none. *Piſt.* Germen ſuperior, roundiſh; ſtyle none; ſtigmas ſix, concave, cohering together. *Peric.* Capſule globoſe, having ſix valves and ſix cells, with ſolitary, oblong, angulated *ſeeds*.

Eſſ. Ch. Male, Calyx five-cleft. Petals five.

Female, Calyx of ſix leaves. Corolla none. Stigmas ſix. Capſule of ſix cells, ſingle-ſeeded.

1. *H. cochinchinenſis.* *Cay Bùi deu* in its native country. Loureir. Cochinch. A native of the woods of Cochinchina.—This is a middling ſized *tree* with ſpreading branches. *Leaves* alternate, ovate-oblong, obtuſe, entire, ſmooth. *Flowers* white, ſmall, faſciculated, nearly terminal. *Capſule* ſmall, blackiſh.

Unknown to us but by Loureiro's deſcription given above. We preſume there is not much doubt reſpecting its being of the natural order we have ſuggeſted.

HEXAEDRON, or HEXAHEDRON, formed of ἑξ, *ſix*, and ἑδρα, *ſeat*, in *Geometry*, one of the five regular bodies, popularly called a cube. See CUBE.

The ſquare of the ſide of a hexaedron is in a ſubtriple ratio to the ſquare of the diameter of the circumſcribed ſphere. Hence, the ſide of the hexaedron is to the diameter of the ſphere in which it is inſcribed, as one to the $\sqrt{3}$: and, conſequently, it is incommenſurable to it.

In general, if A, B, C denote reſpectively the linear ſide, the ſurface, and the ſolidity of a hexaedron or cube; and *r* the radius of the inſcribed ſphere, and R the radius of the circumſcribed one: we ſhall have the following general equations, expreſſing the relations of the one to the other:

$$1.\quad A = 2r = \tfrac{2}{3}R\sqrt{3} = \sqrt{\tfrac{1}{6}B} = \sqrt[3]{C}$$

$$2.\quad B = 24r^2 = 8R^2 = 6A^2 = 6\sqrt[3]{C^2}$$

$$3.\quad C = 8r^3 = \tfrac{8}{9}R^3\sqrt{3} = A^3 = \tfrac{1}{6}B\sqrt{\tfrac{1}{6}B}$$

$$4.\quad R = r\sqrt{3} = \tfrac{1}{2}A\sqrt{3} = \tfrac{1}{2}\sqrt{\tfrac{1}{2}B} = \tfrac{1}{2}\sqrt{3}\times\sqrt[3]{C}$$

$$5.\quad r = \tfrac{1}{3}R\sqrt{3} = \tfrac{1}{2}A = \tfrac{1}{2}\sqrt{\tfrac{1}{6}B} = \tfrac{1}{2}\sqrt[3]{C}$$

HEXAGON, formed of ἑξ, *ſix*, and γωνια, *angle*, a figure of ſix ſides and as many angles.

If theſe ſides and angles be equal, it is called a regular hexagon. The angles of a hexagon are each equal to 120 degrees; and the ſide of a hexagon is equal to the radius of a circle circumſcribed about the ſame.

Hence, a regular hexagon is inſcribed in a circle, by ſetting the radius off ſix times upon the periphery.

To deſcribe a hexagon on a given line A B (*Plate* VIII. *Geometry*, *fig.* 97.) draw an equilateral triangle A B C; the vertex C will be the centre of a circle, which will circumſcribe the hexagon required. See POLYGON.

If the ſide of a hexagon be denoted by *s*, its area will be = $2.5980762\,s^2 = \frac{3}{2}s^2 \times \text{tang. } 60° = \frac{3}{2}s^2\sqrt{3}$. For the reaſon of the rule, ſee POLYGON.

N. B. The reader is here appriſed of an error that occurs under the article DODECAGON, and deſired to transfer the geometrical demonſtration that is introduced under that term to DECAGON, to which it belongs.

HEXAGON, in *Fortification*, is a fortreſs of ſix baſtions.

HEXAGYNIA, in *Botany*, is derived from ἑξ, *ſix*, and γυνη, *a female*, being the name of ſuch orders in the principal claſſes of the Linnæan ſyſtem as are characterized by ſix ſtyles in each flower, or where the ſtyles are wanting, ſix ſeſſile ſtigmas. It is an order which occurs but rarely, though we find *Wendlandia* and *Damaſonium* (both belonging to the claſs *Hexandria*) included under it. The former genus is referred to this order by Schreber, and the latter by Willdenow. In the claſs *Polyandria*, we meet with an elegant aquatic, *Stratiotes*, or Water Soldier, included in *Hexagynia*, as well as with *Braſenia*, a new genus of Schreber's. It does not appear in any other of the Linnæan claſſes, except *Enneandria*, where it is eſtabliſhed to admit *Butomus*, the Flowering Ruſh.

HEXAHEDROSTYLA, in *Natural Hiſtory*, the name of a genus of ſpars.

The word is derived of the Greek ἑξ, *ſix*, ἑδρα, ſide, and στυλος, *a column*.

The bodies of this genus are ſpars of a columnar form, adhering to ſome ſolid body at the baſe, and terminated at the point by a pyramid. The pyramid and column are both hexahedral, or compoſed each of ſix ſides.

Of this genus there are three known ſpecies. 1. A ſlender one with a long pyramid, compoſed of ſo pure and clear a ſpar, that it reſembles cryſtal, and is found in Ockley Hole, on Mendip hills, and in ſome other parts of England. 2. A ſomewhat thick one, with a long irregular pyramid, found in the mines of Cornwall and Devonſhire, and common alſo in thoſe of Germany. 3. One with a very ſhort pyramid found in the Derbyſhire lead-mines, and in thoſe of the Hartz-foreſt in Germany. Hill's Hiſt. of Foſſils, p. 218.

HEXAMERON, or HEXÆMERON, a name given to divers writings, both of ancient and modern authors, containing commentaries, or diſcourſes, on the firſt chapter of

Geneſis; wherein is delivered the hiſtory of the creation or the firſt ſix days of the world.

The word is Greek, formed of ἑξαμερον, or ἑξαημερον; compoſed of ἑξ, *ſex*, *ſix*, and ἡμερα, which in the Doric dialect is wrote ἁμερα, *day*.

St. Baſil, St. Ambroſe, &c. have wrote *Hexamerons*.

HEXAMETER, compoſed of ἑξ, *ſix*, and μετρον, *meaſure*, *foot*, in the *Ancient Poetry*, a verſe uſed by Greek and Latin writers, conſiſting of ſix feet.

The firſt four feet of an hexameter may be indifferently either dactyls, or ſpondees: but the laſt foot, in ſtrictneſs, is always to be a ſpondee, and the laſt but one a dactyl. Such is that of Homer

> Εις ὑδωρ μ᾽ ἐῤῥιψας, ἐχει Θεος ἐκδικον ὀμμα.

And that of Virgil.

> "Diſcite juſtitiam moniti, & non temnere divos."

Hexameter verſes are divided into *heroic*, which are to be grave and majeſtical, ſuitable to the dignity of heroic poetry; and *ſatirical*, which may be more looſe and negligent; as thoſe of the epiſtles of Horace.

Epic poems, as the Iliad, Odyſſey, Æneid, &c. conſiſt of hexameter verſes alone; elegies and epiſtles ordinarily conſiſt, alternately, of hexameters and pentameters.

Some of the French and Engliſh poets have attempted to compoſe in hexameter verſes, but without ſucceſs. Jodelle made the firſt eſſay in 1553, with a diſtich in praiſe of Oliver de Magny, which Paſquier repreſents as a maſterpiece. It is this:

> "Phœbus, Amour, Cypris, veut ſauver, nourrir & orner
> Ton vers, & ton chef, d'umbre, de flamme, de fleurs."

But this kind of poetry pleaſes nobody. The modern languages are not at all fit for a kind of verſe whoſe cadence depends altogether on long and ſhort ſyllables.

HEXAMILA, in *Geography*, a town of European Turkey, in Romania, on the coaſt of the Helleſpont, anciently called Lyſimachia; 12 miles S. of Gallipoli.

HEXAMILION, Hexamili, or Hexamilium, in *Antiquity*, a celebrated wall, built by the emperor Emanuel, in 1413, over the iſthmus of Corinth.

It took its name from ἑξ, *ſix*, and μιλιον, which in the vulgar Greek ſignifies a *mile*; as being ſix miles long.

The deſign of the hexamilion was to defend Peloponneſus from the incurſions of the Barbarians. Amurath II. having raiſed the ſiege of Conſtantinople in the year 1424, demoliſhed the hexamilion; though he had before concluded a peace with the Greek emperor.

The Venetians reſtored it in the year 1493, by 30,000 workmen, employed for 15 days, and covered by an army commanded by Bertoldo d'Eſte, general of the land-forces; and Louis Loredano, commander of the ſea.

The infidels made ſeveral attempts upon it, but were repulſed, and obliged to retire from the neighbourhood thereof; but Bertoldo being killed at the ſiege of Corinth, which was attempted ſoon after, Bertino Calcinato, who took on him the command of the army, abandoned, upon the approach of the beglerberg, both the ſiege and the defence of the wall, which had coſt them ſo dear; upon which it was finally demoliſhed.

HEXANDRIA, in *Botany*, is derived from ἑξ, *ſix*, and ανηρ, *a man*. It forms the ſixth claſs of the ſexual or artificial ſyſtem of Linnæus, and conſiſts of ſuch plants as have ſix ſeparate or diſtinct ſtamens in the ſame flower with the piſtil or piſtils, no regard being had to proportion. It includes ſix orders; *Monogynia*, containing the Liliaceous tribe of plants, called by Linnæus the nobles of the vegetable kingdom, and which indeed may be conſidered as one of its more ſplendid ornaments. The beautiful white Lily, lately made known to us as a native of the vale of Tempe (ſee Sm. Prod. Fl. Græc. p. 2. 227.), and which is ſo univerſally admired, may be adduced as an inſtance. The well-known genera of *Juncus*, or Ruſh, and *Allium*, or Onion, belong alſo to this order, and indeed the former of theſe, though ſo unoſtentatious in its appearance, is more nearly allied to the Lily than its firſt aſpect would induce an unexperienced botaniſt to ſuppoſe; *Digynia* contains the valuable *Oryza*, Rice, a graſs curious for its having ſix ſtamens; *Trigynia* includes the extenſive genus of *Rumex*, or Dock, as well as *Tofieldia*, Scottiſh Aſphodel, and *Colchicum*, or Meadow Saffron; *Tetragynia* conſiſts of *Petiveria alliacea* only; *Hexagynia* of *Wendlandia* and *Damaſonium*, which latter genus comprehends *Stratiotes aliſmoides* of Linnæus; and laſtly *Polygynia* merely depends on *Aliſma*, the Water Plantain.

Hexandria is alſo an order in ſuch of the Linnæan claſſes as are not founded on the number of ſtamens. In *Diadelphia* it includes the beautiful genus *Fumaria*, and alſo the little known *Saraca*. In *Gynandria* this order contains *Ariſtolochia*, and in each of the claſſes *Monœcia* and *Diœcia* we meet with a few genera under the order *Hexandria*.

HEXANTHUS, from ἑξ, *ſix*, and ανθος, *a flower*, becauſe there are ſix flowers in one common calyx. Lour. Cochinch. 195. This is the *Tetranthera ferruginea*, Brown. Prodr. Nov. Holl. vol. i. 403, as appears by a ſpecimen ſent by the author to ſir Joſeph Banks. See Tetranthera.

It is a *tree*, growing wild on the mountains of Cochinchina, where it is called *Cây Ngât*, and the wood uſed for building. The *leaves* are ovate, oblong, pointed, entire, alternate, large. *Flowers* greeniſh white, in ſmall axillary umbels.

HEXAPETALON, in *Natural Hiſtory*, the name of a ſpecies of foſſil plants, found in the coal meaſures of the foreſt of Dean, in Glouceſterſhire, which are figured and deſcribed in the Phil. Tranſ. Abr. by Lowthorp, vol. v. p. 121.

HEXAPLA, formed of ἑξ, *ſix*, and ἁπλοω, *I open*, or *unfold*, in *Church Hiſtory*, a bible diſpoſed in ſix columns; containing the text, and divers verſions thereof, compiled and publiſhed by Origen, with a view of ſecuring the ſacred text from future corruptions, and to correct thoſe that had been already introduced.

Euſebius, Hiſt. Eccl. lib. vi. cap. 16. relates, that Origen, after his return from Rome under Caracalla, applied himſelf to learn Hebrew, and began to collect the ſeveral verſions that had been made of the ſacred writings, and of theſe to compoſe his Tetrapla and Hexapla: others, however, will not allow him to have begun till the time of Alexander, after he had retired into Paleſtine, about the year 231.

To conceive what this Hexapla was, it muſt be obſerved that, beſides the tranſlation of the ſacred writings, called the Septuagint, made under Ptolemy Philadelphus, above 280 years before Chriſt, the ſcripture had been ſince tranſlated into Greek by other interpreters. The firſt of thoſe verſions, or (reckoning the Septuagint) the ſecond was that of Aquila, a proſelyte Jew, the firſt edition of which he publiſhed in the twelfth year of the emperor Adrian, or about the year of Chriſt 128; the third was that of Symmachus, publiſhed, as is commonly ſuppoſed, under Marcus Aurelius, but, as ſome ſay, under Septimius Severus, about the year 200; the fourth was that of Theodotion, prior to that of Symmachus, under Commodus, or about the year 175: theſe Greek verſions, ſays Dr. Kennicott, were made by the Jews from their corrupted copies of the Hebrew, and were deſigned to ſtand in the place of the Seventy, againſt which they were prejudiced, becauſe it ſeemed to favour the Chriſtians. The fifth was found at Jericho, in the reign of Caracalla, about the year 217; and the ſixth was diſcovered at Nicopolis, in the reign of Alexander Severus, about the year 228: laſtly, Origen himſelf recovered part of a ſeventh, containing only the Pſalms.

Now Origen, who had held frequent diſputations with the Jews in Egypt and Paleſtine, obſerving that they always objected againſt thoſe paſſages of ſcripture quoted againſt them, and appealed to the Hebrew text; the better to vindicate thoſe paſſages, and confound the Jews, by ſhewing that the Seventy had given the ſenſe of the Hebrew, or rather, to ſhew, by a number of different verſions, what the real ſenſe of the Hebrew was, undertook to reduce all theſe ſeveral verſions into a body, along with the Hebrew text, ſo as they might be eaſily confronted, and afford a mutual light to each other.

He made the Hebrew text his ſtandard; and allowing that corruptions might have happened, and that the old Hebrew copies might and did read differently, he contented himſelf with marking ſuch words or ſentences as were not in his Hebrew text, nor the later Greek verſions, and to add ſuch words or ſentences as were omitted in the Seventy, prefixing an aſteriſk to the additions, and an obeliſk to the others.

In order to this he made choice of eight columns: in the firſt he gave the Hebrew text in Hebrew characters; in the ſecond, the ſame text in Greek characters; the reſt were filled with the ſeveral verſions above mentioned; all the columns anſwering verſe for verſe, and phraſe for phraſe; and in the pſalms there was a ninth column for the ſeventh verſion.

This work Origen called 'Εξαπλα, *Hexapla, q. d. ſextuple*, or a work of ſix columns, as only regarding the firſt ſix Greek verſions. See TETRAPLA.

Indeed, St. Epiphanius, taking in likewiſe the two columns of the text, calls the work Octapla, as conſiſting of eight volumes.

This celebrated work, which Montfaucon imagines conſiſted of fifty large volumes, periſhed long ago, probably with the library at Cæſarea, where it was preſerved, in the year 653; though ſeveral of the ancient writers have preſerved us pieces thereof, particularly St. Chryſoſtom on the Pſalms, Philoponus in his Hexameron, &c. Some modern writers have earneſtly endeavoured to collect fragments of the Hexapla, particularly Flaminius Nobilius, Druſius, and F. Montfaucon, in two folio volumes, printed at Paris in 1713. In his edition, Montfaucon has prefixed Prolegomena, explaining the form and detailing the hiſtory of the Hexapla.

HEXAPOD, of ἕξ, and ποδες, in *Zoology*, an animal with ſix feet.

HEXAPYRAMIDES, in *Natural Hiſtory*, the name of a genus of ſpars.

The word is derived from the Greek ἕξ, *ſix*, and πυραμις, *a pyramid*.

The bodies of this genus are ſpars formed into pyramids, compoſed of ſix ſides or planes, and affixed to no column, but adhering to ſome ſolid body by their baſes. Of this genus, there are only two known ſpecies: 1. A ſhort one with a broad baſe, which is very rare, and found only in the great mine at Goſſelar in Saxony. And, 2. A long-pointed one, with a narrow baſe; this is found in the fiſſures of the alabaſter quarries of the Hartz-foreſt. Hill's Hiſt. of Foſſ. p. 225.

HEXARMONIAN, in the *Ancient Muſic*, a nome, or ſong, in an effeminate and languid ſtyle, of which Ariſtophanes accuſed its author.

HEXASTYLE, compoſed of ἕξ, *ſix*, and ϛυλος, *column*, in the *Ancient Architecture*, a building with ſix columns in front.

The temple of Honour and Virtue at Rome, built by Mutius, was a hexaſtyle.

HEXHAM, in *Geography*, a market-town and pariſh in the ward of Tynedale, and county of Northumberland, in England, is ſeated at the confluence of the rivers North and South Tyne. In the year 1800, the town and its ſuburbs conſiſted of 732 houſes, and contained 4565 inhabitants. This pariſh conſiſts of five townſhips, and was ranked as a county-palatine till the 33d year of Henry VIII. It is 23 miles W. by N. from Newcaſtle, and has a petty ſeſſions. Anciently it was a manor belonging to the ſee of York, whoſe prelates were inveſted with great regalities and powers within the juriſdiction of this manor. The liberties were affirmed to them by the king's council in parliament, in the 21ſt year of Edward I, and again by a clauſe in the 13th of Edward III. Horſley, in his Britannia Romana, has given views of ſome inſcribed ſtones, which are referred to the Anglo-Romans. One of the inſcriptions records the name of the emperor Lucius Septimius Severus. Horſley conjectures that this place was the Roman ſtation mentioned by Ptolemy under the name of Epiacum. Reſpecting its hiſtory during the Saxon dynaſty, we have more certain evidence: for this, with parts of the adjacent country, were parcels of the crown lands of the kings of Northumbria, and were ſettled by king Egfrid on his queen Etheldreda. The ſame monarch alſo founded a biſhopric here in 674: and Wilfrid, its firſt biſhop, is ſaid by ancient writers to have built a magnificent cathedral church. This ſtructure is deſcribed by Eddius, in his life of Wilfrid, to have had columns, ornamental carvings, oratories, crypts, &c. It is alſo related that the biſhop procured artiſts from various parts of Europe, to build and decorate it. This building, however, was deſtroyed by the Danes about the year 821. Another ſtately church, however, was erected in the time of Henry I, part of which ſtill remains, and diſplays ſome intereſting examples of ancient architecture. It alſo contains ſome curious tombs; among which is one attributed to Alfwald I., king of Northumberland, who was aſſaſſinated in 788. In the choir is a beautiful oratory. This church had the privilege of ſanctuary, which was alſo extended a mile from it to the eaſt, weſt, north, and ſouth. At each extremity was a ſtone croſs. Pennant deſcribes part of the ancient monaſtery and church as remaining when he viſited Hexham in his journey to Scotland. He alſo mentions a fridſtol, or ſtool-of-peace, as preſerved here. The town-houſe is deſcribed by the ſame author as built over an ancient gate, beyond which is an old ſquare tower of three ſtories. The ſtreets of Hexham are narrow and inconvenient. In the vicinity of this town was fought a memorable battle between the Lancaſtrians and Yorkiſts in 1463, when the former were defeated. The monarch fled for life and ſafety, and his queen, with the infant prince, ſought refuge in a neighbouring foreſt. Here ſhe was aſſailed and plundered by a banditti; but afterwards made her eſcape. Pennant's Tour in Scotland, 4to. vol. iii. Hutchinſon's Hiſtory, &c. of Northumberland, 2 vols. 4to.

HEXIS, in the *Writings of the Greek Phyſicians*, a word uſed to expreſs a firm and permanent habitude, in oppoſition to ſcheſis and diatheſis, importing a tranſient or eaſily removed diſpoſition.

HEXODON, in *Entomology*, a genus of *Coleoptera*, eſtabliſhed by Olivier. See SCARABÆUS.

HEYBACH, or HEUBACH, in *Geography*, a town of Germany, in the county of Wertheim, on the Mayn; 5 miles W. of Freudenberg.

HEYDE, a town of Holſtein, about 8 miles from the coaſt; 50 miles S.S.W. of Sleſwick.

HEYDECK, a town of Bavaria, in the principality of Neuburg; 22 miles N. of Neuburg.

HEYDEN, SEBALDUS, in *Biography*, author of a ſmall elementary muſical tract in Latin, publiſhed at Nuremberg in 1537; which extends not to compoſition, pretending nothing more than to teach the mere characters and their value, as a rudiment for reading muſic.

HEYDEN, JOHN VANDER, an extraordinary painter of views of churches, palaces, &c., who was born at Goreum in 1637. He firſt practiſed the art under the directions of a painter on glaſs of no great diſtinction, but he was led by his own taſte to the amazing excellence he obtained in his line of practice; in which he imitated the objects he choſe with the greateſt truth and preciſion. His pictures are finiſhed with inexpreſſible neatneſs, and muſt have required the moſt wonderful degree of patience, as he repreſented buildings ſo minutely exact, that the bricks or ſtones employed in their conſtruction may be counted. Yet notwithſtanding this, he preſerved great breadth of maſs in his lights and ſhadows, and perfect union and harmony in his colouring. Sir Joſhua Reynolds ſays of him, and juſtly, that ſuch is the truth of imitation in his works, that they have very much the effect of nature ſeen in a camera-ſcuro.

Many of the Flemiſh painters have equalled Vander Heyden in neatneſs of finiſh, but very few of them have poſſeſſed the art of uniting mellowneſs with it. Nothing in his paintings appears laboured or ſervile; nothing hard, ſtiff, or dry; but the more minutely and critically we examine them, the more we are aſtoniſhed to obſerve the taſte and conduct viſible through the whole.

He painted for a while in London. In many of his pictures of Amſterdam, Delft, &c. the figures, which are ſometimes numerous, were introduced by A. Van de Velde, which judicious conduct of uniting ſuch able talents to his own, in matters of which he was not well informed himſelf, adds a great additional value to his pictures; which never fail of purchaſers at conſiderable prices. He died in 1712, at the age of 75.

HEYDT, JOHN WOLFGANG, an architect of ſome celebrity, is mentioned in this dictionary on account of a work giving "A true Repreſentation of the principal Countries, Coaſts, and Iſlands belonging to the Dutch Eaſt India Company, in accurate Maps and Charts, with the Towns, Harbours, Forts, Factories, Caſtles, Wharfs, Store-houſes, Churches, and other public Buildings." To this he gave an appendix, or hiſtorical deſcription of his own voyage from Holland to the Eaſt Indies, and thence back to his native country, with a complete index, and 115 drawings, executed on the ſpot chiefly by himſelf. This beautiful work was printed at the author's own expence, and ſcarcely obtained what may be called a publication; it is of courſe very little known, but highly prized by thoſe who have had acceſs to it. Gen. Biog.

HEYLANUS, PETRUS, a Netherlander, and a muſical compoſer of ſongs to French words. In the third book of the Louvain collection of ſongs in the Britiſh Muſeum, in four parts, there is one by Heylanus, of ſuch ſingular merit, that this author muſt have compoſed but little, or been very unjuſtly treated by poſterity; as we find his name no where elſe. The points of imitation in this ſong, though airy and familiar, are brought in almoſt as cloſely and conſtantly as if in perpetual canon; indeed, it would not be eaſy to find a compoſition in which more art is diſcovered, with ſuch ſeeming facility. Had we room in our plates for ſpecimens of compoſition, we ſhould gladly inſert this ſong, as a curioſity, for melody and cloſe imitation during the 16th century.

HEYLYN, PETER, a learned divine, born at Burford, in Oxfordſhire, in the year 1600. He was inſtructed in grammar-learning in the free-ſchool of that place, and when he was only thirteen years of age he entered Hart hall, now Hertford college, in the univerſity of Oxford: he afterwards obtained a fellowſhip at Magdalen college, where he read coſmographical lectures, and in 1621 he publiſhed a "Deſcription of the World," which he afterwards enlarged, under the title of "Coſmography in Four Books, containing the Geography and Hiſtory of the whole World, and all the principal Kingdoms, Provinces, Seas, and Iſles thereof." In 1623, Mr. Heylyn was admitted to holy orders, and in 1625 he made a ſhort tour on the continent, of which he publiſhed an account thirty years afterwards. In 1628 he was appointed chaplain in ordinary to the king, and in 1631 he obtained a prebend of Weſtminſter, which was followed by the living of Houghton, in the dioceſe of Durham. In 1633 he took the degree of doctor of divinity, and ſhortly after obtained more preferment, chiefly by the influence of archbiſhop Laud, of which he was afterwards deprived by the parliament, and being voted a delinquent, his goods were confiſcated, and his perſon endangered. He would now have been reduced to great diſtreſs, if the king had not employed him to write a periodical paper, which was publiſhed weekly at Oxford, under the title of "Mercurius Aulicus," by which, for ſome time, he gained a ſcanty ſubſiſtence. In 1645, when the affairs of Charles became deſperate, Dr. Heylyn, who was his ſteady adherent, quitted Oxford, and wandered about from place to place, ſuffering in himſelf and his family, from the extreme preſſure of his circumſtances. At the reſtoration, he was put in poſſeſſion of his former preferment, and obtained alſo the ſub-deanery of Weſtminſter: this he conſidered as a very inadequate recompence for the ſupport which he had given to the cauſe of the late king, and for the ſufferings which he had undergone in defence of his principles. He died in 1662, a diſappointed man. He was author of numerous works; was a man of conſiderable learning and induſtry, but a partial and bigotted writer; a zealous defender of civil and eccleſiaſtical tyranny, and exceedingly acrimonious againſt thoſe who differed from him. Biog. Brit.

HEYRIEU, in *Geography*, a town of France, in the department of the Iſère, and chief place of a canton, in the diſtrict of Vienne; 1 miles N.E. of Vienne. The place contains 1338, and the canton 9453 inhabitants, on a territory of 195 kiliometres, in 11 communes.

HEYRS, in *Huſbandry*, young timber-trees, uſually left for ſtandards in felling of wood or copſes.

HEY-SAN, or BLACK ISLANDS, in *Geography*, a cluſter of iſlands near the coaſt of China, little better than naked rocks. N. lat. 28 53. E. long. 124.

HEYST-OP-DEN-BERG, a town of France, in the department of the Two Nethes, and chief place of a canton, in the diſtrict of Malines. The place contains 2831, and the canton 8579 inhabitants, on a territory of 90 kiliometres, in 8 communes.

HEYTESBURY. See Heitsbury.

HEYWOOD, John, in *Biography*, an Engliſh poet, was born in London, and educated at Oxford. He is mentioned as one who firſt wrote plays in our language, and is ſaid to have been exceedingly ſkilled in muſic. He was a great favourite with Henry VIII. and queen Mary, but on the acceſſion of queen Elizabeth he went to Mechlin, where he died in 1565. His principal performance is entitled the "Spider and Fly, a Parable," publiſhed in 4to. His ſon, Ellis Heywood, became a Jeſuit, wrote a book in the Italian language entitled "Il Moro," and died at Louvain in 1572.

HEZAREE, in *Geography*, a river of India, the ſame with that of Cabul, or the Kameh.

HHAHB, in *Modern Hiſtory*, is a name which the Mahometans give to one of the officers of their moſques, anſwering to our curates.

HIA-LOUI, in *Geography*, a city of China, of the ſecond rank, in Quang-ſi. N. lat. 22° 54'. E. long. 106° 19'.

HIAM-HO, a town of China, of the third rank, in Pe-tche-li; 26 miles E. S. E. of Peking.

HIANG-NING, a town of China, of the third rank, in Chan-ſi; 37 miles W. of Pin-yang.

HIANG-OU, a city of China, of the ſecond rank, in Quang-ſi. N. lat. 23° 10'. E. long. 106° 26'.

HIAO-FONG, a town of China, of the third rank, in Tche-kiang; 10 miles S. S. W. of Ngan-ki.

HIAO-Y, a town of China, of the third rank, in Chan-ſi; 10 miles E. of Fuen-tcheou.

HIAO-KANG, a town of China, of the third rank, in Hou-quang; 25 miles S. S. W. of Te-nghan.

HIA-PETIE, a town of Chineſe-Tartary. N. lat. 40° 48'. E. long. 117° 38'.

HIA-QUI, a province of New Mexico, between Mayo (now Oſtimuri) and Sonora, which is conſidered by ſome as a diſtrict of New Navarre: it derives its name from that of the river which waters it. Its chief town is Riochico.—Alſo, a river of New Mexico, which is a large and fertile ſtream, dividing Sonora from Cinaloa, and inundating the neighbouring provinces of Sonora and Oſtimuri. Riſing in the extenſive province of Tauramara, it leaves or pervades the grand chain of mountains, running about half its courſe towards the N. W. After which it purſues the remainder towards the S. W., entering the gulf of California at the village of Huiribis, where is a ſecure harbour, the neareſt to California, and whence proviſions are generally conveyed to that peninſula. The banks produce abundant harveſts of maize, French beans, a kind of peas, and lentiles.

HIARNOE, a ſmall iſland of Denmark, near the E. coaſt of Jutland, at the mouth of the gulf of Horſens. N. lat. 55° 50'. E. long. 10° 5'.

HIASTAOTOMTEHOM, a Chineſe name, expreſſing a plant, the root of which is ſaid to change, at a certain time, into a worm. M. Reaumur has given it the name of *plante ver* in the French, but he has diſcovered the error of ſuppoſing ſuch a transformation: the whole truth of the caſe being, that a certain caterpillar, when about to change into the chryſalis ſtate, ſo nicely joins itſelf to the root of this plant, as to appear a part of it.

HIAT, in *Geography*, a country of Africa, ſituated on the S. of Fezzan.

HIATCHE, a city of China, of the ſecond rank, in Quang-ſi. N. lat. 22° 10'. E. long. 106 20.

HIA-TEIN, a town China, of the third rank, in Chang-tong; 11 miles W. N. W. of Cao-tang.

HIATICULA, in *Ornithology*, the ſea-lark. See Charadrius *Hiaticula*.

HIA-TIEN, in *Geography*, a town of China in Pe-tche-li, ſaid to contain 80,000 inhabitants; 25 miles E. of Peking.

HIATSTOWN, a town of America, in Middleſex county, New Jerſey; 17 miles S. W. from Brunſwick.

HIATULA, in *Ichthyology*. See Labrus *Hiatula*.

Hiatula is alſo a name by which Gaza, and ſome other authors, have called the ſhell-fiſh more uſually named *Chama;* a genus diſtinguiſhed from other kinds by its always keeping its ſhells in ſome degree open, and in many ſpecies having no power to ſhut them entirely; for this reaſon they defend their naked bodies by burying themſelves in the mud, or in other ſubſtances.

HIATUS, a Latin term, properly ſignifying the aperture of the mouth, from the verb *hiare, to gape.*

It is variouſly uſed, in works of literature, &c. to denote a *chaſm* or *gap;* particularly in verſes, where there is a claſhing of vowels, by one word ending with a vowel, and the following one beginning with another:

As in—"Tho' oft the ear the open vowels tire."

This claſhing of vowels, ſo diſagreeable to the ear, is called a hiatus in proſe as well as verſe. The Romans were ſo very careful to avoid it, that they always ſuppreſſed the preceding vowel even in proſe; as it is obſerved by Cicero in his Orator. In writing, to avoid it, they uſed to inſert the letter *d:* as in *redeo, redamo, mederga,* &c. Hence, on the baſe of the Duilian column, we meet with *prædad. alod. marid.* &c. Voſſ.

Hiatus is alſo uſed for a defect in a manuſcript copy, where ſomething is loſt or effaced by the injuries of time or otherwiſe.

In a theatrical piece, there is ſaid to be a hiatus, when a ſcene is not well connected to the next, but leaves the action interrupted, and the ſtage empty.

In matters of genealogy, hiatus is an interruption in a line or ſeries of deſcendants.

Hiatus, in *Geology*, is a term uſed by Dr. Woodward, "Nat. Hiſt. of the Earth," p. 117. 135. 137, &c. to denote the vaſt fiſſures and chaſms, which, according to his theory, were opened by the earthquakes which preceded the Noachian deluge, and through which the waters of his ſubterranean abyſs were forced up, by the preſſure of elaſtic fluids generated by central fires. Mr. Whitehurſt, in his "Enquiry concerning the Earth," 2d edit. p. 189. ſuppoſes ſimilar fiſſures, which he calls gulfs, to have occupied the bottom of each valley, and into which the matter excavated to widen the vale above was tumbled, and filled up theſe gulfs, ſome of which he ſuppoſes may have been "many hundreds of miles deep." M. De Luc, § 284, of his "Treatiſe on Geology," has recourſe to ſimilar openings or intervals between the maſſes of ſtrata, which, according to his theory, by their ſubſidence and angular motion formed the vallies. The recent and minute examination of Derbyſhire and its environs, by Mr. Farey, (ſee his Report on Derbyſhire,) ſhews, beyond the poſſibility of doubt, that the bottoms of the many vallies in that diſtrict are whole and unbroken, and that the hiati of Whitehurſt or De Luc are alike wanting in the vallies of that diſtrict; and that the valley at Matlock Tor, in particular, which Mr. W. had explained by the ſubſidence and angular motions of the ſtrata, exactly on M. De Luc's principles, was not ſo occaſioned, is ſhewn by a new and accurate ſection acroſs it, in the Philoſophical Magazine, vol. 31. p. 56.

HIBBERTIA, in *Botany*, named in honour of George Hibbert, eſq., M. P. F. L. S., a gentleman eminently diſtinguiſhed for his love of plants and the liberality of his communications, who purchaſed the entire herbarium of the late profeſſor Murray of Göttingen, and for ſome time maintained an able collector at the Cape of Good Hope, for the purpoſe of enriching his garden with living plants; as well as his herbarium, and thoſe of his friends, with dried ſpecimens. Andr. Repoſ. t. 126. Saliſ. Parad. 73. (Candollea; Billard. Nov. Holl. v. 2. 33.)—Claſs and order, *Polyandria Pentagynia*. Nat. Ord. *Multiſiliquæ*, Linn. *Ranunculaceæ*, Juſſ. *Dilleneæ*, Saliſ.

Gen. Ch. *Cal.* Perianth inferior, of five equal, coriaceous, ovate, permanent leaves. *Cor.* Petals five, roundiſh, obtuſe, with broadiſh claws, deciduous. *Stam.* Filaments numerous, ſometimes partially combined, much ſhorter than the corolla; anthers vertical, erect, oblong, of two parallel cells, burſting at the edges. *Piſt.* Germens ſuperior, five or ten, ſometimes more, ſeſſile, ovate; ſtyles one to each germen, terminal, cylindrical, ſpreading; ſtigma obtuſe. *Peric.* Capſules five to ten, occaſionally more or fewer, diſtinct, ovate, ſomewhat triangular, of one cell. *Seeds* ſeveral, roundiſh, each in a fleſhy tunic, burſting at the top.

Eſſ. Ch. Calyx inferior, of five coriaceous permanent leaves. Petals five, deciduous. Nectaries none. Capſules ſeveral, ovate, of one cell. Seeds ſeveral, tunicated.

1. H. *volubilis*. Andr. Repoſ. t. 126. (Dillenia volubilis; Venten. Choix de Plantes, t. 11. D. ſcandens; Willd. Sp. Pl. v. 2. 1251. D. ſpecioſa; Curt. Mag. t. 449.)—Stem twining. Leaves obovate, acute, nearly entire.—Native of the country about Port Jackſon, New South Wales, from whence ſeeds were brought ſoon after the eſtabliſhment of the colony there, and plants raiſed, according to Meſſrs. Lee and Kennedy, in ſeveral gardens about London in 1792. Mr. Andrews publiſhed it in 1800; ſo that the name he has given takes precedence of the otherwiſe highly eligible *Candollea* of La Billardiere, not publiſhed till 1806. This is a hardy green-houſe plant, of rapid growth, bloſſoming from May to September, and readily encreaſed by cuttings, delighting in a light ſandy peat ſoil. The *ſtem* is ſhrubby, twining, three or four feet high, branched, moſtly downy. *Leaves* ſcattered, on ſhort ſtalks, recurved, two or three inches long, ſimple, obovate, acute, convex; ſmooth and dark green above, pale and ſilky beneath; their edges either entire or ſlightly toothed. *Stipulas* none. *Flowers* terminating the ſhorter branches, ſolitary, nearly ſeſſile, two inches wide, bright yellow, with an extremely diſagreeable ſmell like that of the nauſeous *Actæa racemoſa*. *Calyx* fringed. *Germens* and *ſtyles* five.

2. H. *cuneiformis*. (Candollea cuneiformis; Billard. Nov. Holl. v. 2. 34. t. 176.)—Stem erect, ſhrubby. Leaves wedge-ſhaped, ſmooth, nearly entire. Petals ſhorter than the calyx.—Native of Van Lewin's Land, on the ſouth coaſt of New Holland. *Stem* ſhrubby, eight or nine feet high, erect, much branched. *Leaves* about an inch and half long, wedge-ſhaped, ſometimes obſcurely lobed or wavy at the end. *Flowers* not half ſo large as the former, their petals much ſhorter than the calyx. *Filaments* united into five parcels, oppoſite to the petals. *Germens* and *ſtyles* five. *Seeds* two in each capſule.

3. H. *crenata*. Andr. Repoſ. t. 472. (Burtonia groſſularifolia; Saliſ. Parad. t. 73, the page ſubſequently changed for one with the name of *Hibbertia groſſularifolia*, but we much prefer the original appellation, *crenata*, Curt. Mag. t. 1218.)—Stem decumbent. Leaves roundiſh, notched. Flower-ſtalks elongated.—Native of the weſt coaſt of New Holland, near King George's Sound. *Stem* trailing, much branched, hairy, a foot or two in length, ſcarcely ſhrubby. *Leaves* recurved, roundiſh-obovate, ſtalked, ſtrongly crenate, ſomewhat plaited, paler beneath, about an inch long. *Flower-ſtalks* twice or thrice that length, hairy, reddiſh. *Flowers* the ſize, colour, and appearance of thoſe of *Potentilla fruticoſa*, with a ſlight protuberance under the calyx, on which Mr. Saliſbury founded his genus *Burtonia*, but he has ſince juſtly corrected that opinion.

4. H. *anguſtifolia*. Saliſ. n. 4. (Dillenia procumbens; Billard. Nov. Holl. v. 2. 16. t. 156.)—Stem decumbent. Leaves linear-lanceolate, entire.—Gathered by La Billardiere in Van Diemen's Land. The numerous *ſtems* are rather ſhrubby, ſpreading on the ground to the extent of a foot, and are branched, bearing numerous ſmooth, ſeſſile, thickiſh, narrow, lanceolate, acute *leaves*, not an inch long. *Flowers* ſolitary, terminal, ſeſſile, ſmaller than the laſt, their petals round, equal to the calyx. *Stamens* all ſeparate. *Styles* five.

The moſt remarkable circumſtance in the botanical hiſtory of this genus, is Mr. Curtis's miſtaking the firſt ſpecies for *Dillenia indica* of Linnæus, D. *ſpecioſa* of Thunberg, and of Sm. Exot. Bot. t. 2, 3, though he actually quotes the *Syalita* of Hort. Malab. v. 3. t. 38, 39, which is ſtrikingly different. This is ſo unlike his uſual correctneſs, that we preſume he did not turn to the book.

HIBE, in *Geography*, a town of Hungary; 16 miles N. E. of Roſenburg.

END OF VOL. XVII.

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